Making the Case for Transit: the Transit Competitiveness Index

William E. Walter, GISP
Understanding Conditions in Each Travel Market
Few of These Are Under the Control of Transit Agencies

**Origin Conditions**
- Trip volume
- Land use density
- Household characteristics
- Pedestrian environments
- Wait times
- Real time arrival information
- Walk distances
- Park-n-ride supply & placement

**O-D Conditions**
- Congestion
- Distance
- Time of day
- Trip purposes
- Transit priority
- Reliability
- Transfers
- Fares/cost

**Destination Conditions**
- Trip volume
- Land use density and mix
- Walk distance from parking
- Parking cost
- Parking search time
- Pedestrian environments
- Errands access (car sharing, bicycle, shuttles)
Underlying Analytics of TCI
Combining Market Conditions That Drive Transit Ridership

Transit Mode Share

Origin Land Use Density

Destination Land Use Density

TCI

Transit Mode Share

100
Understanding the Potential of Each Travel Market

Competitiveness Unrelated to Current Transit Service

- **Residential Suburb**
  - Plentiful free parking
  - Low density, little diversity
  - Poor pedestrian environment

- **Business Park**
  - Plentiful free parking
  - Low density, little diversity
  - Poor pedestrian environment

- **Commercial Strip Mall**
  - Increase density
  - Charge for parking

- **Mixed Use District**
  - High parking cost
  - High density
  - Good pedestrian environment
## Applications of TCI

1. **Santa Clara VTA**
   - COA to lower cost & improve ridership
   - LRT Restructuring Study

2. **SamTrans**
   - Short & Long-Term Strategic Plan

3. **BART**
   - Identify Metro Core
   - Expansions corridors & in-fill stations

4. **San Francisco MTA**
   - Transit Effectiveness Project

5. **Bay Area MTC TSP**
   - Intra-regional corridor analyses
   - Available to 28 Bay Area transit agencies

7. **Alameda County Transportation Commission**
   - Countywide plan
   - AC Transit Major Corridors

8. **San Joaquin COG**
   - Inter-city bus feasibility

9. **LA Metro**
   - Foothill Transit BRT study

10. **Utah Transit Authority (UTA)**
    - Restructure bus routes
    - Evaluate LRT extensions

11. **Puget Sound Regional Council**
    - Design Transportation 2040 transit alternatives
    - General planning for Sound Transit and Pierce Transit

12. **Capital Metro, Austin**
    - Support Comprehensive Operations Analysis

13. **PACE, suburban Chicago**
    - Restructure bus routes
    - Strategic planning

15. **Nashville MPO**
    - Restructuring of bus system
    - Strategic Planning

16. **DART**
    - Restructuring of bus system
    - Strategic Planning
## DART & Nashville TCI Specifications

<table>
<thead>
<tr>
<th></th>
<th>DART</th>
<th>Nashville</th>
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<tbody>
<tr>
<td><strong>Years</strong></td>
<td>2018</td>
<td>2015 &amp; 2040</td>
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<tr>
<td><strong>Coverage</strong></td>
<td>13 counties</td>
<td>7 counties</td>
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<tr>
<td><strong>Granularity</strong></td>
<td>5,386 traffic zones</td>
<td>2,817 traffic zones</td>
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<tr>
<td></td>
<td>&gt; 29 million O-D pairs</td>
<td>Nearly 4 million O-D pairs</td>
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<tr>
<td><strong>Fixed Market</strong></td>
<td>Trip purposes:</td>
<td>Trip purposes:</td>
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<td><strong>Conditions</strong></td>
<td>- Home-based work (peak)</td>
<td>- Home-based Work (HBW)</td>
</tr>
<tr>
<td></td>
<td>- Home-based non-work (off-peak)</td>
<td>- All</td>
</tr>
<tr>
<td></td>
<td>- Non-home based (off-peak)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- All</td>
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<tr>
<td><strong>Household</strong></td>
<td>Household characteristics</td>
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<td><strong>characteristics</strong></td>
<td>- Vehicle availability</td>
<td>- Vehicle availability</td>
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<tr>
<td></td>
<td>- Income</td>
<td>- Income</td>
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<td><strong>Policy</strong></td>
<td>Costs</td>
<td>Costs</td>
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<tr>
<td><strong>Variables</strong></td>
<td>- Parking cost (at destination)</td>
<td>- Parking cost (at destination)</td>
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<tr>
<td></td>
<td>- Parking time (at destination)</td>
<td>- Auto operating costs ($/mile)</td>
</tr>
<tr>
<td></td>
<td>- Auto operating costs ($/mile)</td>
<td>- Tolls</td>
</tr>
<tr>
<td></td>
<td>- Tolls</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Land use</td>
<td>- Production density</td>
</tr>
<tr>
<td></td>
<td>- Production density</td>
<td>- Attraction density</td>
</tr>
<tr>
<td></td>
<td>- Attraction density</td>
<td></td>
</tr>
<tr>
<td><strong>Central</strong></td>
<td>Central Business District</td>
<td>Central Business District</td>
</tr>
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</table>
Transit Competitiveness Index (TCI)
Each Factor Weighted by Ability to Generate Transit Tours

- Tour volume
- Land use density
- Parking cost
- Congestion

Customer Types
- Household Characteristics
  - Income
  - Household size
  - Auto ownership

Trip Purposes
- Work
- Other
Interpreting the Transit Competitiveness Index

- Shows how competitive transit is relative to auto
- Based on all modes of travel not current transit network or service

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Competitiveness</th>
</tr>
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<tbody>
<tr>
<td>&gt; 125</td>
<td>Strongly Competitive</td>
</tr>
<tr>
<td>100 - 125</td>
<td>Marginally Competitive</td>
</tr>
<tr>
<td>75 - 100</td>
<td>Marginally Uncompetitive</td>
</tr>
<tr>
<td>1 - 75</td>
<td>Uncompetitive</td>
</tr>
<tr>
<td>0</td>
<td>Little or no travel</td>
</tr>
</tbody>
</table>
Triage of 9 Million Daily Tours
Bay Area Travel Grouped into Five Tiers

- Strongly Competitive: 33% (37% Work Tours) - 33% (All Tours)
- Marginally Competitive: 3% (3% Work Tours) - 3% (All Tours)
- Marginally Uncompetitive: 3% (4% Work Tours) - >125% (All Tours)
- Uncompetitive: 100% (100% Work Tours) - 52% (56% All Tours)
- Little or No Travel: 0% (0% Work Tours) - 0% (0% All Tours)

Work Tours vs All Tours: Graph showing the distribution of tours across different tiers.
Distribution of Low Income Households Grouped into Five Tiers Based on Work Origin TCI

- Strongly Competitive: 26% Low Income (Lifeline households), 43% Above Low Income
- Marginally Competitive: 3% Low Income (Lifeline households), 4% Above Low Income
- Marginally Uncompetitive: 5% Low Income (Lifeline households), 6% Above Low Income
- Uncompetitive: 64% Low Income (Lifeline households), 45% Above Low Income
- Little or No Travel: 2% Low Income (Lifeline households), 2% Above Low Income

Categories: Above Low Income, Low Income (Lifeline households)
Origin (Production)TCI for Trips To Alameda County as a Destination in 2010

- Trip volume: 3.7 Million
- TCI: 373
- Mode share: 8.8%

Contribution from...
- Attraction density: 23
- Production density: 27
- Auto availability: 0
- Household income: 2
- Land use diversity: 1
- Congestion: 0
- Parking costs: 0
- Parking search time: 0
- Toll costs: 0
- Persons per household: 0
- Workers per household: 0
Origin (Production) TCI for Trips To Alameda County as a Destination in 2040

All trips performance
- Trip volume: 4.7 Million
- TCI: 593
- Mode share: 12.6%

Contribution from...
- Attraction density: 31
- Production density: 33
- Auto availability: -28
- Household income: -4
- Land use diversity: 6
- Congestion: 0
- Parking costs: 0
- Parking search time: 4
- Toll costs: 0
- Persons per household: 0
- Workers per household: 0
Dallas/Ft. Worth Region (NCTCOG)
All Trips from Origin Markets in 2018
Dallas/Ft. Worth Region (NCTCOG) All Trips to Destination Markets in 2018

The map shows the distribution of trips to destination markets in the Dallas/Fort Worth Region (NCTCOG) in 2018. The colors indicate the number of trips:

- Dark red: > 2,001 trips
- Orange: 501 - 2,000 trips
- Yellow: 201 - 500 trips
- Light yellow: 101 - 200 trips
- Light green: 51 - 100 trips
- Dark green: 1 - 50 trips
- White: 0 trips
DART Service Area
All Trips from Origin Markets
DART Service Area
All Trips to Destination Markets
## DART 2018 Existing Transit Service
### Orange Line (Irving) to CBD Travel Markets

### All trips performance
- **Trip volume**: 21,722
- **TCI**: 1,042
- **Mode share**: 7.8%

### Work trips performance
- **Trip volume**: 4,778
- **TCI**: 5,375
- **Mode share**: 22.3%

### Contribution from…
- **Attraction density**: 4,931
- **Production density**: 2,024
- **Congestion**: 362
- **Parking costs**: 805
- **Parking time**: 813
- **Toll costs**: 122
### 2018 TCI Validation of Existing Transit Service
Orange Line (Irving) to CBD Travel Markets – All Trips

#### Average (Irving Spur) FY 13 Weekday Ridership: 452 – TCI: 137

#### Average (Bachman to CBD) FY 13 Weekday Ridership: 1,352 – TCI: 2,390

<table>
<thead>
<tr>
<th>Station</th>
<th>TCI</th>
<th>Riders</th>
</tr>
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<tbody>
<tr>
<td>Belt Line</td>
<td>26</td>
<td>658</td>
</tr>
<tr>
<td>North Lake College</td>
<td>221</td>
<td>492</td>
</tr>
<tr>
<td>Irving Conf. Center</td>
<td>116</td>
<td>314</td>
</tr>
<tr>
<td>Las Colinas UC</td>
<td>205</td>
<td>588</td>
</tr>
<tr>
<td>University of Dallas</td>
<td>120</td>
<td>209</td>
</tr>
<tr>
<td>Bachman</td>
<td>1,916</td>
<td>1,912</td>
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<tr>
<td>Burbank</td>
<td>164</td>
<td>590</td>
</tr>
<tr>
<td>Inwood/Love Field</td>
<td>4,986</td>
<td>1,368</td>
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<tr>
<td>SWMD/Parkland</td>
<td>2,958</td>
<td>2,398</td>
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<tr>
<td>Market Center</td>
<td>3,034</td>
<td>465</td>
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<tr>
<td>Victory</td>
<td>1,283</td>
<td>1,381</td>
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Competitiveness versus Transit Mode Share
Orange Line to Downtown Dallas

Transit Market Share

TCI

- Uncompetitive markets
- Mostly small uncompetitive markets
- Under-served and competitive markets
- Well-served competitive markets
Policy Analysis
Belt Line Station to Downtown Dallas

Increase residential density

Increase downtown parking costs

Transit Market Share

Uncompetitive markets
Mostly small uncompetitive markets
Under-served and competitive markets
Well-served competitive markets

Belt Line

Improved Belt Line market conditions

0% 100 200 1000 2000 3000 4000 5000 TCI

0% 5% 10% 15% 20% 25%
Nashville 2015 Existing Transit Service
Gallatin Pike Travel Markets

All trips performance
- Trip volume: 53,686
- TCI: 545
- Mode share: 1.1%

Work trips performance
- Trip volume: 3,906
- TCI: 156
- Mode share: 8.4%

Contribution from...
- Attraction density: 80
- Production density: 27
- Congestion: 1
- CBD characteristics: 1
- Parking costs: 0
- Auto ownership: -2
Nashville 2040 Projection
Gallatin Pike Travel Markets

All trips performance
- Trip volume  70,468
- TCI  1,075
- Mode share  1.2%

Work trips performance
- Trip volume  4,970
- TCI  277
- Mode share  9.0%

Contribution from…
- Attraction density  138
- Production density  82
- Congestion  4
- CBD characteristics  11
- Parking costs  0
- Auto ownership  0
Competitiveness versus Transit Mode Share
Nashville Work Trips in 2015 and 2040

Well-served competitive markets
Under-served and competitive markets
Uncompetitive markets

2015
TCI: 166
Work trips: 3,906
O/D: Gallatin-CBD

2040
TCI: 277
Work trips: 4,970
O/D: Gallatin-CBD

2015
TCI: 2,059
Work trips: 4,214
O/D: AMP Corridor

2040
TCI: 2,928
Work trips: 4,664
O/D: AMP Corridor

2015
TCI: 99
Work trips: 5,738
O/D: Franklin-CBD

2040
TCI: 206
Work trips: 6,330
O/D: Franklin-CBD

0% 100 200 300 2,000 2,500 3,000
0 5 10 15 20 25

Uncompetitive markets
Mostly small uncompetitive markets
Under-served and competitive markets
Well-served competitive markets
Origin TCIs and LRT Network
Existing Stations and Proposed LRT Extensions
Destination TCIs for San Carlos Extension

Correspondence between New Station Locations & TCIs

- 269 – 42,519 Trips
- 617 – 85,610 Trips
- 48 – 19,390 trips
- 30 – 13,218 trips

0 - 25
25 - 50
51 - 100
101 - 200
>200
Transit Competitive Destinations

Universities and Colleges

<table>
<thead>
<tr>
<th>Destination</th>
<th>TCI</th>
</tr>
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<tbody>
<tr>
<td>San Jose State</td>
<td>572</td>
</tr>
<tr>
<td>De Anza</td>
<td>239</td>
</tr>
<tr>
<td>San Jose City</td>
<td>198</td>
</tr>
<tr>
<td>West Valley – Saratoga</td>
<td>115</td>
</tr>
<tr>
<td>Santa Clara University</td>
<td>93</td>
</tr>
<tr>
<td>Mission</td>
<td>80</td>
</tr>
<tr>
<td>Stanford</td>
<td>45</td>
</tr>
<tr>
<td>Foothill</td>
<td>34</td>
</tr>
<tr>
<td>Evergreen</td>
<td>22</td>
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TCI = 100
Transit Competitive Destinations

Downtowns

- San Jose: TCI = 285
- Los Gatos: TCI = 242
- Palo Alto: TCI = 160
- Los Altos: TCI = 146
- Milpitas: TCI = 115
- Sunnyvale: TCI = 107
- Mountain View: TCI = 84 (Includes surrounding residential areas)
- Campbell: TCI = 75
- Santa Clara: TCI = 31

TCI = 100
## Transit Competitive Destinations

### Medical Centers

<table>
<thead>
<tr>
<th>Location</th>
<th>TCI</th>
<th>Daily Person Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Medical</td>
<td>86</td>
<td>5,600</td>
</tr>
<tr>
<td>O’Connor</td>
<td>80</td>
<td>5,700</td>
</tr>
<tr>
<td>Valley Medical*</td>
<td>59</td>
<td>16,600</td>
</tr>
<tr>
<td>El Camino*</td>
<td>52</td>
<td>14,400</td>
</tr>
<tr>
<td>Good Samaritan*</td>
<td>52</td>
<td>8,200</td>
</tr>
<tr>
<td>Stanford</td>
<td>42</td>
<td>4,000</td>
</tr>
<tr>
<td>Santa Teresa</td>
<td>35</td>
<td>4,900</td>
</tr>
<tr>
<td>Palo Alto Veterans</td>
<td>24</td>
<td>6,800</td>
</tr>
</tbody>
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* Includes surrounding residential areas
Four Applications of TCI

- Intra-Agency Resource Allocation
  - Expand competitive markets
  - Investigate marginal markets
  - Reduce or eliminate uncompetitive markets

- Screening & Evaluations
  - Quick evaluation of alternatives
  - Avoids coding transit service
  - Screen potential expansions

- Negotiations with Jurisdictions
  - Land use density
  - Parking price & supply
  - Transit priority

- Public Outreach & Funding
  - Advocates
  - Voters
  - Neighborhoods
Questions and Answers