Integrating Urban Design, Architecture and Engineering in Station Design

CRANDALL ARAMBULA

October 29, 2008
Ideal Station
Land Use & Ridership
Ideal Station

- Neighborhood Hub
  - Grocery Store
  - In-Line Retail Shops
  - Office
  - Support Services
  - Public Gathering Area

- Light Rail
- 1/4 Mile
- 1/8 Mile
- Roads to Station
IDEAL TOD ASSUMPTIONS

The Ideal Transit Oriented Development (TOD) has the following characteristics:

- Occurs on vacant land within a 360 degree, 1/4 mile radius of the transit stop.
- Has a neighborhood hub adjacent to the transit station containing a grocery store, retail, support services and public gathering space.

Assumptions related to the Ideal TOD development potential and transit ridership are listed below:

**Gross Areas - Ideal TOD**
- Within 1/8 mile of station: 31.4 acres
- 1/8 mile to 1/4 mile of station: 94.2 acres

**Developable Area**
- Subtract 10% for environmentally sensitive areas.
- Subtract 25% for streets and public facilities.
- Within 1/8 mile of station: 20.4 acres
- 1/8 mile to 1/4 mile of station: 61.2 acres

**Households & Employment**
- 20.4 acres x 40 dwelling units per acre: 816 units
- 61.2 acres x 25 dwelling units per acre: 1,531 units
- Employment, 3 acres x 285 employees/acre: 285 employees

**Generated Trips**
- 2,347 dwelling units x 10.8 trips per day: 25,347 trips per day
- 285 employees x 24.88 trips per day: 7,090 trips per day

**Transit Trips**
- 32,437 trips x 10% on transit: 3,244 trips per TOD

3,200 Transit Trips (10% on transit)
Ideal Station

Moderate Density Residential

High Density Residential

Neighborhood Hub
Grocery Store
In-Line Retail Shops
Office
Support Services
Public Gathering Area

Light Rail
TOD Potential

- Existing Population
- Intermodal Connections
- New Development Potential
- Neighborhood Hub Potential
- Platform Environment
- Pedestrian Access

Categories: Good, Fair, Poor
TOD Potential

- Existing Population
- Intermodal Connections
- Platform Environment
- Pedestrian Access
- New Development Potential
- Neighborhood Hub Potential

Existing Population: Good, Fair, Poor
TOD Potential

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Potential: Good, Fair, Poor
TOD Potential

- Existing Population
- New Development Potential
- Neighborhood Hub Potential
- Pedestrian Access
- Platform Environment
- Intermodal Connections

Potential:
- Good
- Fair
- Poor
Ideal Station
Timing
Project Timeline

LRT Project
- Preliminary Engineering
- EIS
- Final Design
- Value Engineering
Project Timeline

LRT Project
- Preliminary Engineering
- EIS
- Final Design
- Value Engineering

TOD Station Area Planning

YEAR
1 2 3 4 5 6 7 8 9

Final Draft

Too Late
Project Timeline

LRT Project
- Preliminary Engineering
- EIS
- Final Design
- Value Engineering

TOD Station Area Planning

YEAR
1 2 3 4 5 6 7 8 9

Too Late
LRT Alignment Selection
Bellevue, WA
BelRed HCT Redevelopment Corridor, Bellevue, WA
Bel-Red Corridor Project
Preliminary Preferred Alternative Concept Plan
June 13th, 2007

BelRed HCT Redevelopment Corridor, Bellevue, WA
1) SR 520 Alignment

2) Bear Creek Alignment

3) BN Alignment

Alternative Alignments
<table>
<thead>
<tr>
<th></th>
<th>SR 520</th>
<th>Bear Creek</th>
<th>BNSF</th>
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</thead>
<tbody>
<tr>
<td><strong>1. Existing Population</strong></td>
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<tr>
<td>within 1/4 mile of Station</td>
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<td><strong>7. Park &amp; Ride Site Potential</strong></td>
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<td>Poor: Little potential without dominating or blocking pedestrian access</td>
<td>Poor: Moderate potential without dominating or blocking pedestrian access</td>
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<td><strong>8. Park &amp; Ride Use Potential</strong></td>
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<td></td>
<td>Poor: Higher travel times, lower ridership</td>
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Legend: | Good | Poor | Fair | N/A |

Downtown High-Capacity Transit & TOD Study, Redmond, WA
Alignments Options

Station Area Potential
Station Area Potential
### STATION CRITERIA

1. **Existing Population**
   - Existing Population: Within 1/4 Mile Of The Station

2. **Future Development**
   - Potential For New Development: Within 1/4 Mile Of The Station

3. **Neighborhood Hub**
   - Potential For A Neighborhood Hub: Adjacent To The Station

4. **Pedestrian Access**
   - Potential For On-grade Access: From All Directions

5. **Platform Environment**
   - Potential For An On-grade Platform: In A Quiet Safe Environment

6. **Traffic Effects**
   - Intermodal Connections And Effects: On Traffic

### SUMMARY

<table>
<thead>
<tr>
<th>Category</th>
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<td>NEED</td>
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<tr>
<td>Fair</td>
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<td>Poor</td>
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<td>Very Poor</td>
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**TOD Potential**

Interstate Ave. Alignment
Alignment Selection - Lessons Learned

Alignment alternatives must consider TOD potential along entire alignment.

CRANDALL ARAMBULA, PC
1. LRT Project
   - Preliminary Engineering
   - EIS
   - Final Design
   - Value Engineering

2. TOD Station Area Planning
Project Timeline

1 LRT Project
   - Preliminary Engineering
   - EIS
   - Final Design
   - Value Engineering

2 TOD Station Area Planning

YEAR
1 2 3 4 5 6 7 8 9

By Client
Station Location
ORENCO STATION

Live life to the MAX!

Come live in one of the nation's most honored new neighborhoods, surrounded by great restaurants, shops, parks, recreation, and employment, and just a hop on MAX to Portland and beyond. Homes for just about every lifestyle and budget:

MORELLO CONDOMINIUMS:
Hillsboro development Oregon’s top project

Take a mix of housing, parks, a traditional neighborhood “main street” retail area and a community-friendly environment. Homes are closer to the street and feature detailed Craftsman and English Cottage exteriors, many with front porches. Single-family, detached and attached homes are integrated to help create the look and feel of a traditional neigh-
Orenco Station TOD, Hillsboro, OR
Orenco Station TOD, Hillsboro, OR
1  LRT Project
   - Preliminary Engineering
   - EIS
   - Final Design
   - Value Engineering

2  TOD Station Area Planning
Option B - Land Use
Option B - Proposed Station Platform Location
Option B - Station Platform Location
Lakewood Gulch at Federal Blvd. Bridge
Option B - Station Platform Location
Lakewood Gulch at Federal Blvd. Bridge
Portland Light Rail Station Crime Rates

- Willow Creek
- Lloyd Center
- Beaverton Central
- Rose Quarter
- Gateway
- 42nd
- 82nd
- 162nd
- 122nd

Crime Rate Categories:
- Low Crime Rate 0-10/year
- Moderate Crime Rate 11-20/year
- High Crime Rate 21+/year

Portland Light Rail Station Crime Rates
Mall/ SW 5th Avenue

Robberies: 0
Assaults: 0
Menacing and harassment: 1
Thefts and purse snatchings: 0
Graffiti/mischief/theft of Tri-Met property: 0
Other offenses: 0
Total: 1
Mall/ SW 5th Avenue Station
N.E. 82nd Avenue
Robberies: 19
Assaults: 26
Menacing and harassment: 4
Thefts and purse snatchings: 5
Graffiti/mischief/Tri-Met property theft: 6
Other offenses: 2
Total: 62
82nd Avenue Station
Station Platform

Interstate

82nd Avenue Station
<table>
<thead>
<tr>
<th><strong>Lower Crime Stations</strong></th>
<th><strong>Higher Crime Stations</strong></th>
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<tr>
<td>Moderate to high pedestrian traffic</td>
<td>Low pedestrian traffic</td>
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<tr>
<td>Pedestrian traffic from transit users and adjacent businesses</td>
<td>Pedestrian traffic is limited to transit users</td>
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<tr>
<td>Located at street level</td>
<td>Located below grade “buried stations”</td>
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<tr>
<td>“Eyes on the station” from adjacent housing, retail and commercial</td>
<td>No “eyes on the station”</td>
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<td>Direct adjacency to parks</td>
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Option C - Land Use
Decatur Station
Project Timeline

1. LRT Project
   - Preliminary Engineering
   - EIS
   - Final Design
   - Value Engineering

2. TOD Station Area Planning
Station Location - Lessons Learned

Station locations should be determined through a design process that identifies:
1) Development potential
2) Ability to create a safe station
Station Area Plans
Edmonton, Alberta
Stadium Station
Stadium LRT Station Area Transportation Issues
Stadium LRT Station Issues

800 Meter Radius

400 Meter Radius

Stadium LRT Station Issues
Stadium LRT Station Area Transportation Issues
Stadium LRT Station Area Transportation Issues
Station Safety & Lack of a TOD Plan

Stadium LRT Station Area Transportation Issues
The Round, Beaverton, Oregon
Beaverton, OR
Beaverton looks to take control of the Round

City officials want to bring in their own developer to finish the beleaguered downtown centerpiece

The Round was expected to include stores, offices, condominiums, apartments, a movie theater and a hotel surrounding a brick courtyard, all accessible by light rail.

If the land goes into foreclosure, it could be sold at a sheriff’s sale. If that happens, the city would be in danger of losing the land altogether.

Offer for land falls

Beaverton downtown deal collapses again

Contractors who have gone unpaid balk at a deal in which the city would take over the Round at Beaverton Central

By AARON PENTRESS
THE OREGONIAN

BEAVERTON — Lienholders have turned down a proposed deal expected to save the Round at Beaverton Central, leaving the city and developers looking for other ways to complete the perpetually-under-construction downtown core.

Beaverton had offered to buy the 4.5-acre site from BCB Group Developers LLC for $3.4 million over two years. That money would have gone to about 75 contractors owed $4.8 million to keep them from foreclosing on the property on Southwest Watson Avenue, just north of Canyon Road.

A handful of lienholders worry about giving up their lien rights, however, did not like the deal because it lacked guarantees that future city administrations would continue to make the staggered payments.

If nothing is resolved, lienholders could begin foreclosure proceedings that could result in a sheriff’s sale of the property. But most have indicated that they would like to see the project completed.

Beaverton officials made the purchase offer to try to avoid foreclosure. They remain hopeful the project will be completed by either BCB or another developer, said Linda Adlard, Beaverton chief of staff and lead negotiator for the city. But securing an investor has proved difficult.

Beaverton and BCB have begun discussing other alternatives to save the project, envisioned as an amalgamation of stores, offices, condominiums, apartments, a movie theater and hotel surrounding a brick courtyard and accessible by light rail.

At this point, Beaverton taxpayers are not losing money on the project. Beaverton exchanged the land, valued at $2.7 million, to BCB for its work on preparing the soft soil for construction. That work cost about $3 million more than the land’s value, prompting Beaverton to give BCB a $1 million tax break over 10 years.

Please see ROUND, Page C7

Round: Developer ran out of cash

Continued from Page C1

"The reality is that all of the creditors are victims and they have the right to the $2.9 million in liens now," she said.

That means contractors would probably not be happy to settle.
The Round:
Project suffers setbacks over past 10 years

Continued from Page D1

to comment.

The news of the foreclosure, first reported by the Beaverton Valley Times on Thursday, comes as the city is seeking a developer to buy the former Westgate Theatre site next to the Round and develop it in a similar fashion, with multistory buildings of ground-floor retail and housing and offices above, with structured parking.

The Round has struggled since 1997, when the city sold the former sewage treatment plant to a developer and called for multistory buildings with ground-floor retail and restaurants with housing and offices above.

The first developer declared
development plaintiffs

Developers of the Round at Beaverton Central are in default on a $31.5 million loan, according to legal documents.

The Round at Beaverton Central timeline

1979: Beaverton leaders propose a site for two eight-story office buildings that would include City Hall and the city library. The plan falls after an economic downturn.

April 1997: City leaders approve plans for development of the Round by BCB Group Developers

1999: Construction begins on the Round.

2003: The Round opens with some tenants move in.

July 2004: City officials declare Dorn-Platz has defaulted on its agreement and has fallen behind schedule, which called for the project to be finished in 2005.

June 2005: City leaders sign new development agreement
A Regional Embarrassment

Fatal Flaws
1) A “developer knows best” philosophy by the City of Beaverton
2) A decision to use a developer offering as a substitute for a station area framework plan
3) Selection of a developer’s concept that was all flash, with little substance

Fundamental Problems
1) Isolated station location with little pedestrian or auto connectivity to the surrounding area
2) Low population density in the station area
3) New development potential limited by existing low density uses
4) Did not respond to basic siting requirements for housing, retail or office uses

A developer offering is not a substitute for a public planning process
10th and Osage
DEVELOPMENT SUMMARY
Retail - 139,000 SF
Commercial - 322,200 SF
Office - 280,000 SF
Housing - 6,900 Dwelling Units
Parking - 8,900 spaces
Open Space - 381,000 SF
Recommended Ground Floor Uses and Active Edges
Primary Pedestrian & Bicycle Circulation
Primary Auto and Bus Circulation
Park Blocks
Existing South Lincoln Park Homes – 270 Units
Phase 1

New 140 units
Relocated 0 units

South Lincoln Park Homes - Potential Phasing
Phase 2A

New: 140 units
Relocated: 42 units

South Lincoln Park Homes - Potential Phasing
Phase 2B

New 340 units
Relocated 42 units

South Lincoln Park Homes - Potential Phasing
Phase 3A

- New: 340 units
- Relocated: 84 units

South Lincoln Park Homes - Potential Phasing
Phase 3B

New: 460 units
Relocated: 84 units

South Lincoln Park Homes - Potential Phasing
Phase 4A

New: 460 units
Relocated: 134 units

South Lincoln Park Homes - Potential Phasing
Phase 4B

New: 560 units
Relocated: 134 units

South Lincoln Park Homes - Potential Phasing
Phases 5A

New: 560 units
Relocated: 270 units

South Lincoln Park Homes - Potential Phasing
Phase 5B

New 1195 units
Relocated 270 units

South Lincoln Park Homes - Potential Phasing
Phase 5B

New 1195 units
Relocated 270 units
New/Relocated 4.4 to 1

South Lincoln Park Homes - Potential Phasing
DEVELOPMENT SUMMARY
Retail - 139,000 SF
Commercial - 322,200 SF
Office - 280,000 SF
Housing - 6,900 Dwelling Units
Parking - 8,900 spaces
Open Space - 381,000 SF
<table>
<thead>
<tr>
<th>No.</th>
<th>Block</th>
<th>Development Potential Draft 1/27/07</th>
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<tbody>
<tr>
<td></td>
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<td>Building 10th &amp; Osage Development Potential</td>
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<td>Block</td>
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10th & Osage Development Potential
## 10th & Osage Development Potential

### Table: Development Potential

<table>
<thead>
<tr>
<th>Block No.</th>
<th>Development Types</th>
<th>Site Block Area (SF)</th>
<th>Building Floors</th>
<th>New Bldg. Area (SF)</th>
<th>Density</th>
<th>FAR</th>
<th>Total Units</th>
<th>Provided Parking</th>
<th>Levels</th>
<th>Structure Area</th>
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</tbody>
</table>

### Summary

- **Retail - NEW**: 61,000 SF
- **Commercial - NEW**: 504,200 SF
- **Office - NEW**: 1,631,400 SF
- **Housing - Condo/Apt.**: 8,500 dwelling units
- **Parking**: 16,300 parking spaces
- **Open Space**: 7 Acres

### Comments

- Condo/Apartment and Basement Level Parking
- Podium and Basement Level Parking
- Under Blocks 3 and 4
- Buckhorn Exchange structured parking provided on ground floor at existing location
- Under Blocks 6 and 7
- Parking provided at block 7
- Basement Level Parking

### Financial Note

- **$3 Billion**
10th & Osage Station - Infrastructure Projects
## 10th & Osage Station - Summary Infrastructure Cost Estimates

<table>
<thead>
<tr>
<th>Projects</th>
<th>Project Name</th>
<th>Description</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Intersection Improvements - 10th &amp; Kalamath</td>
<td>Installation of traffic signal for pedestrians</td>
<td>$ 500,856</td>
</tr>
<tr>
<td>2</td>
<td>Intersection Improvements - 10th &amp; Santa Fe</td>
<td>Installation of traffic signal for pedestrians</td>
<td>$ 500,856</td>
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<tr>
<td>3</td>
<td>10th Avenue Pedestrian Improvements (Mariposa to Santa Fe)</td>
<td>Sidewalk reconstruction</td>
<td>$ 210,714</td>
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<td>4</td>
<td>11th Avenue Re-Opening at Greenlee Elementary</td>
<td>Bike/Pedestrian infrastructure</td>
<td>$ 113,747</td>
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<td>5</td>
<td>Osage Street Extension (to 8th)</td>
<td>Subsidy and improvements</td>
<td>$ 5,302,176</td>
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<td>6</td>
<td>East-West Plaza Blocks</td>
<td>Subsidy and improvements</td>
<td>$ 1,345,422</td>
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<td>South-North Park Blocks</td>
<td>Subsidy and improvements</td>
<td>$ 2,372,122</td>
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<td>AREA A</td>
<td>New and Enhanced Roads</td>
<td>Subsidy and improvements</td>
<td>$ 12,712,280</td>
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<td>AREA B</td>
<td>New and Enhanced Roads</td>
<td>Subsidy and improvements</td>
<td>$ 4,916,130</td>
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<td>TOTAL</td>
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<td>$ 27,974,352</td>
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</tbody>
</table>

*$30 Million*
Station Area Plans - Lessons Learned

1) Development will be piecemeal or will not happen without a plan

CRANDALL ARAMBULA, PC
Station Area Plans - Lessons Learned

1) Development will be piecemeal or will not happen without a plan

2) Developer offerings are not a substitute for a public planning process

CRANDALL ARAMBULA, PC
Station Area Plans - Lessons Learned

1) Development will be piecemeal or will not happen without a plan
2) Developer offerings are not a substitute for a public planning process
3) Plans need to:
   - Be detailed
   - Consider quality of life
   - Be economically feasible
   - Have an implementation strategy
   - Be adopted

CRANDALL ARAMBULA, PC
Other Issues
National Energy Issues

- Environmental (Global warming)
- Economic (Rising energy costs)
U.S. Energy Use by Sector

Industrial: 32%
Transportation: 29%
Residential: 21%
Commercial: 18%

U.S. Energy Use by Sector
Strategies for Saving Energy

- Strict Conservation Standards
- Reuse Waste Heat

Building Codes

- Industrial
- Transportation
- Residential
- Commercial
Strategies for Saving Energy

- Great Centers
  - Strong Retail
  - Public Open Space

- Great Streets
  - Pedestrian Friendly
  - Bike Friendly

- Great Transit
  - High Density Housing

- Building Codes
  - Strict Conservation Standards
  - Reuse Waste Heat

- Land Use & Transportation Actions

- Industrial
- Transportation
- Residential
- Commercial

Strategies for Saving Energy
Strategies for Saving Energy

Potential Transportation Energy Savings Over 50%
Strategies for Saving Energy

- Strict Conservation Standards
- Great Centers
  - Strong Retail
  - Public Open Space
- Great Streets
  - Pedestrian Friendly
  - Bike Friendly
- Great Transit
  - Fewer & Shorter Auto Trips

- Reuse Waste Heat
- Building Codes
- Land Use & Transportation Actions
- Building Codes
- Building Codes

Industrial | Transportation | Residential | Commercial

Strategies for Saving Energy
Typical Development

Residential

1 Mile Radius
Typical Development

1 Mile Radius
Center Development

Center
- Retail
- Commercial
- Government
- Recreation
- Public Open Space
- Transit

1 Mile Radius
Center Development

Center
- Retail
- Commercial
- Government
- Recreation
- Public Open Space
- Transit

1 Mile Radius
Center Development

Residential

Center
- Retail
- Commercial
- Government
- Recreation
- Public Open Space

1 Mile Radius

Fewer & Shorter Auto Trips
Center Development With Bike Lanes

Center
- Retail
- Commercial
- Government
- Recreation
- Public Open Space
- Transit

Bike System
- On Street Bike Lanes (10% Mode Split)
Typical Bike Lanes (Best case ridership, 10% of all trips)
# Bicycle Use Comparison

<table>
<thead>
<tr>
<th>United States (Typical)</th>
<th>Bike</th>
<th>Walk</th>
<th>Transit/Auto</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1%</td>
<td>3%</td>
<td>96%</td>
</tr>
</tbody>
</table>
Centered With Protected Bike Lanes

Center
- Retail
- Commercial
- Government
- Recreation
- Public Open Space
- Transit

Bike System
- Protected Bike Lanes (40% Mode Split)
Protected Bike Lanes (ridership, 30% to 40% of all trips)
# Bicycle Use Comparison

<table>
<thead>
<tr>
<th>Location</th>
<th>Daily Trips</th>
<th>Bike</th>
<th>Walk</th>
<th>Transit/Auto</th>
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</thead>
<tbody>
<tr>
<td>United States (Typical)</td>
<td>1%</td>
<td>3%</td>
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<td>96%</td>
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<tr>
<td>Netherlands</td>
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<td>Utrecht (288,000)</td>
<td>31%</td>
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<tr>
<td>Wageningen (33,000)</td>
<td>41%</td>
<td>18%</td>
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<td>41%</td>
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</tbody>
</table>
Center With Protected Bike Lanes

- Residential
- Center
- Retail
- Commercial
- Government
- Recreation
- Public Open Space

1 Mile Radius

More Reduction in Auto Trips

40% Mode Split
Typical Development

Mixed Use Center

Center & Bike Lanes

Center & Protected Lanes

Household Gasoline Expenditure*

- 21,900 miles/yr @ $4,380/year
- 13,140 miles/yr @ $2,628/year
- 11,826 miles/yr @ $2,365/year
- 7,884 miles/yr @ $1,577/year

* 20 miles/gallon @ $4.00 per gallon = $0.20 per mile
Typical Development

Mixed Use Center

Center & Bike Lanes

Center & Protected Lanes

Household Gasoline Expenditure*

21,900 miles/yr  
$4,380 /year

13,140 miles/yr  
$2,628 /year

11,826 miles/yr  
$2,365 /year

7,884 miles/yr  
$1,577 /year

Economic Stimulus**

0 miles  
0 stimulus  
$27 million

60 million miles  
$34 million

76 million miles  
$55 million

122 million miles  
$55 million

* 20 miles/gallon @$4.00 per gallon = $0.20 per mile

** Total miles not driven times $0.45/ mile
Ideal Station

¼ Mile Radius
5 Minute Walk
Ideal Station?

TOD

BCD

1/4 Mile Radius
5 Minute Walk

1 Mile Radius
5 Minute Bike Ride
(Protected)

LRT
Ideal Station?

TOD

¼ Mile Radius
5 Minute Walk

1 Mile Radius
5 Minute Bike Ride
(Protected)

BCD

3,200 Transit Trips
(10% on transit)
Ideal Station?

- **LRT**
  - 3,200 Transit Trips (10% on transit)
    - ¼ Mile Radius
    - 5 Minute Walk
  - 12,800 Transit Trips (10% on transit)
    - 1 Mile Radius
    - 5 Minute Bike Ride (Protected)

**TOD**

**BCD**
Alignment & TOD Design

Alternatives must consider:
1) TOD potential
2) Stations safety
3) BCD potential (1 mile rad.)?
Project Timeline

LRT Project
- Preliminary Engineering
- EIS
- Final Design
- Value Engineering

TOD Station Area Planning

YEAR
1 2 3 4 5 6 7 8 9

1-4

5-9

Yes
Project Timeline

LRT Project
- Preliminary Engineering
- EIS
- Final Design
- Value Engineering

TOD Station Area Planning

YEAR
1 2 3 4 5 6 7 8 9

Yes
No
Too Late

Drat Final

Yes

Too Late
Integrating Urban Design, Architecture and Engineering in Station Design

CRANDALL ARAMBULA
October 29, 2008