Multimodal Evaluation at the City of Redmond

Patrick McGrath & Joel Pfundt, AICP, CTP
APA Washington Chapter Conference, October 11, 2012

Access-Based Concurrency Concept

How Did Redmond Get There?

• 2005 Transportation Master Plan (TMP)
  • A plan that supports and enables land use vision
  • Implemented Annual Mobility Report Card
• TMP Update identifies key strategies, outcomes and performance measures to better tell Redmond’s transportation story

Access-Based Concurrency Concept

Multimodal Plan-Based Concurrency

• PM peak hour person miles traveled (Mobility Unit)
• Improve level of service (LOS) by implementing projects and programs in 20-year plan that add MU supply
• Development produces MU demand
• Ensure that growth and transportation improvements are proportional

Plan-Based Concurrency Pros and Cons

Pros
• Driven by community values – not tied to a single measure (congestion)
• Yields the city we want to have
• Minimal resources required for upkeep

Cons
• Using person miles traveled means transportation demand management has be accounted for differently
• “Supply” is based on an output (project cost), not on transportation outcome (e.g. capacity, access, delay…)

Results

• Broader implementation of projects to meet concurrency
• Simple and predictable
  • Lookup tables to determine mobility units
  • Checkbook style ledger

Presentation Overview

1. Multimodal concurrency
2. Pedestrian route directness
Access-Based Concurrency Concept

Definition

Access Unit = Ability of 1 peak hour traveller to reach 1,000 sq ft of floor area

Process

1. Run baseline year (e.g. 2012). Each parcel gets access score “A.”
2. Run plan year (e.g. 2030). Each parcel gets updated access score “B.”
3. \[ \sum(B) - \sum(A) \] = Supply delivered by City projects.
4. Supply exceeds demand = concurrent.

Unresolved Issues

- Multimodality
- Synergistic projects
- Time/resources required
Pedestrian Route Directness – The Function

\[ \text{Route directness} = \frac{A}{B} \]

A = 2,400 ft
B = 3,600 ft
A/B = 0.67 (pretty good)

Pedestrian Route Directness – The Function (Radius)

Pedestrian Route Directness – Example of Highly-Connected Neighborhood

Pedestrian Route Directness – Example of Low-Connectivity Neighborhood

Pedestrian Route Directness – Downtown Redmond Results

Urban Network Analyst – Results

<table>
<thead>
<tr>
<th>Route Directness</th>
<th>Current Floor Area (Sq Ft)</th>
<th>Percent</th>
<th>Buildout (2030+) Floor Area (Sq Ft)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75 - 1.0</td>
<td>1,078,028</td>
<td>15%</td>
<td>3,693,205</td>
<td>30%</td>
</tr>
<tr>
<td>0.70 - 0.75</td>
<td>2,443,996</td>
<td>34%</td>
<td>4,351,359</td>
<td>36%</td>
</tr>
<tr>
<td>0.65 - 0.70</td>
<td>1,222,967</td>
<td>19%</td>
<td>1,367,948</td>
<td>11%</td>
</tr>
<tr>
<td>0.60 - 0.65</td>
<td>1,222,847</td>
<td>17%</td>
<td>1,512,662</td>
<td>12%</td>
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<tr>
<td>0.55 - 0.60</td>
<td>1,033,442</td>
<td>15%</td>
<td>1,193,169</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>7,102,280</td>
<td>100%</td>
<td>12,118,343</td>
<td>100%</td>
</tr>
</tbody>
</table>

Average RD 0.66

Current 0.70
Connectivity Tools

MIT Urban Form Lab
Urban Network Analysis

Transpo Group
ViaCity

http://cityform.mit.edu/projects/urban-network-analysis.html

Access-Based Concurrency Concept

Thank you

Connectivity Resources


Access-Based Concurrency Concept

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Access-Based Concurrency Concept

Pedestrian Route Directness – Distribution of Values

http://www.viacity.info/

Multimodal Transportation Concurrency in Bellingham, WA

Is There a New Math for Evaluating Transportation Concurrency for Bicycle & Pedestrian Facilities?

APA WA Conference, Olympia, WA - October 11, 2012

Bellingham, WA
“City of Subdued Excitement”

Whatcom’s Regional Center
- City limits = 81,000 residents
- Urban Growth Area = 11,000 pop.
- 45% Whatcom County 201,140 pop.
- Seat of Whatcom County government
- 18 of Top 25 employers in County
- Bellingham International Airport
- 3 universities (WWU, WCC, BTC)
- Major regional hospital (St Joseph)
- Restaurants, Pub, Social Places
- Theaters & performing arts centers
- Parks and Recreational Facilities

Land Use Goals
Several compact mixed use
“Urban Villages” adopted in Comp Plan Land Use Element
- Downtown Bellingham
- Old Town Village
- Samish Way Village
- Fountain District
- Fairhaven District
- Barkley Village
- Future Waterfront District

All are well-connected with
- High-frequency (15 min) transit
- ADA Pedestrian Sidewalks
- Marked Arterial Bike Lanes
- Multi-use “Greenways” Trails
- Multimodal Arterial Streets

Non-Motorized Facilities
Pedestrian Master Plan
- Approved August 2012
- Defines 266-mile “primary pedestrian network”
- 170 miles (64%) complete
- Identifies pedestrian needs
- Prioritizes improvements

Bicycle Master Plan
- Planning effort 2012-2013
- 63 miles existing bike lanes
- 62 miles planned bike lanes
- Will further define 125-mile (+) bicycle network
- Will identify bicycle needs
- Will prioritize improvements

Multiuse Greenways Trails
- Extensive citywide trail system
- 65 existing trail miles

Ease of Walking
Residents Currently (2010) Living Within 1/4-mile (5-min) Walk of Urban Villages

10/22/2012
Bellingham’s Multimodal Transportation Mode Shift Goals

TG-28: Set target goals to increase the mode share of pedestrian, bicycle, and transit trips and reduce automobile trips as a percentage of total trips, as listed below.

<table>
<thead>
<tr>
<th>Mode</th>
<th>2004</th>
<th>2010</th>
<th>2015</th>
<th>2022</th>
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</thead>
<tbody>
<tr>
<td>Auto</td>
<td>87%</td>
<td>84%</td>
<td>80%</td>
<td>75%</td>
</tr>
<tr>
<td>Transit</td>
<td>2%</td>
<td>3%</td>
<td>4%</td>
<td>6%</td>
</tr>
<tr>
<td>Bike</td>
<td>3%</td>
<td>4%</td>
<td>5%</td>
<td>6%</td>
</tr>
<tr>
<td>Ped</td>
<td>8%</td>
<td>9%</td>
<td>11%</td>
<td>13%</td>
</tr>
</tbody>
</table>

Notes:
1. 2004 raw data from FTA/Social Data Study
2. City/WTA recommendations based on 2004 raw data from FTA/Social Data Study

You Get What You Measure
(Inadequate Metrics = Inadequate Outcomes)

- Key Concepts
  - Traditional LOS Standards & Perspectives
  - Common Outcomes Resulting from Inadequate Tools & Metrics

Terminology of Metrics: Inverse Values = Public Confusion

<table>
<thead>
<tr>
<th>Public Experience:</th>
<th>LOS</th>
<th>Traffic Engineering Demand vs. Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Achievement</td>
<td>Value Assigned</td>
<td>Transportation Capacity</td>
</tr>
<tr>
<td>90–100%</td>
<td>A</td>
<td>50–60%</td>
</tr>
<tr>
<td>80–90%</td>
<td>B</td>
<td>60–70%</td>
</tr>
<tr>
<td>70–80%</td>
<td>C</td>
<td>70–80%</td>
</tr>
<tr>
<td>60–70%</td>
<td>D</td>
<td>80–90%</td>
</tr>
<tr>
<td>N/A</td>
<td>E</td>
<td>90–100%</td>
</tr>
<tr>
<td>&lt; 60%</td>
<td>F</td>
<td>&gt;100%</td>
</tr>
</tbody>
</table>

Highway Capacity Manual letter value LOS classifications and inaccurate engineering terminology, such as “failure,” contribute to public confusion and controversy.

Traditional HCM “Level of Service” (LOS) is Auto-centric

R.M. Peak Traffic Volumes
(The Local Evening Rush Hour)

Traditional LOS & GMA Concurrency Approach

- GMA Goals: “compact urban infill” … “discourage urban sprawl” … “encourage multi-modal” transportation system
- Common Approach: Adopt/maintain static LOS standards based on a mode-limited measurement (traffic volume / road capacity) from national manual (HCM) that is not registered to the local community’s desired land use and transportation goals;
- Common Implementation: Develop, deny, or mitigate (add vehicle capacity);
- Common Result: Road and intersection widening in urban area, development pushed to edges of City, expansion of “urban sprawl,” primarily land-intensive and auto-oriented transportation system

……… Common results don’t achieve the GMA goal.

“Insanity: doing the same thing over and over again, but expecting different results”
- attributed to Albert Einstein

Measures to Get What You Want

RCW 36.70A.070 (6) requirements: “A transportation element that implements, and is consistent with, the land use element.”

Key Concepts
- Regulatory Tools & What GMA really says ……
- Basic Assumptions About “Growth”
- Bellingham’s Multimodal Measurements
- Land Use Typology & “Policy Dials”
- Annual Concurrency Status Reports
Washington’s Regulatory Tools for Transportation

- Multimodal Concurrency: Bike/ped, rail, transit service, and arterial improvements;
- SEPA (Traffic Studies): Traffic signals, turn lanes, safety, connectivity of non-motorized facilities;
- Street Standards: Sidewalks, bike lanes, street trees, ADA ramps;
- Transportation Impact Fee: Recoup portion of City’s capital investment in citywide multimodal transportation network.

Transportation Concurrency:

- Washington GMA Concurrency Requirements
  - WAC 365-195-510 (3)(b) Concurrency: Levels of service should be set to reflect realistic development consistent with the achievement of growth aims. Setting such levels too high could, under some regulatory strategies, result in no growth. As a deliberate policy, this would be contrary to the act.
  - Simple Translation ...
  - Transportation Concurrency is NOT a regulation to stop growth, but a performance measure to ensure that adequate transportation facilities are available to serve amount of growth planned for in Comprehensive Plan.
  - Thankfully GMA does not define LOS standards for local jurisdictions or the methodology used to monitor, maintain, and enforce LOS because there is not a “one-size-fits-all” solution

Bellingham’s Perspective

- “Growth Aims” = Infill, Urban Villages, Multimodal, and Mode Shift
- “Adequate” means Multimodal Transportation Facilities – All Modes
- Bellingham adopted LOS standards and a “Plan-based” Multimodal Transportation Concurrency performance measures tailored to achieving local Comp Plan goals and priorities for urban infill and multimodal transportation

Creating a Multimodal Transportation Concurrency System

- Goals: Implement Comp Plan Vision for how transportation should look, feel, and function in Bellingham
- Based on Land Use Typologies

**Land Use Typologies**

- Urban Institutional (Type 1A) Blue
  - Western Washington University (Future: Hospital, WCC, BTC)
- Urban Village (Type 1) Green
  - Higher density urban mixed use
  - Downtown Core District
  - Fairhaven Village District
- Transition (Type 2) Yellow
  - Moderate density neighborhoods
  - 1 Urban Institutional (Type 1A) Blue Western Washington University (Future: Hospital, WCC, BTC)
- Suburban (Type 3) Red
  - Lower density neighborhoods
  - Auto-centric commercial (north)

**Mode Weight Factors**

- **Bicycle**
  - Person trip credit for 1% greater than threshold7
  - Person trip credit for 1% greater than 50%
- **Pedestrian**
  - Person trip credit for 1% greater than threshold6
  - Person trip credit for 1% greater than 50%
- **Transit**
  - WTA seated 2-way capacity
  - WTA seated 2-way capacity
  - WTA seated 2-way capacity

- **Non-Motorized**
  - Percent threshold for minimum network completeness
  - Percent threshold for minimum network

**Simple Translation**

- 2008 hired TranspoGroup, Inc.
- 15 alternatives studied – 10 months
- “Plan-based” – 16 Concurrency Service Areas (CSA, “Mobility Sheds”)
- Variable typology & weighting factors based on land use context
- Pedestrian = % completeness of network in Pedestrian Master Plan
- Bicycle = % completeness of network in Bicycle Master Plan
- Multimodal Tools = % completeness relative to Ped & Bike networks
- Transit = WTA seated 2-way capacity and WTA ridership counts
- Non-Motorized = pm peak 2-way arterial lane-to-capacity ratio

- Infilled urban areas
- Transportation Concurrency = NOT a regulation to stop growth, but a performance measure to ensure that adequate transportation facilities are available to serve amount of growth planned for in Comprehensive Plan.
- The City Council allows some arterials to experience higher levels of vehicle traffic congestion during the weekday p.m. peak hour, as follows:
- Transportation Concurrency is NOT a regulation to stop growth, but a performance measure to ensure that adequate transportation facilities are available to serve amount of growth planned for in Comprehensive Plan.
10/22/2012

Pedestrian Infrastructure Completeness by CSA

Bicycle Infrastructure Completeness by CSA

Annual Calculation

Person Trips Available by Concurrency Service Area

Define Concurrency Service Areas, Corridors, & Measurement Points

Collect Demand & Supply Data of Motorized Modes

Collect Data of Existing & Planned Non-Motorized Facilities

Define Concurrency Service Area

Calculate Concurrency Service Area Total Person Trips Available

Calculate Available Person Trips for Auto & Transit Modes

Calculate Credit Person Trips of Non-Motorized Facilities

Draw Down Available Person Trips in each Impacted Concurrency Service Area for each Concurrency Application

Analogous to Checking Account

Transportation Report on Annual Concurrency (TRAC)

Multiple Benefits of Annual Reporting

Future Metric Enhancements
Transferability to Other Jurisdictions

• Bellingham’s Multimodal Transportation Concurrency framework is transferable to other urban, but not rural, jurisdictions

• “Plan-based” system tailored to achieving local Comprehensive Plan goals and priorities for urban infill and multimodal transportation

• Modal measurements must be registered to local land use contexts and data needs include:
  – GIS-based annual measure of sidewalk & bike network completeness
  – Annual arterial street traffic counts
  – Transit data for seated capacity & ridership

Conclusions & Recommendations

• There is no magic, unifying, “one-size-fits-all” transportation concurrency methodology

• Bellingham’s Multimodal Transportation Concurrency Program is a work in progress and over time we will adjust and enhance it

• It’s good that GMA requires transportation concurrency, but State shouldn’t dictate or standardize methodology to be used locally

• If “Off-the-shelf” LOS standards & methodologies are used, they must be adjusted to account for unique local land use and transportation contexts, goals, and circumstances

• Best Practice = Create tools and metrics to help accomplish what your community wants for the long term.

For more information

www.cob.org/services/neighborhoods/community-planning/transportation/index.aspx

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(360) 778-7946; or ccomeau@cob.org

GMA Land Use & Transportation Elements

RCW 36.70A.70 Comp Plan – Mandatory elements.
“The plan shall be an internally consistent document and all elements shall be consistent with the future land use map.’”

RCW 36.70A.070 (6) requirements: “A transportation element that implements, and is consistent with, the land use element.”

RCW 36.70A.070 (6) (b) “Local jurisdictions must adopt and enforce [transportation concurrency] ordinances which prohibit development approval if the development causes the level of service (LOS) on a locally owned transportation facility to decline below the standards adopted in the transportation element of the comprehensive plan, unless transportation improvements or strategies to accommodate the impacts of development are made concurrent with the development.”

Therefore, if the land use element calls for infill, then the transportation element, the transportation concurrency ordinance, and the adopted LOS standards must be designed to allow infill (rather than prevent it).

Sounds pretty simple so far ….. right?

Public Controversy: LOS & Traffic Congestion = OMG!

Bellingham Herald newspaper headlines fueled controversy over City staff’s proposed Transportation Concurrency policy approach

“City policy would lead to severe traffic congestion”
- Sunday, June 5, 2005, Bellingham Herald Opinion

“City wrong to allow traffic woes to fester”
- Sunday, May 7, 2006, Bellingham Herald Opinion

“Bellingham maddeningly illogical on growth, traffic”
- Sunday, June 10, 2007, Bellingham Herald Opinion

Public sentiment favors accommodating automobile convenience at the cost of other transportation modes and land use goals
LOS, Concurrency, & The Need to Change Perspectives

- **Public/Community:**
  Wish to plan for misperceived “excellence” – LOS A or B;
  Outcome = would waste tax-payer dollars on under-utilized roads

- **Anti-Growth & NIMBY Groups:**
  “Planning to Fail is Failing to Plan” (Bham Group “Responsible Development”)
  Outcome = denying compact infill encourages more urban sprawl

- **Traffic Engineering:**
  Maximize vehicle “through-put” while minimizing vehicle “delay”;
  Arterial or Intersection LOS “F” = “failure” (inaccurate & temporary)
  Outcome = measure & mitigate (widen) for vehicle capacity only

- **21st Century Transportation Planning:**
  Balance & integrate transportation improvements according to
  land use context and mobility needs of all transportation users;
  Outcome = GMA compliance, reduction of urban sprawl, and
  **stated expectation** of peak hour traffic congestion in urban places
Is There A New Math For Evaluating Concurrency?

City of Tukwila
Multi-Modal Level of Service

Cyndy Knighton, Senior Transportation Engineer

Tukwila Multi-Modal LOS

2009 EETP grant of $69,500 to develop MMLOS standards
• A tool to transform its auto-dominated transportation system to one that promotes alternative modes and reduces VMT

City Goals
• Include in Transportation Element update
• Develop quantitative approach to implement Walk & Roll and Complete Streets
• Open funding opportunities for non-motorized CIP projects
• Support Southcenter redevelopment

Tukwila Multi-Modal LOS

The Plan
• Inventory existing bicycle and pedestrian conditions leveraging data from the City’s Walk & Roll non-motorized plan
• Identify pedestrian and bike LOS standards (Transit excluded)
• Calculate City-wide levels of service for pedestrian and bike modes on all arterials
• Identify existing deficiencies
• Use the pedestrian and bike LOS to decide what facilities are needed for 2030
• Integrate the non-motorized LOS into development review standards and public improvement plans

Spoiler Alert!

But it didn’t work as expected
• Auto LOS is a familiar old standby
• Bike LOS works pretty well
• Pedestrian LOS is problematic
  – Lack of sensitivity to adjacent land uses is biggest downfall
  – Not a tool to use to identify potential mitigation

Traditional Level of Service (LOS)

LOS A – B
LOS C – D
LOS E – F
• Measures speed, maneuverability, interruptions
• Generally focused solely on the automobile
• Oblivious to the impacts on other modes of travel

Traditional Pedestrian LOS

LOS A / B
LOS C / D
LOS E / F
**Traditional Bicycle LOS**

- LOS A/B
- LOS C/D
- LOS E/F

**Highway Capacity Manual 2010**

- Comfort based
- LOS based on:
  - Autos: quality of service
  - Transit: quality of service, comfort
  - Bikes: comfort
  - Pedestrians: comfort

**Accounts for:**
- Street cross-section
  - Travel lanes
  - Bike lanes
  - Parking
  - Landscaping
  - Sidewalk
  - Bus Shelters
  - Speed of traffic
  - Vehicle volume (ADT)

**Highway Capacity Manual 2010**

- Multimodal Level of Service – what are we getting at?
  - Is this a nice place to walk?
  - Is this a nice place to bike?
  - Is transit convenient?
  - Bottom Line – Are there options besides the car?

**Basic Concept of MMLOS**

- Developed four separate, independent LOS models:
  - Auto LOS
  - Transit LOS
  - Bicycle LOS
  - Pedestrian LOS
- Did not develop a single LOS by integrating the four modes of travel

**Basic Concept of MMLOS**

- 2010 Highway Capacity Manual
- Each urban street right-of-way is shared by 4 major types of users:
  - Pedestrians
  - Bicycle riders
  - Transit passengers
  - Auto drivers
- Urban Street should serve all users.
- Transit LOS: Not included for Tukwila project

**Layered Network Connection**

- Layered network provides
  - Preferred features by mode for evaluating level of service
- MMLOS could provide a method for
  - Identifying layer-specific deficiencies
  - Prioritizing modal improvements by layer
  - Suggesting features to be included in the layered network
2010 Highway Capacity Manual – MMLOS Methodology

Application of MMLOS

Auto LOS

Application of MMLOS

Bicycle LOS

Application of MMLOS

Pedestrian LOS

Application of MMLOS

Interpreting the Results

Whoa, Nelly! What does this all mean?

Lessons Learned

- LOS results generally met expectations, particularly for bicycles
- Some surprises: Lack of a sidewalk did not lead to automatic LOS F
- Difficult to score LOS A or LOS F
- Not tuned to identifying mitigations
- Not sensitive to urban form/adjacent land uses
- Need for clear policy guidance and design standards
  - Does not replace need for design standards
Reality Checks

• Bicycle LOS A/B – SB E Marginal Way

• Bicycle LOS A/B – WB 112th Street

• Bicycle LOS A/B – NB 51st Ave (Seg # 49)

• Bicycle LOS E/F – NB Interurban Ave

• Bicycle LOS E/F – WB 180th Street (Seg #12)

• Pedestrian LOS A/B – NB Macadam Rd S

• SB LOS C?
Reality Checks

- Pedestrian LOS D – WB Southcenter Blvd

Reality Checks

- Pedestrian LOS D – WB Southcenter Blvd

- Really?

Reality Checks

- Pedestrian LOS E/F – SB 61st Ave S

- NB LOS C

Challenges:
Urban Form

- LOS results not sensitive to adjacent uses
- Challenges in applying a data driven LOS (engineers love) but doesn’t support qualitative urban design (planners love)
- Not sensitive to existing or planned future land uses – not context sensitive
- Not a good tool for identifying mitigation

Transportation Strategies

Develop streets and public frontages that encourage walking, bicycling and transit ridership, as well as support auto use

- MMLOS can identify deficiencies
- MMLOS can’t be used as nexus for desired urban form especially for pedestrians

Tukwila’s Conclusion

HCM 2010 MMLOS – not quite there yet

- What about …?

Supportive land uses

Urban design factors

ADA Features

Identifying mitigations
What’s Left?

• Complete Transportation Element Update
  – Establish MMLOS standard
• Develop Design Standards
  – But can they be based on MMLOS?
  – Still need policy direction to achieve vision
• Prioritize Project Needs
  – Competing for funding
  – State law does not yet support MMLOS-based impact fees
  – Funding sources not necessarily supportive of non-motorized needs

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