City of Bellevue

2007-08 Pedestrian and Bicycle Transportation Plan
Project Prioritization

Outline

• Intro
  – Brief History and background of Ped/Bike Program
• Defining the “new” Project List
  – Engaging the Public and our Planning Staff
• Prioritization Analysis
  – Tips
• Issues
  – Some solutions too!
34 Years of Non-Motorized Planning

1973 Plan

GIS used

1979 Plan

1993 Plan

1999 Plan

2008 Plan

Project Approach

1. Needs Assessment
   - Evaluate Existing Conditions
   - Define Goals, Objectives, & Policies
   - Identify Unmet Needs

2. Ped-Bike Network
   - Design the Network
   - Evaluate and Select Routes
   - Select Appropriate Design Elements
   - Design-Bicycle & Pedestrian
   - Type of Roadway
   - Traffic Operations
   - Yields
   - TAA
   - Grade Crossing
   - Ca Speed limit
   - Parking

3. Plan Elements
   - Policy evaluation
   - Design guidelines
   - Prioritized list of pedestrian and bicycle facilities
   - Cost Estimation
   - Funding Strategy
   - Performance Monitoring

Community Participation
Big Ideas

- Engage as Many people as possible
  - Gather public comments in a robust way and use the comments!
  - Involve decision support staff all along the way
- Project Improvements understandable to all (Graphics)
- Use technology to:
  - Make prioritization methods reproducible and unbiased
  - Help with cost estimation
  - Allow performance monitoring

On my way to the Analysis...

- Decided on a model/Looked at Data sources
- Organized ancillary data
- Decided System complete/Not complete
- Data Structure reorganization
- Others did these:
  - Initiated Public/Staff comments
  - Typology graphics (no, not topology!)
Level of Service Equation – NO!

- BLOS = 0.507 ln(Vol15/Ln) + 0.189 SPt(1+10.38HV)^2 + 7.066(1/PR5)^2 - 0.005 We2 + 0.760
  
  where:
  - Vol15 = volume of directional traffic in 15 minutes = (ADT * D * Kd) / (4 * PHF)
  - ADT = Average Daily Traffic on the segment
  - D = Directional Factor
  - Kd = Peak to Daily Factor
  - PHF = Peak Hour Factor
  - Ln = number of directional through lanes
  - SPt = effective speed limit = 1.1069 ln(SPp-20) + 0.8103, where SPp is the posted speed limit
  - HV = percentage of heavy vehicles (as defined in the 1994 Highway Capacity Manual)
  - PRS = FHWA's 5-point pavement surface condition rating (15-100)
  - We = average effective width of outside through lane:
    - We = AW - (10 * OS)PA where Wi = 0
    - We = AW + Wi (1 - 2 * OS)PA where Wi > 0 and Wi > We = 0
    - We = AW + Wi - 2 (10 * OS)PA where Wi = 0, We > 0, and a bike lane exists
    - Wi = total width of outside lane (and shoulder) pavement
    - OS = fraction of segment with occupied on-street parking
    - OS = width of striping between outside lane and edge of pavement
    - AW = width of pavement striping or curbside
    - AW = effective width as a function of traffic volume
    - AW = Wi if ADT>4000, weekday
    - AW = Wi (2 - (ADT/4000)) if ADT<4000 and road is undivided and unstriped

Site Suitability – Yes!

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corridor Conditions</td>
<td></td>
</tr>
<tr>
<td>Severity of problem (how many collisions have occurred)</td>
<td>10</td>
</tr>
<tr>
<td>Roadway arterial classification</td>
<td>10</td>
</tr>
<tr>
<td>System linkage (connectivity to other sidewalk/bikeway facilities)</td>
<td>20</td>
</tr>
<tr>
<td>Bus stop level ridership (1/4 mile proximity)</td>
<td>10</td>
</tr>
<tr>
<td>Social Justice</td>
<td></td>
</tr>
<tr>
<td>Vehicle ownership (%)</td>
<td>5</td>
</tr>
<tr>
<td>Below poverty level (%)</td>
<td>5</td>
</tr>
<tr>
<td>Under 18, 65 or over (%)</td>
<td>5</td>
</tr>
<tr>
<td>Destination Network</td>
<td></td>
</tr>
<tr>
<td>Park proximity (%)</td>
<td>5</td>
</tr>
<tr>
<td>School proximity (%)</td>
<td>5</td>
</tr>
<tr>
<td>Community center/social service/library proximity (%)</td>
<td>5</td>
</tr>
<tr>
<td>Retail proximity (%)</td>
<td>5</td>
</tr>
<tr>
<td>Major employment center (Comprehensive Plan)</td>
<td>5</td>
</tr>
<tr>
<td>Housing density (Comprehensive Land Use Plan)</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>
Other Data Committee Use

- Speed Limit Data
- Traffic Volume Data
- Arterial Type Data
- Land Use Data
- Collision Data Ped & Bike

Complete/Incomplete/Not Started...Done/Not Done...Huh?
Data Structure Issues

- Originally there was the System (Skeleton), Projects (The Skin), and the System Inventory
  - Old data structure (Coverages)
  - This created many headaches in GIS analysis
- The System and Projects were joined to define the 2 layers with a check (completion status) against the inventory
Committee Meeting after Committee Meeting after…

Various ways of Eliciting Comments

Docs

Flickr

Survey

VE / Comments
Public Website

- Interactive Mapping
- Comments
Comment page

Comment Mgmt

Manage comments for Ped Bike Plan site

<table>
<thead>
<tr>
<th>Name</th>
<th>E-Mail</th>
<th>Project</th>
<th>Comment</th>
<th>Posted</th>
</tr>
</thead>
<tbody>
<tr>
<td>James</td>
<td></td>
<td>B-217</td>
<td>This small section of road is very dangerous right now. A bike lane would be very appreciated!</td>
<td>10 Oct 2007</td>
</tr>
<tr>
<td>Dan</td>
<td></td>
<td>L-445</td>
<td>Great addition to neighborhood walking choices!</td>
<td>2007</td>
</tr>
<tr>
<td>Dan</td>
<td></td>
<td>B-009</td>
<td>This looks interesting, but make sure the eastern entrance has a good connection for westbound bike traffic on N 20th Way.</td>
<td>2007</td>
</tr>
<tr>
<td>Dan</td>
<td></td>
<td>B-303</td>
<td>This would mainly be used by walkers, so you could more economically make it a narrower sidewalk.</td>
<td>2007</td>
</tr>
<tr>
<td>Dan</td>
<td></td>
<td>S-010</td>
<td>Good idea. While you're at it, could you make a smoother crossing at the multiple old railroad tracks on this road? It's almost bad enough now to bust a tooth.</td>
<td>2007</td>
</tr>
<tr>
<td>Dan</td>
<td></td>
<td>B-237</td>
<td>I suppose this means actually building NE 16th St. as well?</td>
<td>2007</td>
</tr>
<tr>
<td>Dan</td>
<td></td>
<td>B-217</td>
<td>This is not really needed. Please make sure the one-way NE 12th St bridge over I-405 has sufficient space for bike lanes</td>
<td>2007</td>
</tr>
<tr>
<td>Dan</td>
<td></td>
<td>B-205</td>
<td>This is an important addition. Currently this section of 140th is like the running of the bulls for bikers.</td>
<td>2007</td>
</tr>
<tr>
<td>Dan</td>
<td></td>
<td>M-429</td>
<td>Much as I like trails, this is not really needed. The bike lanes and sidewalks are adequate in this area (except more bikelanes needed 130th - 140th) and the nearly 520 bike path makes this unnecessary.</td>
<td>2007</td>
</tr>
<tr>
<td>Dan</td>
<td></td>
<td>B-205</td>
<td>This is already a hair-raising intersection for cyclists. Motorists are not looking for bicycles coming the wrong way. By insisting on having bicycles ride on the wrong side of the street, we will have many (fatal) accidents at this intersection. How will the City protect cyclists at this location? How will they &quot;force&quot; motorists to look in the non-intuitive direction?</td>
<td>2007</td>
</tr>
</tbody>
</table>
### Prioritization Phase

### Rating Value Max – All 100

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
<th>Weight</th>
<th>Indicator Score</th>
<th>Rating Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corridor Conditions</td>
<td>System Linkage</td>
<td>20</td>
<td>No connection to existing facilities</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>One connection to existing facilities</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Two connections to existing facilities</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Multiple connections to existing facilities</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Collisions (average annual ped/vehicle collisions)</td>
<td>10</td>
<td>0-0.1</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.2-0.3</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.4-0.5</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.6-0.7</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.8-0.9</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.0+</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Roadway Arterial Classification Proximity (R)</td>
<td>10</td>
<td>Collector</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minor</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Major</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Bus Stop Level Ridership (1/4 Mile Proximity)</td>
<td>10</td>
<td>25+ boardings</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10-24 boardings</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;10 boardings</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Vehicle Ownership (%)</td>
<td>5</td>
<td>0-10</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11-20</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21-30</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>31-40</td>
<td>40</td>
</tr>
</tbody>
</table>
Final Results

Accidents
Arterials
Bus Stops
Num of Cars
Connections
Employment Centers
Housing Density

Multiply by Weights
(Schools had Weight of 5%)
Use `<Raster>`.<`Weight Field>` to Calculate Final Indicator Raster

**Final Grid**

Outgrid = Sum (ingrid1, ingrid2, ...)

Buffer projects by total of 100 ft (avg max ROW), then do Zonal statistics on these project buffer zones to get final rank for each project (Use Mean Value)
Prioritization Analysis Tips

- If using weighting by the 100% method, make sure that all indicator’s have the same max rating value. (In our case, 100).
- Can add fields to Integer grids, so make sure that initial ratings are integers.
- Use `<raster name>..<weighting field>` in raster calculator to get final raster with correct values.
- Make sure that Null values become 0’s in Raster used for calculations. Use `outgrid = con(isnull(ingrid1), 0, ingrid1)`

In the End... GIS rank is only Part of the Solution!
Major Data issues

- Accidents as modeled did not have much influence
  - I would change this to be more corridor centric
- Using old data to do long-range planning
  - Census data is old (2000)
    - Does this truly reflect the potential areas of growth in Bellevue? NO!
  - Bus ridership has increased significantly because of gas price increases
- Connectivity was not based on regional systems, but only on internal connected-ness

Major Results Issues

- We only ran the “model” once
  - We discussed “calibrating” to known conditions, but ran out of time/energy
Project Management Issues/Solutions(?)

- Scope was not defined until late in the process
  - Prepare Scope as early as possible(?)
  - Agreed Upon deliverables – get sign off
  - Amend as needed to keep on task
  - (Sounds like being a consultant)
- Project manager ran out of steam at end and “just wanted to get it all done.”
  - This is dangerous
  - Results were just taken as-is
  - How to avoid: see bullet one above

Project Management Issues/Solutions(?)

- Be ready to defend analysis
  - GIS results do not always meet staff expectations
- If you want reproducible results, build a Model from the start
  - I’m doing this on the backend and I just wish I would have done it upfront
Politics

- All decisions are influenced by the influential.
  - GIS only carried so much weight