

City of Bellevue



2007-08 Pedestrian and Bicycle Transportation Plan Project Prioritization

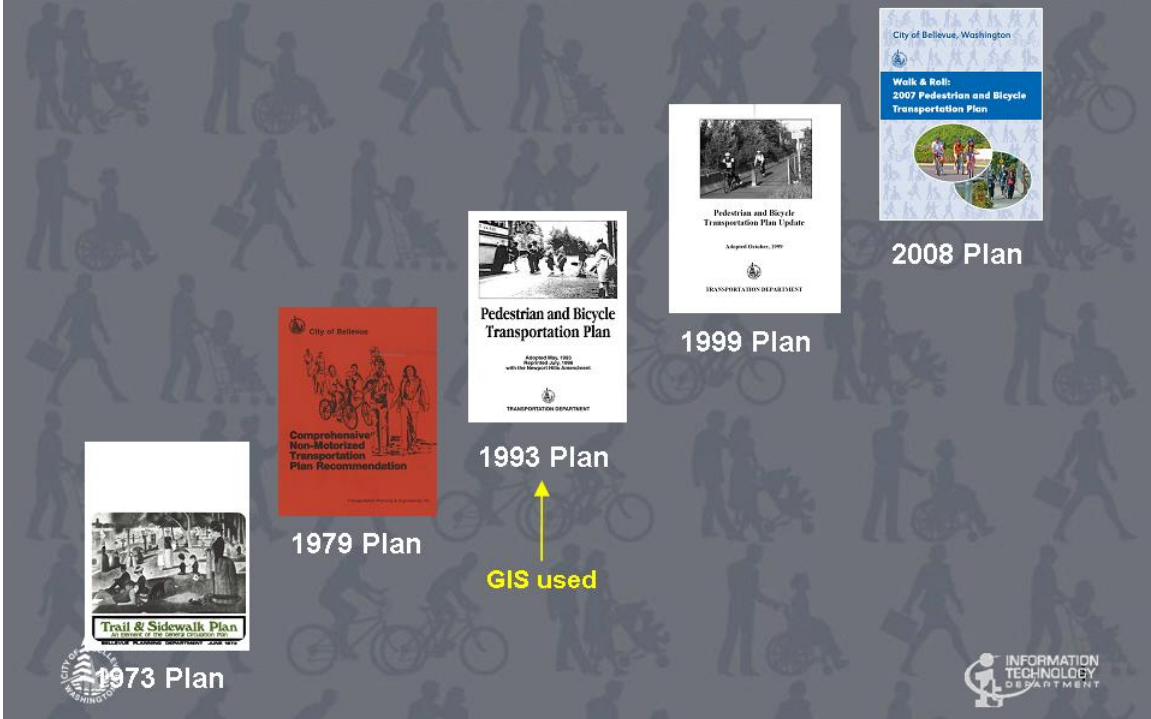


Outline

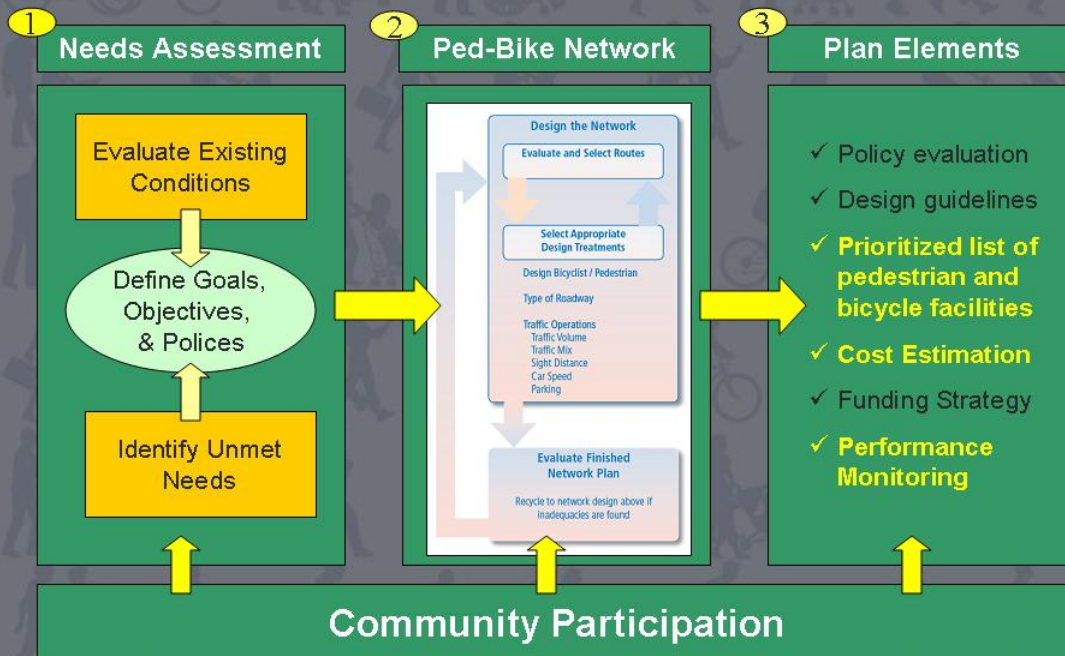
- Intro
 - Brief History and background of Ped/Bike Program
- Defining the “new” Project List
 - Engaging the Public and our Planning Staff
- Prioritization Analysis
 - Tips
- Issues
 - Some solutions too!



34 Years of Non-Motorized Planning



Project Approach



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

Plan Elements

- ✓ Policy evaluation
- ✓ Design guidelines
- ✓ **Prioritized list of pedestrian and bicycle facilities**
- ✓ **Cost Estimation**
- ✓ Funding Strategy
- ✓ **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!)



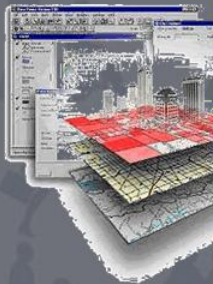
Level of Service Equation – NO!

- **BLOS = 0.507 ln(Vol15/Ln) + 0.199 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 = 1.1199 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)
- PR5 = FHWA's 5-point pavement surface condition rating (5=best)
- We = average effective width of outside through lane:
- We = Wv – (10' * OSPA) where WI = 0
- We = Wv + WI (1 – 2 * OSPA) where WI > 0 & Wps = 0
- We = Wv + WI – 2 (10' * OSPA) where WI > 0, Wps > 0, and a bike lane exists.
- Wt = total width of outside lane (and shoulder) pavement
- OSPA = fraction of segment with occupied on-street parking
- WI = width of paving between outside lane stripe and edge of pavement
- Wps = width of pavement striped for on-street parking
- Wv = effective width as a function of traffic volume
- Wv = Wt if ADT > 4000 veh/day
- Wv = Wt (2 – (ADT/4000)) if ADT < 4000 and road is undivided and unstriped



Site Suitability – Yes!

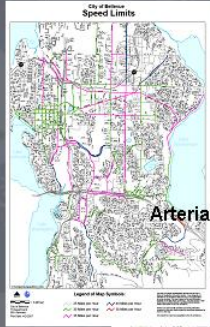


	Category	Points
Corridor Conditions	Severity of problem (how many collisions have occurred)	10
	Roadway arterial classification	10
	System linkage (connectivity to other sidewalk/bikeway facilities)	20
	Bus stop level ridership (1/4 mile proximity)	10
Social Justice	Vehicle ownership (%)	5
	Below poverty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



Other Data Committee Use

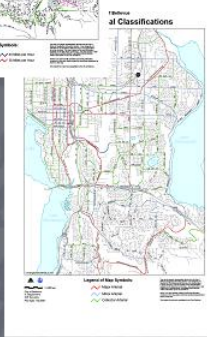
Speed Limit Data



Traffic Volume Data



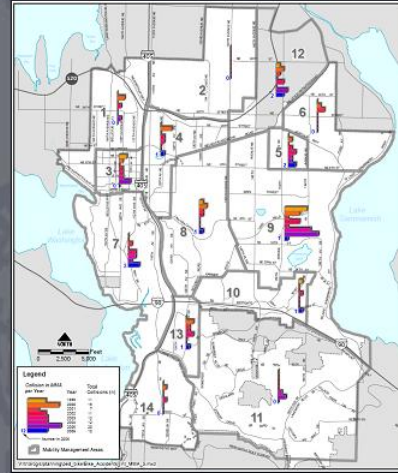
Arterial Type Data



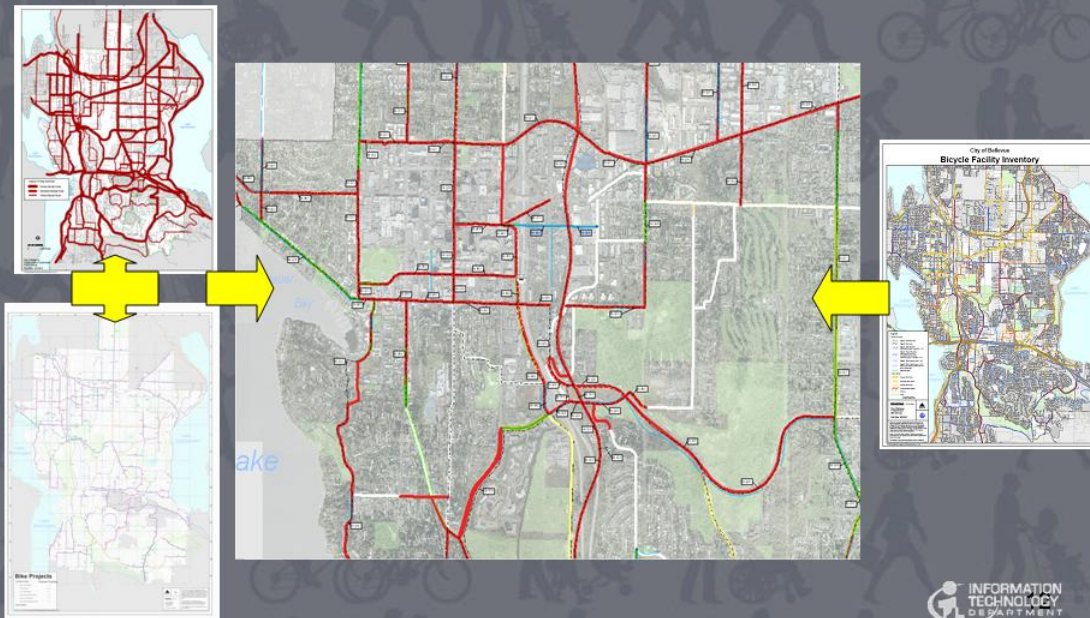
Land Use Data



Collision Data
Ped & Bike



Complete/Incomplete/Not Started... Done/Not Done... Huh?



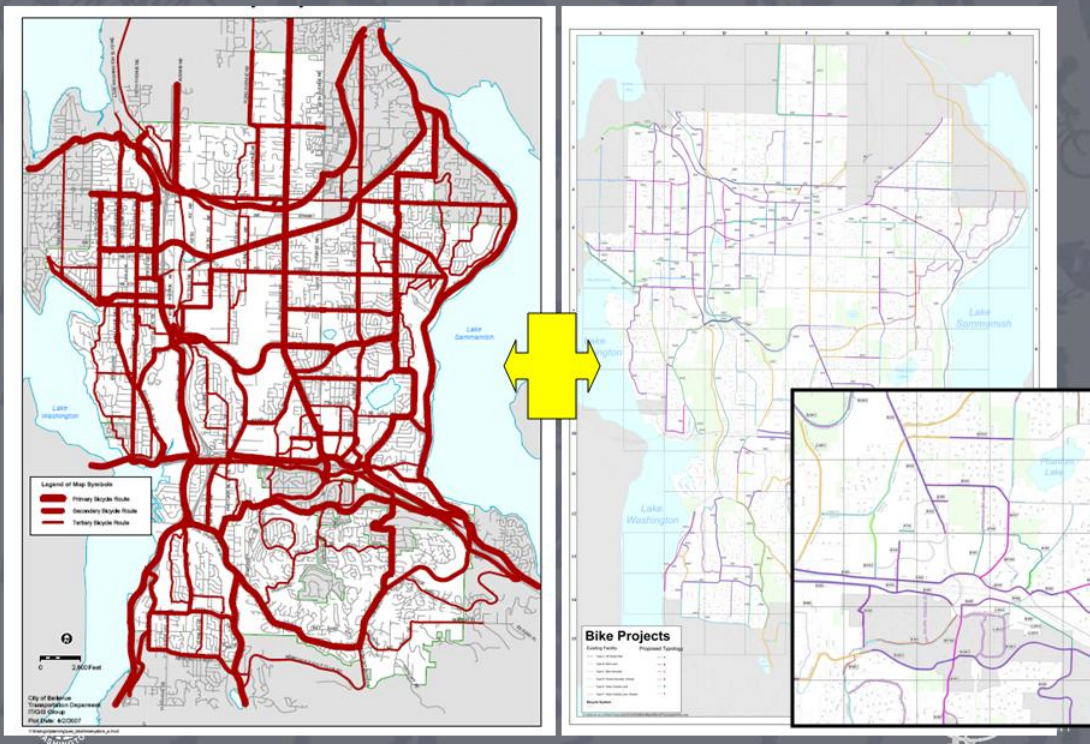
Data Structure Issues

- 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



System

Projects



Typology

Type A: Off-Street Path [21%]



Legend	Length (Miles)
Proposed Type A Bikeways (55 Projects)	39.03
Existing Type A Bikeways	11.17
All Other Proposed Bikeways	148.90
All Other Existing Bikeways	178.69

Type B: Bike Lane [54%]



Legend	Length (Miles)
Proposed Type B Bikeways (72 Projects)	102.10
Existing Type B Bikeways	44.59
All Other Proposed Bikeways	85.84
All Other Existing Bikeways	145.27

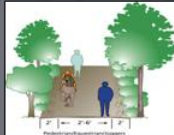
Type A: 5 ft. Sidewalk (& 4 ft. Landscaping Strip) [30%]



Legend	Length (Miles)
Proposed Type A Sidewalks (53 Projects)	25.18
Existing Sidewalks	303.03
All Other Proposed Sidewalks	59.75

Confusing or Clarifying?

Type A: Pedestrian Walking Trail (2'-6') [56%]



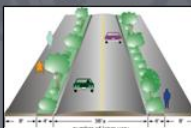
Legend	Length (Miles)
Proposed Type A Trails (39 Projects)	13.90
All Other Existing Trails	96.00
All Other Proposed Trails	10.82

Type B: 6 ft. Sidewalk & 4 ft. Landscaping Strip [55%]



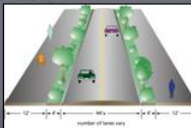
Legend	Length (Miles)
Proposed Type A Sidewalks (61 Projects)	46.51
Existing Sidewalks	303.03
All Other Proposed Sidewalks	38.43

Type C: 8 ft. Sidewalk & 4 ft. Landscaping Strip [15%]



Legend	Length (Miles)
Proposed Type C Sidewalks (25 Projects)	12.46
Existing Sidewalks	303.03
All Other Proposed Sidewalks	72.47

Type D: 12 ft. Sidewalk & 4 ft. Landscaping Strip [1%]



Legend	Length (Miles)
Proposed Type D Sidewalks (3 Projects)	0.79
Existing Sidewalks	303.03
All Other Proposed Sidewalks	87.15

Committee Meeting after Committee Meeting after...

Project	Link	Limits	2007 Plan	Description	Costing
B-226.2	Lakemont Blvd SE	164th Way SE to Forest Dr	B	Add a 6' foot wide bike lane on both sides of Lakemont Boulevard SE from 164th Way SE to Forest Drive	167
B-226.3	Lakemont Blvd SE	164th Way SE to Forest Dr	A	Add a 10'-4' foot wide off-street path on both sides of Lakemont Boulevard SE from 164th Way SE to Forest Drive	246
B-227.1	Village Park Drive SE	Lakemont Blvd SE to eastern city limits	B	Add a 6' foot wide bike lane on both sides of Village Park Drive SE from Lakemont Boulevard SE to the eastern city limits	167
B-229.1	Factoria Blvd/SE Newport Way	Cool Creek Parkway to 120th Pl SE	B	Add a 6' foot wide bike lane on both sides of Factoria Boulevard and SE Newport Way from Cool Creek Parkway to 120th Place SE	167
B-229.3	Newport Way	Downsview Boulevard to the eastern city limits past Lakemont Boulevard	B	Add a 6' foot wide bike lane on both sides of SE Newport Way from east of SE Allen Road to the eastern city limits past Lakemont Boulevard SE	167
B-229.2	SE 60th St	161th Pl SE to eastern city limits	B	Add a 6' foot wide bike lane on both sides the north side of SE 60th Street from 161st Place SE to eastern city limits	167
B-231	164th Ave SE	Lake Hills Blvd to SE 148th St	D	Add a shared shoulder on the east side of 164th Avenue SE from Lake Hills Boulevard to SE 148th Street	112
B-234	Bel-Ried Road	124th Ave NE to Northrup Way	F	Add a shared outside lane on both sides of Bel-Ried Road from 124th Ave NE to Northrup Way	22
B-237	any change from?	NE 12th St	B	Add a 6' foot wide bike lane on both sides of NE 12th Street from 100th Avenue NE to 124th Avenue NE	167
B-238	Northrup Way	Bellevue Way to 120th Ave NE	B	Add a 6' foot wide bike lane on both sides of Northrup Way from Bellevue Way to 120th Avenue NE	167
B-239	164th Way SE/SE 44th Pl/161st Ave SE	Newport Way to Lakemont Blvd	B	Add a 6' foot wide bike lane on both sides of 164th Way SE, SE 44th Place, and 164th Avenue SE from SE Newport Way to Lakemont Boulevard SE	14
B-240	Bel-Ried Road	164th Ave NE to NE 20th St	B	Add a 6' foot wide bike lane on both sides of Bel-Ried Road from 164th Avenue NE to NE 20th Street	167
B-241.1	Northrup Way	West Lake Sammamish Parkway to 160th Avenue NE NE 19th St	B	Add a 6' foot wide bike lane on both sides of Northrup Way from West Lake Sammamish Parkway NE to 160th Avenue NE NE 19th Street	167

Various ways of Eliciting Comments

Docs

Flickr

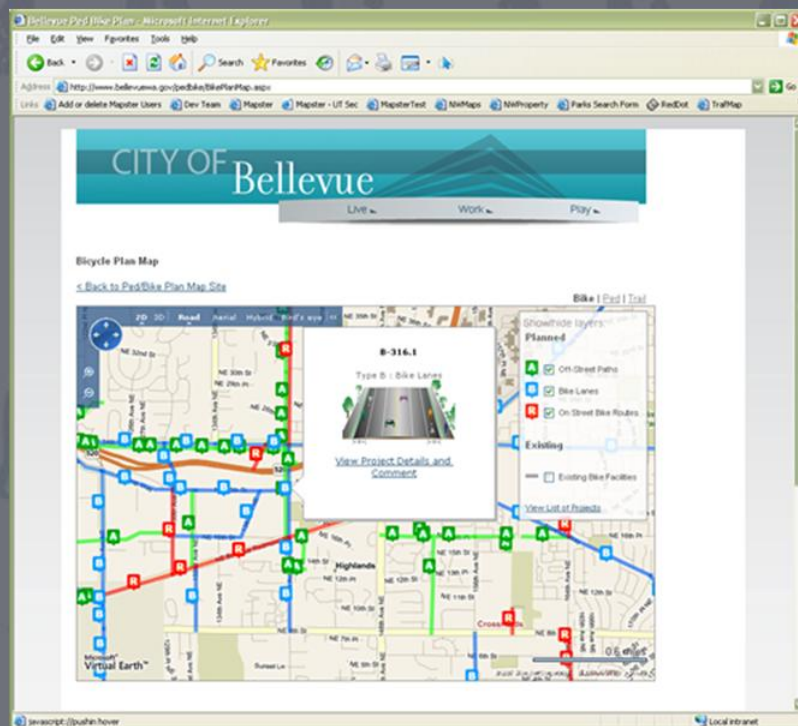
Survey

VE / Comments



Public Website

- Interactive Mapping
- Comments



Comment page

Project B-316.1

Street Name: 140th Ave NE
Type: Bike Lane

Project Limits:
NE 24th St to Bel-Red Road

Description:
Add a 5 foot-wide bike lane on the west side of 140th Avenue NE from NE 24th Street to Bel-Red Road

(Note: This is not a picture of this project or location. The image is an example of what similar projects look like.)

Comments on Project B-316.1

Post a Comment:

Name:
Your first name, a nickname or online alias.

E-Mail:
If you want us to contact you about your comments.

Comments:

Comment Mgmt

Manage comments for Ped Bike Plan site

[Export List to Excel](#)

ID	Name	E-Mail	Project	Comment	Posted
23	James		B-217.1	This small section of road is very dangerous right now. A bike lane would be VERY appreciated! I would rank this highest on any priority on my route.	10 Oct 2007
25	Dan		L-445	Great addition to neighborhood walking choices!	10 Oct 2007
26	Dan		B07-009	This looks interesting, but make sure the eastern entrance has a good connection for westbound bike traffic on Northup Way.	10 Oct 2007
27	Dan		B-382.2	This would mainly be used by walkers, so you could more economically make it a narrower sidewalk.	10 Oct 2007
28	Theresa		S-810	I am excited to learn about project S-810. The sidewalk on Newport Way is very much needed as it is not safe walking now. When will the work be completed?	10 Oct 2007
32	Dan		B07-004	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 tire!	10 Oct 2007
33	Dan		B07-001	I suppose this means actually building NE 16th St as well?	10 Oct 2007
34	Dan		B-237	This is sorely needed. Please make sure the new NE 12th St bridge over I-405 has sufficient space for bike lanes - space for bikes on the 10th St bridge was left out due to limitations on construction near the hospital.	10 Oct 2007
35	Dan		B-217.1	This is an important addition. Currently this section of 140th is like the running of the bulls for bikers.	10 Oct 2007
37			B-205.2		10 Oct 2007
39	Dan		M628	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 nearby 520 bike path makes this unnecessary.	10 Oct 2007
43			B-205.2	This is already a hair-raising intersection for cyclists. Motorists will not be 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 bicyclists at this location? How will they "force" motorists to look in the non-intuitive direction?	11 Oct 2007

Prioritization Phase



Rating Value Max – All 100

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



Final Results

Accidents

Arterials

Bus Stops

Num of Cars

Connections

Employment Centers

Housing Density

Parks

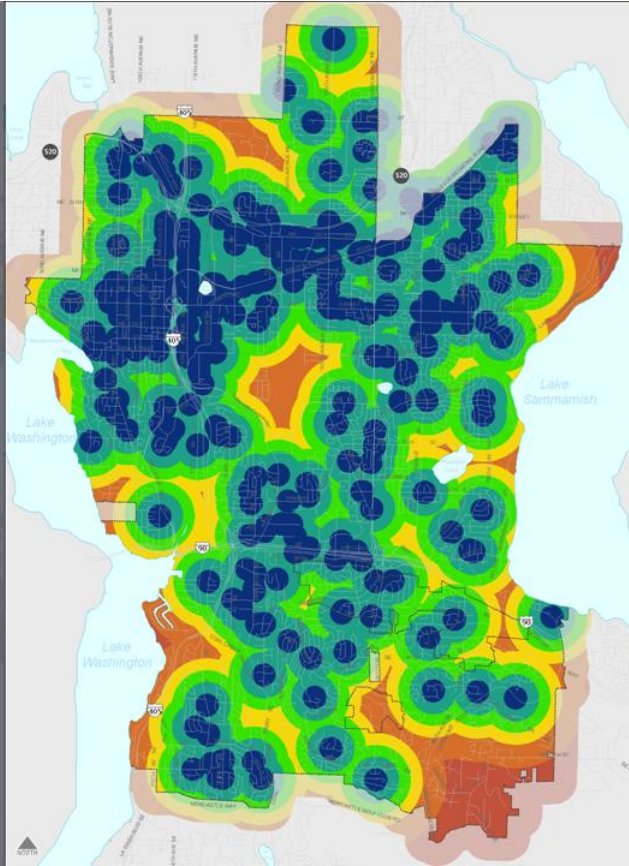
Population

Poverty

Retail

Schools

Social Services



Multiply by Weights (Schools had Weight of 5%)

Attributes of schools

Rowid	VALUE ^	COUNT	SCH_WTS
0	0	848376	0
1	10	2439379	0.5
2	20	5747425	1
3	40	5066634	2
4	60	6174048	3
5	80	5469963	4
6	100	4372878	5

Record: 1 | Show: All ect

Attributes of schools

Rowid	VALUE ^	COUNT	SCH_WTS
0	0	848376	0
1	10	2439379	0.5
2	20	5747425	1
3	40	5066634	2
4	60	6174048	3
5	80	5469963	4
6	100	4372878	5

Record: 4 | Show: All ect

Legend:

- social Value High: 5
- schools Value High: 5
- retail Low: 0
- poverty
- population
- parks



Use <Raster>.<Weight Field> to Calculate Final Indicator Raster

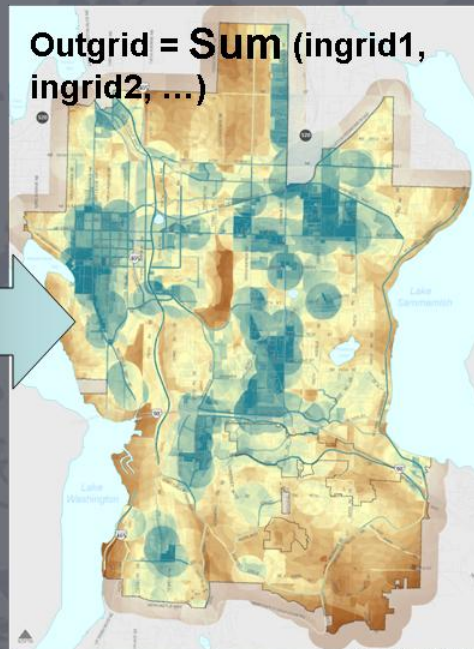
The Raster Calculator dialog box shows the following configuration:

- Layers: connect, employ, hse_den, parks, population, poverty, retail, schools, social
- Expression: `[schools].sch_wts`
- Buttons: Evaluate, Cancel, >>

The Attributes of schools dialog box shows the following table:

COUNT	SCH_WTS
848376	0
2439379	0.5
5747425	1
5066634	2
6174048	3
5469963	4
4372678	5

Final Grid



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!

GISRank	MEAN	GIS Ranking	Staff Rank(1 to 20 scale)	Staff Ranking	Number of Staff (6/16)	Public Input	Co
1	55.254	1	Low	2	1	3	
2	54.9801	2	High	2	1	1	
3	52.7838	3	High	2		3	
4	52.0203	4	Low	3		1	
5	51.9918	5	Low	3		3	
6	49.7871	6	Low	2	1	1	
7	49.6989	7	High	2	1	1	
8	49.6868	8	High	1	4	1	



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

