City of Bellevue

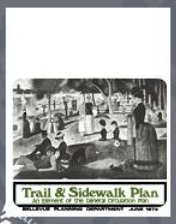
WALK & ROLL

2007-08 Pedestrian and Bicycle Transportation Plan Project Prioritization

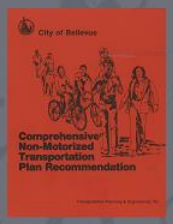
Outline

- 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!

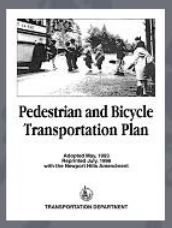
34 Years of Non-Motorized Planning



1973 Plan

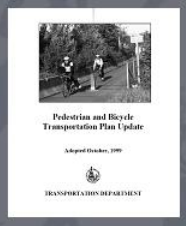


1979 Plan

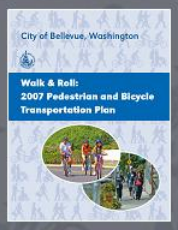


1993 Plan

GIS used

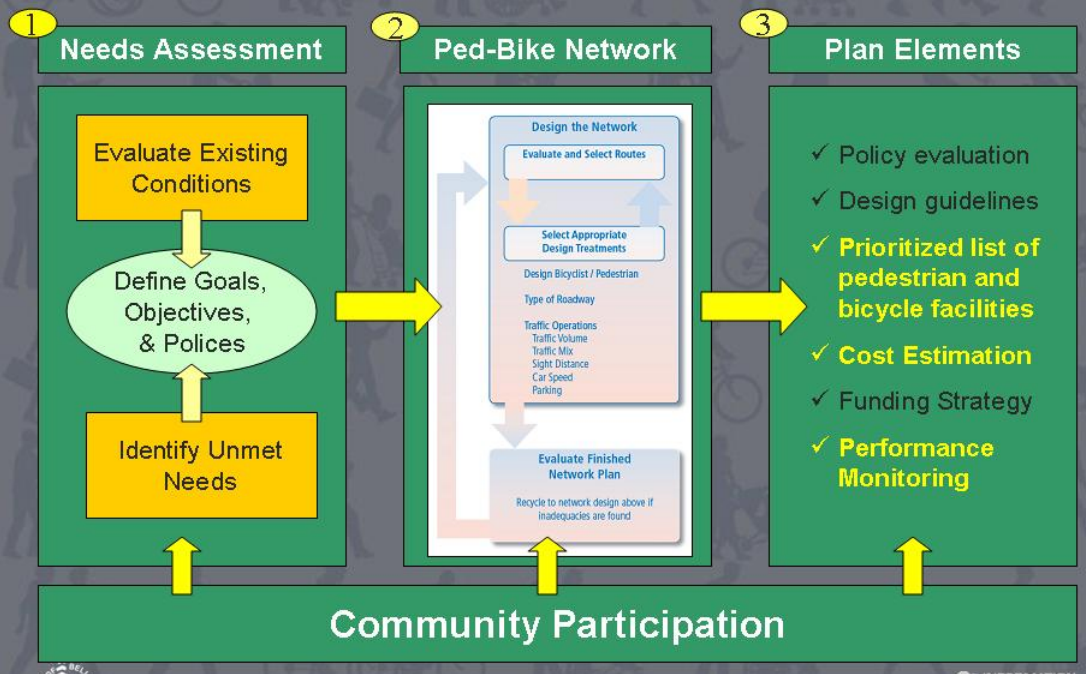


1999 Plan



2008 Plan

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**

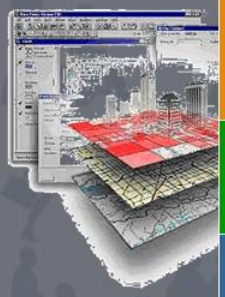
On my way to the Analysis…

- 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 Wl = 0
- We = Wv + Wl (1 – 2 * OSPA) where Wl > 0 & Wps = 0
- We = Wv + Wl – 2 (10' * OSPA) where Wl > 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
- Wl = 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!

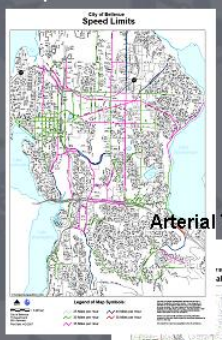


	Category	Points
Corridor Conditions	Severity of problem (how many collisions have occurred)	10
	Roadway arterial classification	10
	System linkage (connectivity to other sidewalk/bikeway facilities)	20
	Bus stop level ridership (1/4 mile proximity)	10
Social Justice	Vehicle ownership (%)	5
	Below poverty 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**

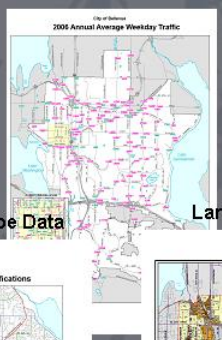
Other Data

Committee Use

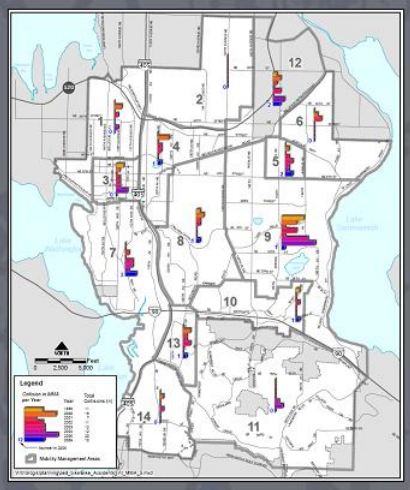
Speed Limit Data



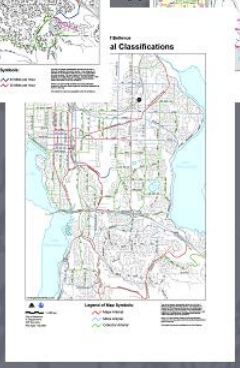
Traffic Volume Data



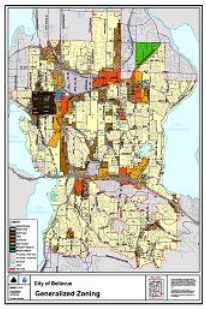
Collision Data
Ped & Bike



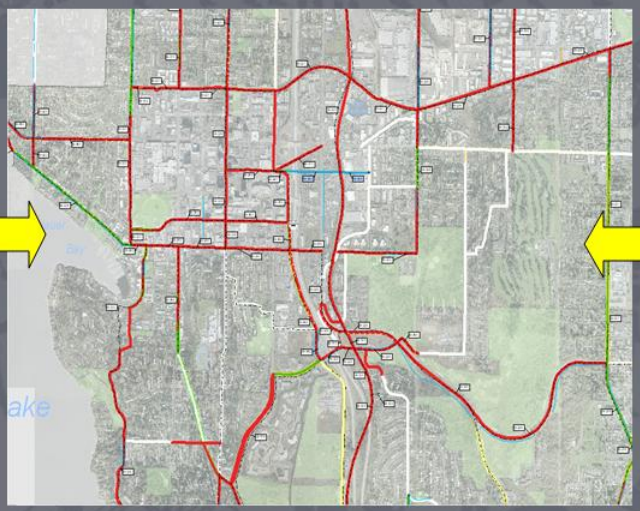
Arterial Type Data



Land Use Data



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

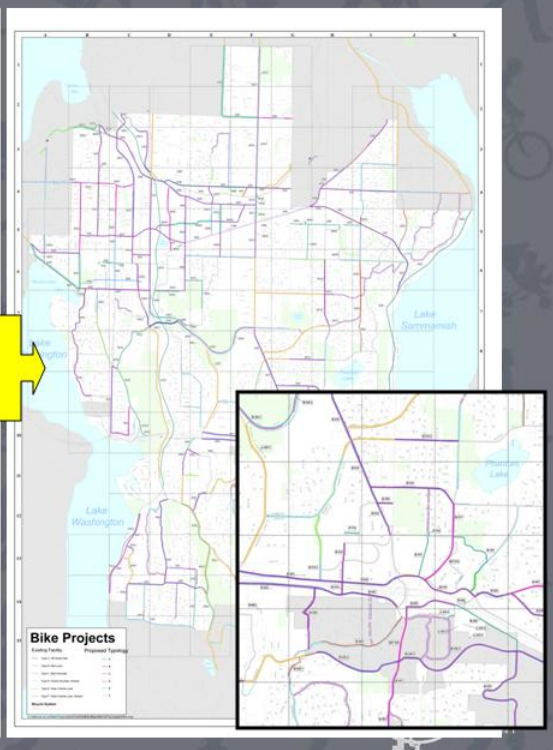


Data Structure Issues

- 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

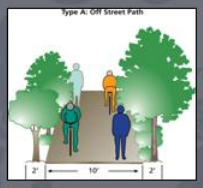
System

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%]

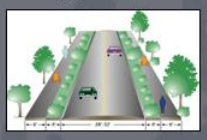
Legend	Length (Miles)
Proposed Type A Sidewalks (53 Projects)	25.18
Existing Sidewalks	303.03
All Other Proposed Sidewalks	59.75

Confusing or Clarifying?

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

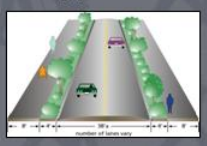
Legend	Length (Miles)
Proposed Type A Trails (39 Projects)	13.90
All Other Existing Trails	96.00
All Other Proposed Trails	10.82

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



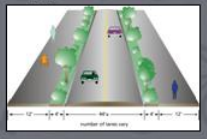
Legend	Length (Miles)
Proposed Type A Sidewalks (61 Projects)	46.51
Existing Sidewalks	303.03
All Other Proposed Sidewalks	38.43

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



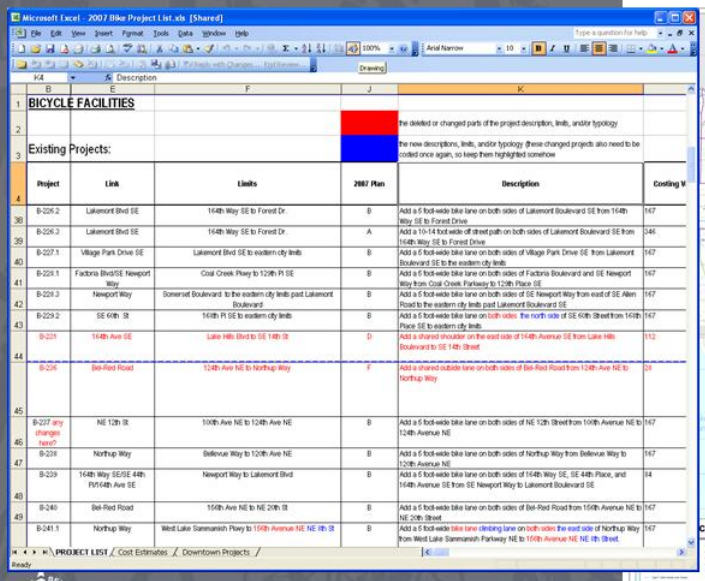
Legend	Length (Miles)
Proposed Type C Sidewalks (25 Projects)	12.46
Existing Sidewalks	303.03
All Other Proposed Sidewalks	72.47

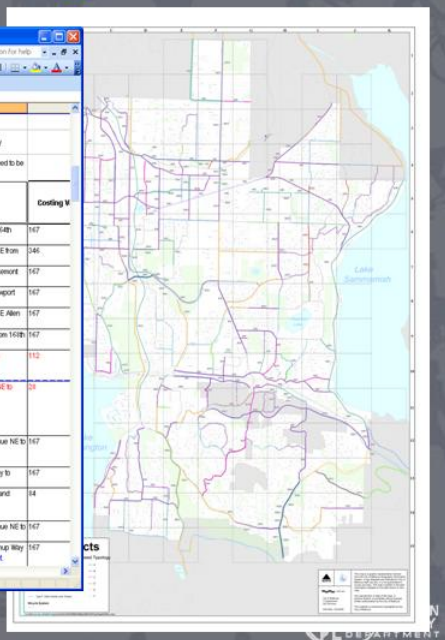
Type D: 12 ft. Sidewalk & 4 ft. Landscaping Strip [1%]



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

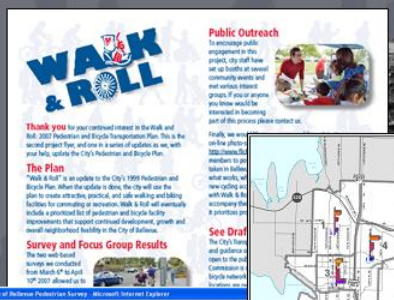
Committee Meeting after Committee Meeting after…



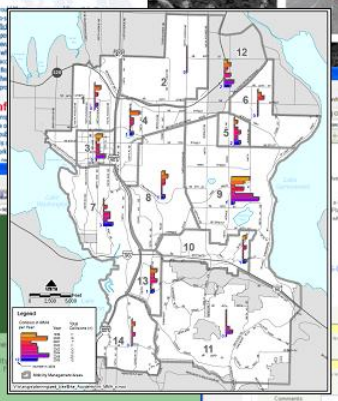


Various ways of Eliciting Comments

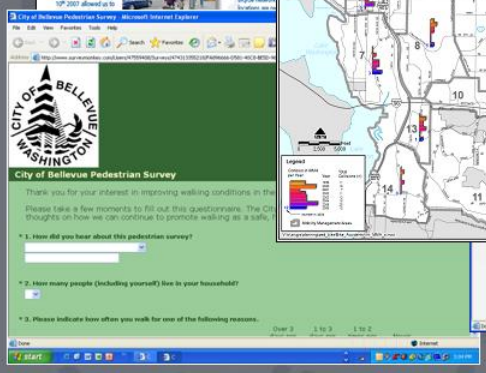
Docs

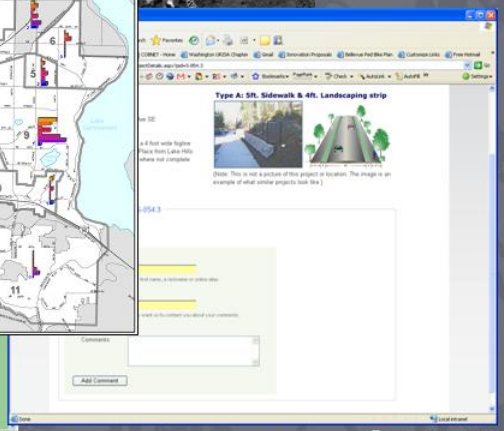


Flickr



Survey

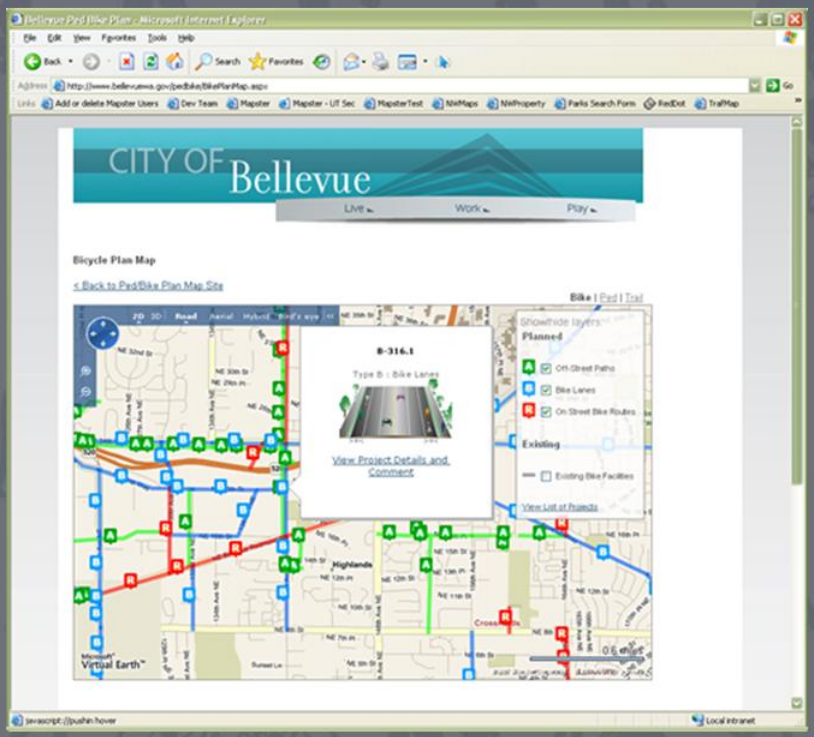




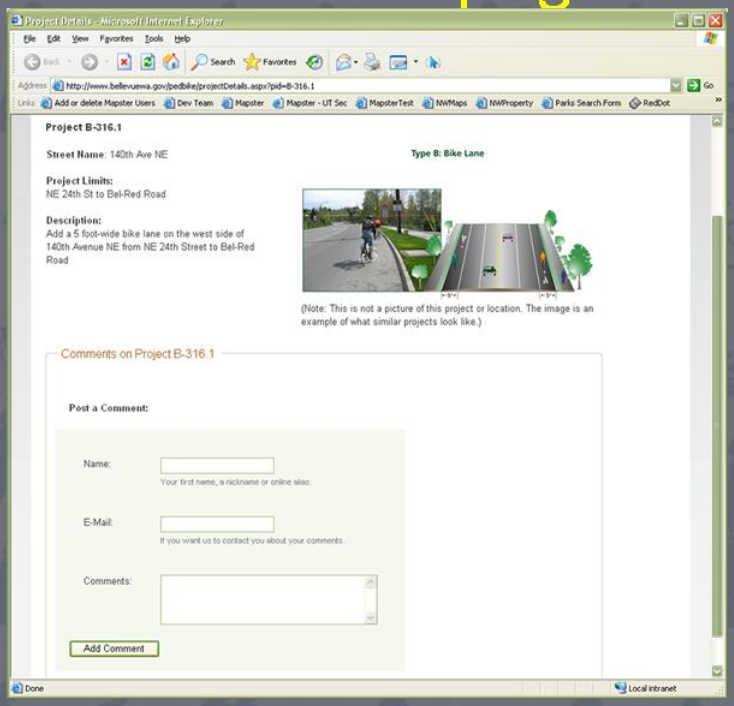
VE / Comments

Public Website

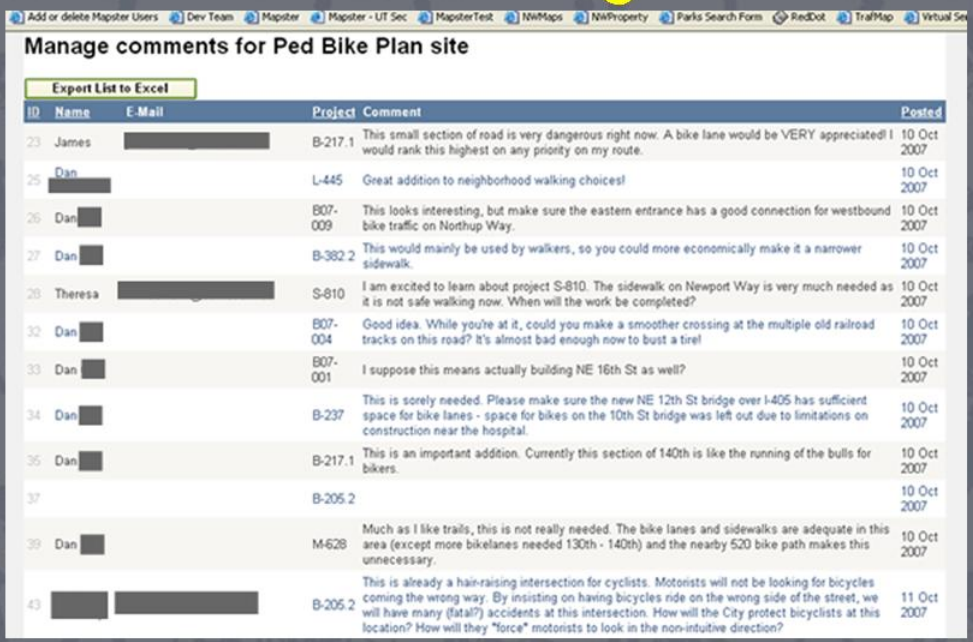
- Interactive Mapping
- Comments



Comment page



Comment Mgmt



Manage comments for Ped Bike Plan site

Export List to Excel

ID	Name	E-Mail	Project	Comment	Posted
23	James	[redacted]	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 [redacted]		L-445	Great addition to neighborhood walking choices!	10 Oct 2007
26	Dan [redacted]		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 [redacted]		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	[redacted]	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 [redacted]		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 [redacted]		B07-001	I suppose this means actually building NE 16th St as well?	10 Oct 2007
34	Dan [redacted]		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 [redacted]		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 [redacted]		M-628	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	[redacted]	[redacted]	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
			1.0+	100
	Roadway Arterial Classification Proximity (ft)	10	Collector	10
			Minor	50
			Major	100
	Bus Stop Level Ridership (1/4 Mile Proximity)	10	25+ boardings	100
			10 - 24 boardings	50
			<10 boardings	20
	Vehicle Ownership (%)	5	0-10	100
			11-20	80
			21-30	60
			31-40	40

Final Results

Accidents

Arterials

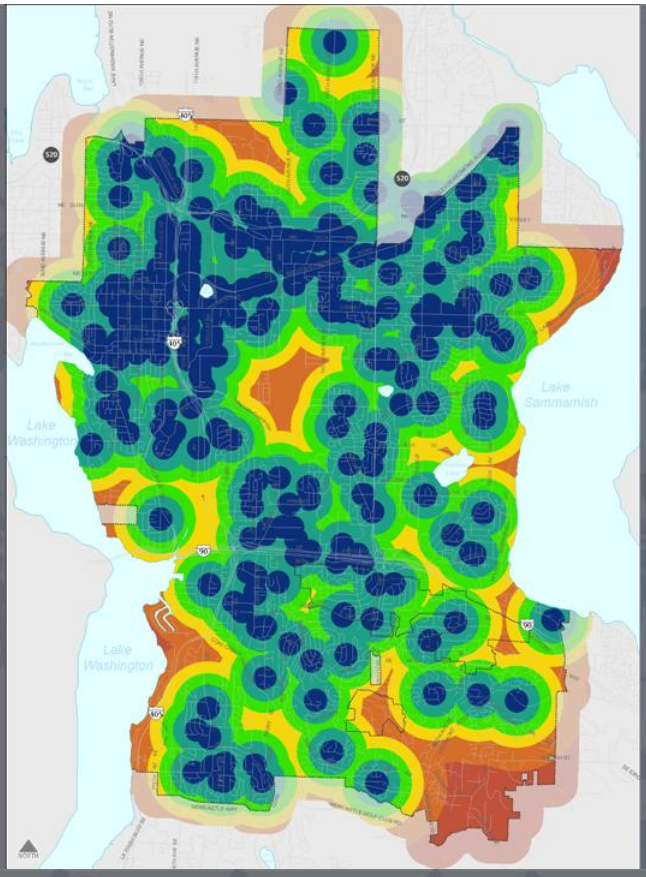
Bus Stops

Num of Cars

Connections

Employment Centers

Housing Density



Parks

Population

Poverty

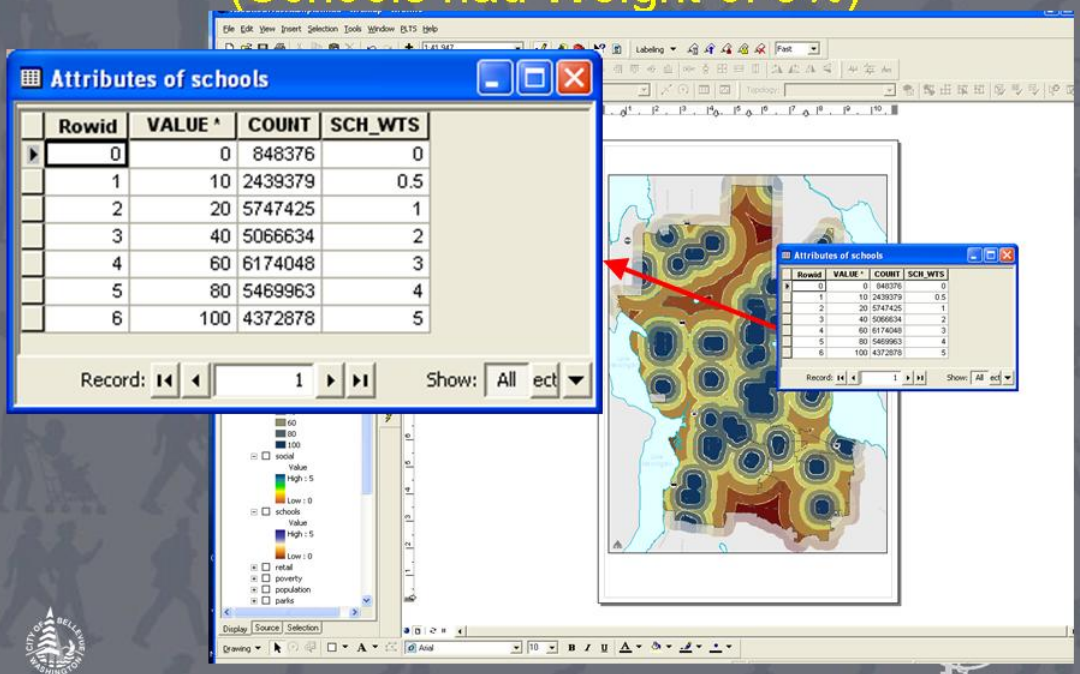
Retail

Schools

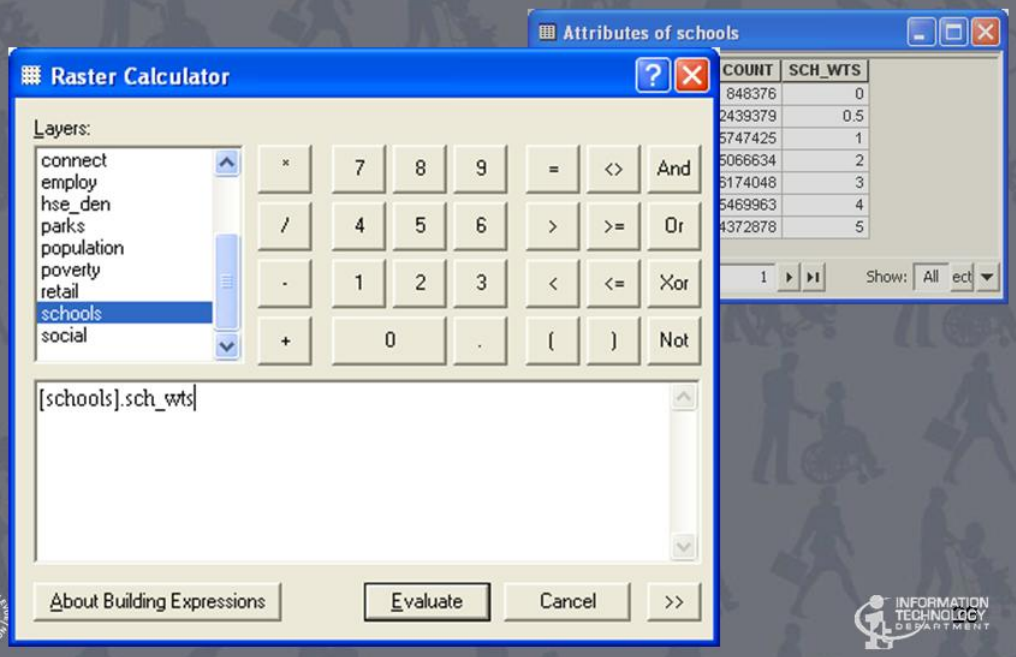
Social Services

Multiply by Weights

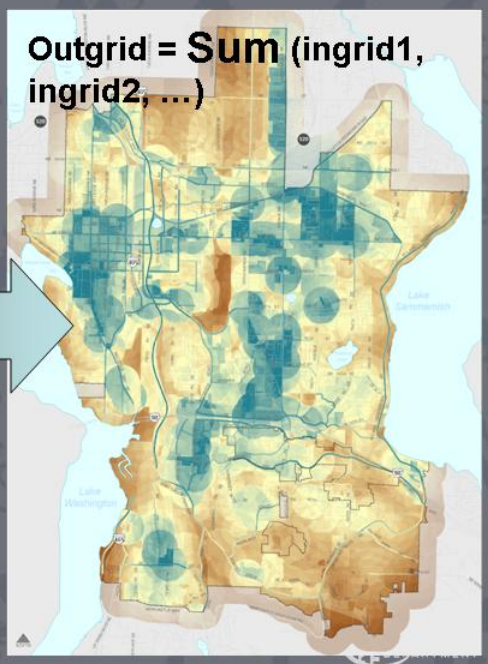
(Schools had Weight of 5%)



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



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	C
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