

Geodatabase to Assist with Accessible Route Identification for Wheelchair Users

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Project Outline

- ▣ The Design objective
- ▣ Background
- ▣ Methods and Techniques
- ▣ Analysis
- ▣ Other Applications

Design Objective

To design a geodatabase that will assist wheelchair users with identifying accessible travel routes

Project background

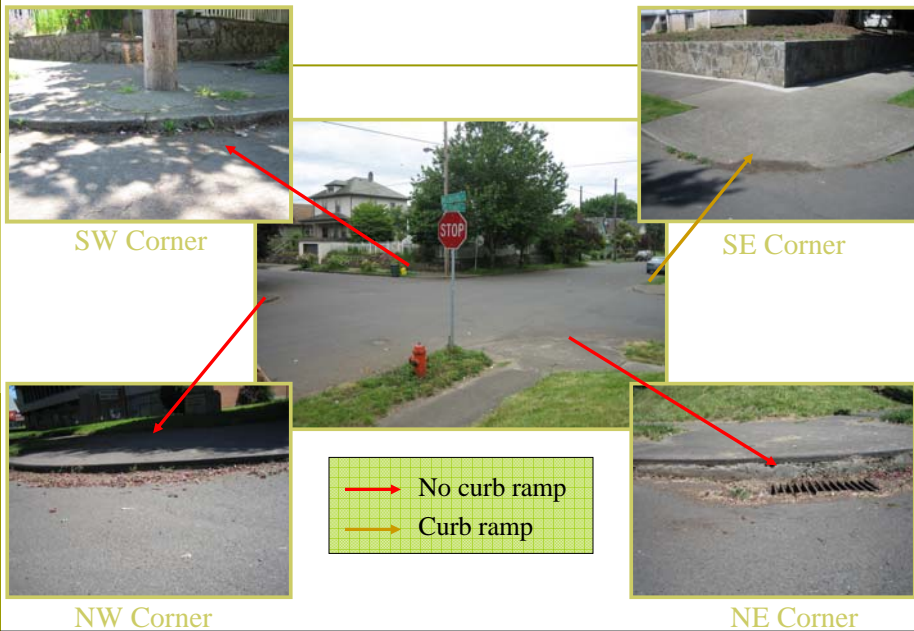
- ❑ Wheelchair users face barriers to their mobility while navigating the urban landscape:
 - Incomplete sidewalks
 - Curb ramps that do not connect
 - Steep inclines and declines
- ❑ The absence of safe accessible routes can place individuals using wheelchairs in dangerous situations add to travel time

Missing links of sidewalk



Missing link of sidewalk at the intersection of N. Druid Avenue and Willis Blvd.

Lack of Curb Ramps



Slope

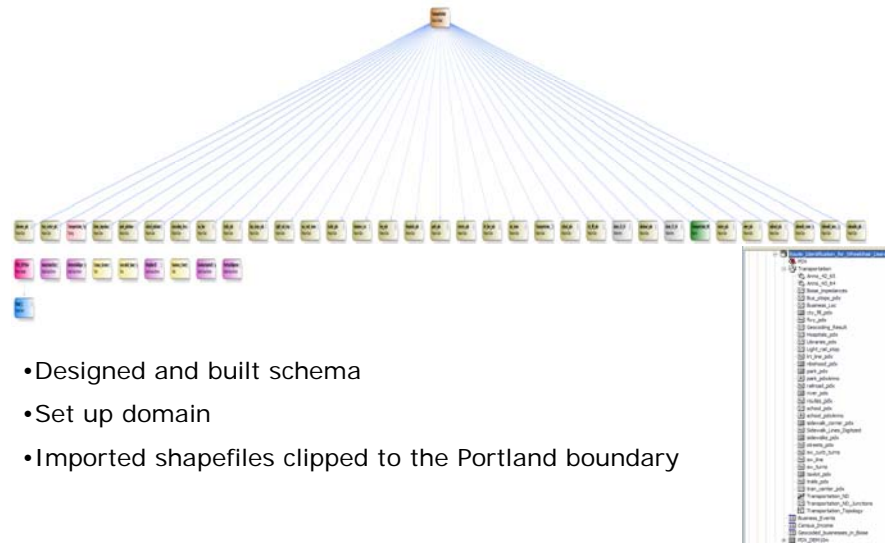


Data Acquisition

RLIS		CITY OF PORTLAND (office of Transportation)
Tax lots	Schools	Sidewalks
City Fill	Streets	Sidewalks corners
Bus stops	Transit ctr.	
Freeway	Trails	WALK SCORE
Hospitals	Railroads	Business addresses
Library	Light rail stops	
Neighborhoods	DEM 10m	US CENSUS BUREAU
Parks	COLLECTED	Income
River	Curb ramps	

Geodatabase

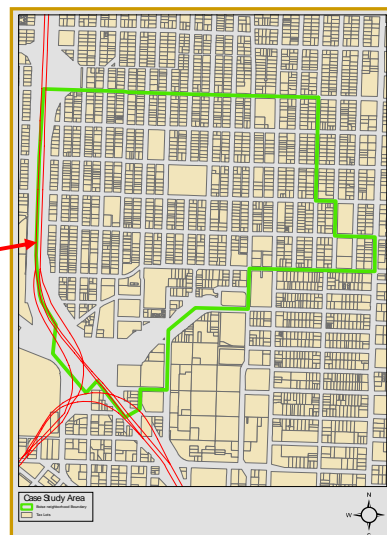
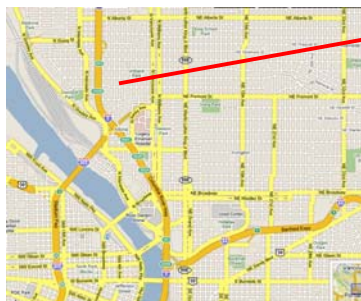
Methods and Techniques



Study area

Area extent: Portland

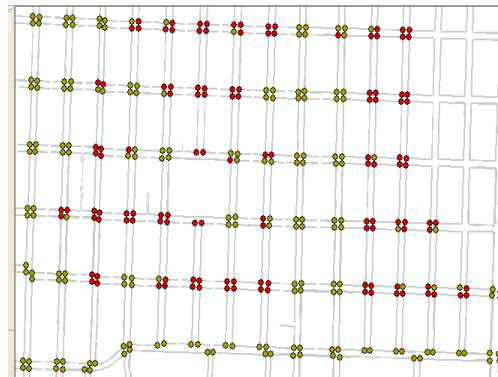
Boise neighborhood located in northeast Portland between Mississippi Avenue and Martin Luther King Blvd and Shaver Avenue and Stanton Avenue



Curb Ramps

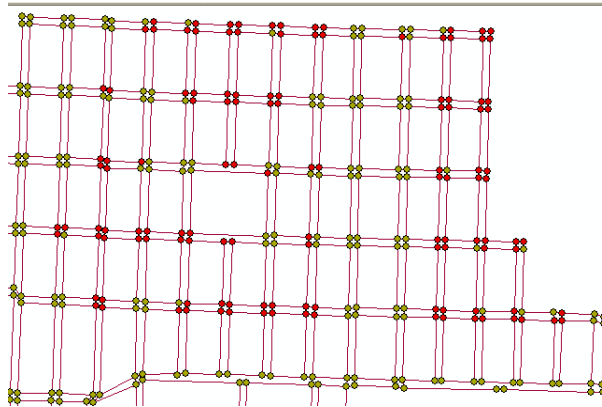
Methods and Techniques

- Curb ramp data
 - Walked Boise neighborhood recorded curb ramp locations
 - Created a feature class called Boise_impedances
 - Digitized the curb ramp data (Bureau of Planning has curb ramp data in paper form) with an attribute field indicating yes or no curb ramp



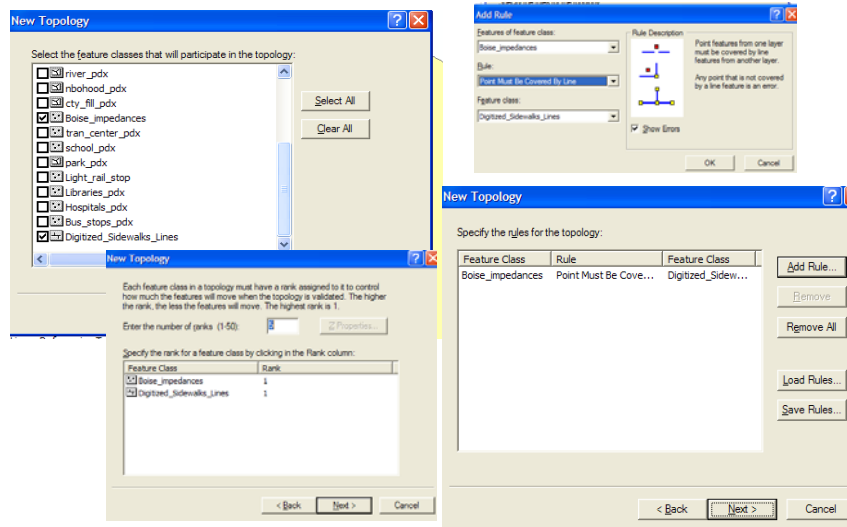
Methods and Techniques

- Digitized east/west and north/south lines along sidewalks

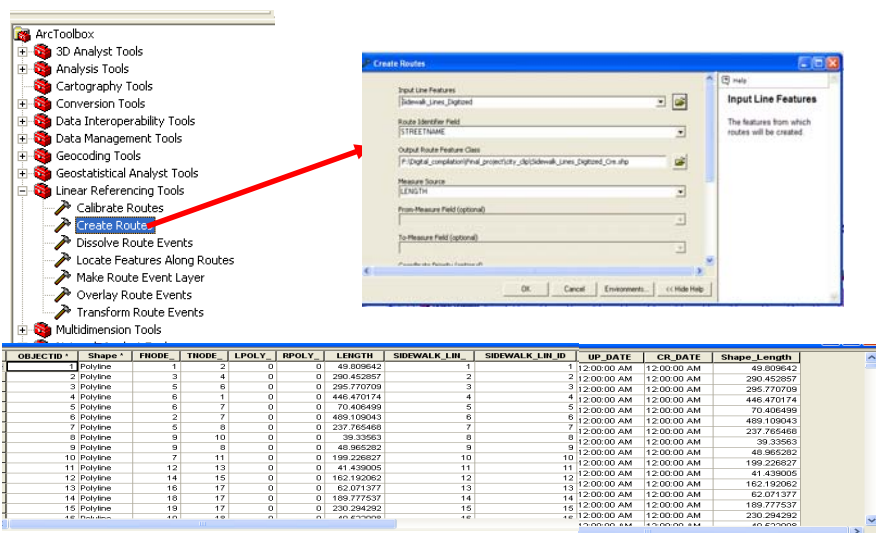


Topology

Methods and Techniques



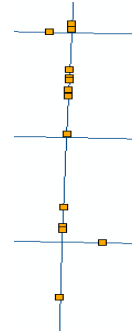
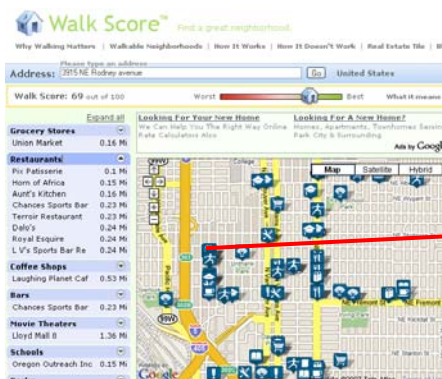
Created a route using digitized lines



Geocoded

Methods and Techniques

- ❑ Used walkscore.com to determine local business addresses
 - Geocoded the businesses in the neighborhood using RLIS streets



Section of N. Mississippi Ave

Create Turn Table

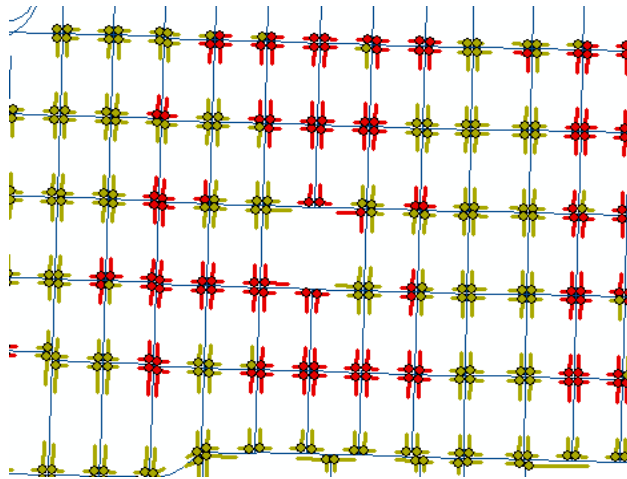
Methods and Techniques

Rowid	HODE#	ARC1#	ARC2#	AZIMUTH	ANGLE	ARC1-ID	ARC2-ID
1	1	4	1	187.8237	98.79436	4	1
2	1	1	4	269.0293	-98.79436	1	4
3	2	6	1	187.5785	-81.4508	6	1
4	2	1	6	89.0293	81.4508	1	6
5	3	74	2	180.4813	89.1491	74	2
6	3	2	74	271.3322	-89.1491	2	74
7	5	7	3	180.9836	130.4249	7	3
8	5	3	7	230.5597	-130.4249	3	7
9	6	22	5	181.5194	129.2136	22	5
10	6	22	4	181.5194	-6.304295	22	4
11	6	22	3	181.5194	-49.03937	22	3
12	6	5	22	232.3058	129.2136	5	22
13	6	5	4	232.3058	44.48211	5	4
14	6	5	3	232.3058	1.747041	5	3
15	6	4	22	7.823657	6.304295	4	22
16	6	4	5	7.823657	-44.48211	4	5
17	6	4	3	7.823657	137.2649	4	3
18	6	3	22	50.55873	49.03937	3	22
19	6	3	5	50.55873	-1.747041	3	5
20	6	3	4	50.55873	-137.2649	3	4
21	7	20	10	181.0545	112.6847	20	10
22	7	20	6	181.0545	-7.890923	20	6
23	7	20	5	181.0545	-51.25124	20	5
24	7	10	20	248.3699	112.6847	10	20
25	7	10	6	248.3699	59.42442	10	6
26	7	10	5	248.3699	16.06411	10	5
27	7	6	20	8.945455	7.890923	6	20
28	7	6	10	8.945455	-59.42442	6	10
29	7	6	5	8.945455	136.6397	6	5

- ArcInfo was used to create a coverage
- Created a Turn feature class from the coverage

Turn Feature Class

Methods and Techniques

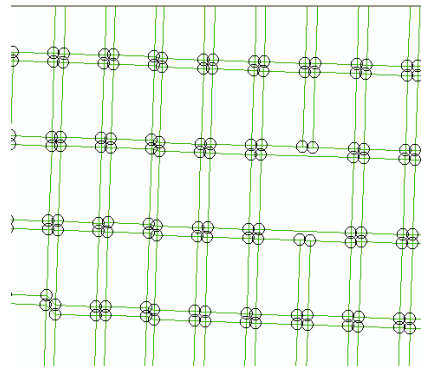


Joined the Boise_impedance feature class to the turn feature class

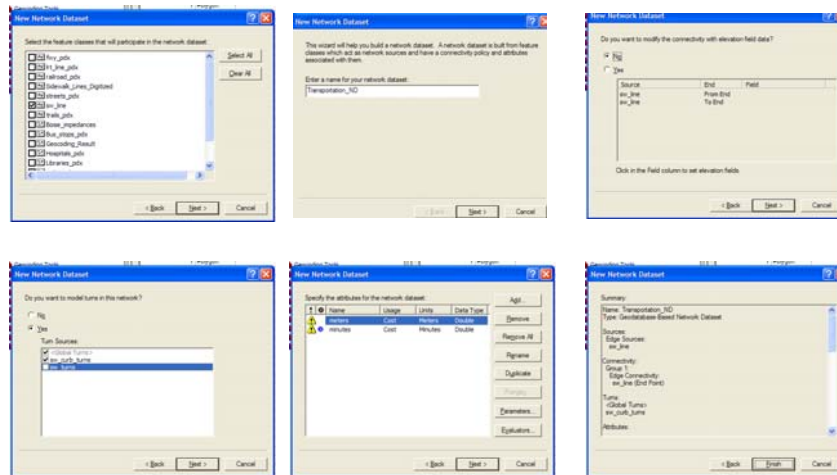
Create Network Data Set

Methods and Techniques

- ▣ Created a network dataset in my geodDB
- ▣ Built the network
 - Edges
 - Junctions



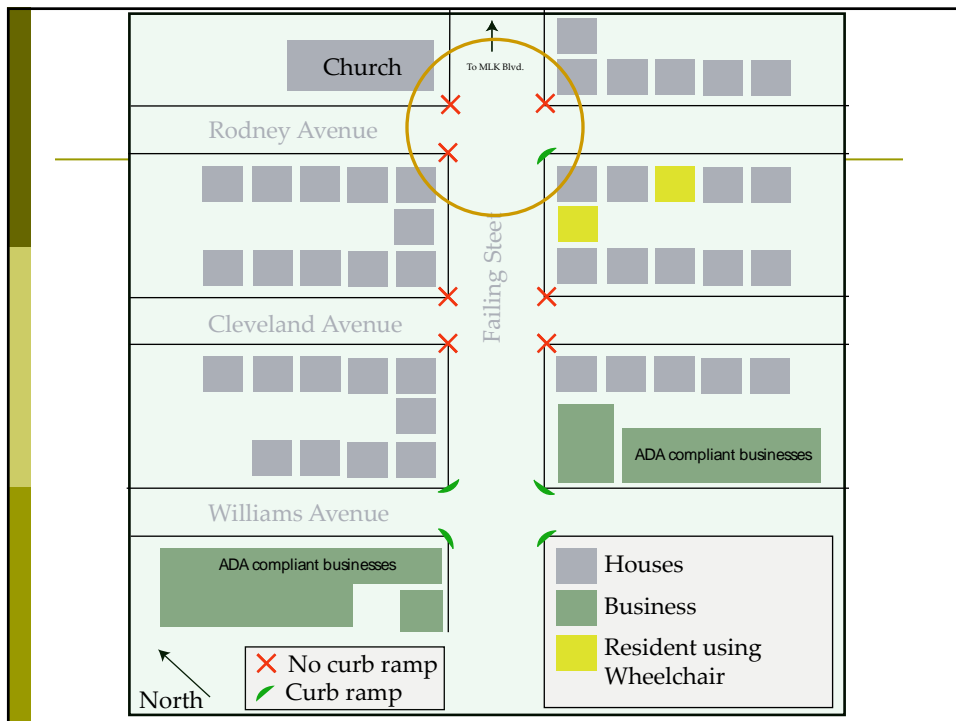
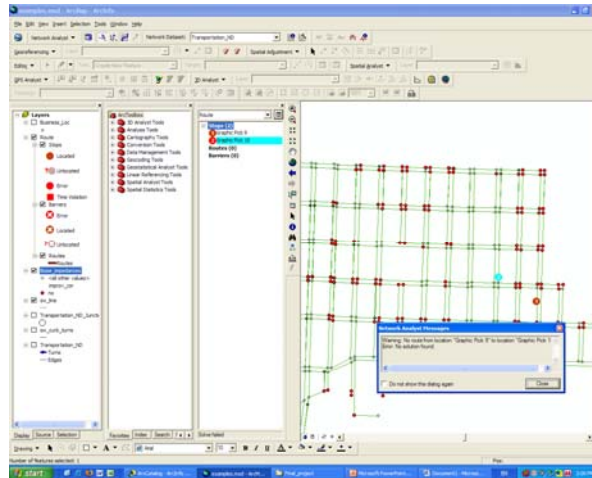
Create Network Data Set Methods and Techniques



Analysis

Shortest path Analysis

No access

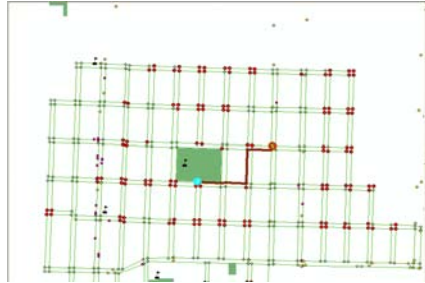


Bus stop to school

Closest stop to SEI school is the #44 bus stop on Failing and N.Vancouver

Shortest accessible path is .25 miles

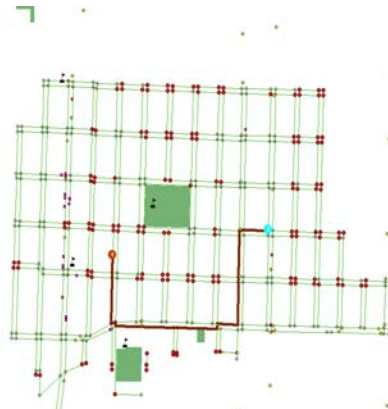
Shortest able bodied path is .15 miles



Trip to the New Old Lompoc Brewery

Wheelchair distance is .7 miles

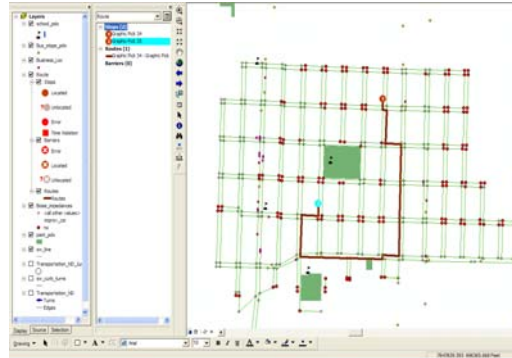
Able-bodied distance .4 miles



Visiting a friends house

Wheelchair user .8 mile

Able-bodied pedestrian .4 miles



Applications

- ❑ Foundation for interactive map
- ❑ This geodatabase can serve as the foundation for further studies on curb ramp connectivity
- ❑ Resource allocation
 - The BOM will be able to make better use of their monetary resources and make a more profound impact on overall neighborhood accessibility
- ❑ Census data can be used to assess neighborhood demographics
- ❑ Determine slope of area to find least cost path using DEM

QUESTIONS?

References

- Chang, K. Introduction to Geographic Information System.Report. McGraw-Hill. 2005.
- Beale, L., K. Field, D. Briggs, P. Picton, and H. Matthews. 2006. Mapping for Wheelchair Users: Route Navigation in Urban Spaces. *Cartographic Journal* 43: 68-81.
- Church, R. L., and J. R. Marston. 2003. Measuring Accessibility for People with a Disability. *Geographical Analysis* 35:83
- Census Bureau. 2005. U.S. Census Bureau, 2005 American Community Survey. Internet accessed November 30, 2007
- ❑ www.walkscore.com
 - ❑ www.esri.com
 - ❑ Geoffrey Duh

Thanks to Rhonda, Dan C., Joe, and Luis for their suggestions