Regional Planning and GIS at SWRPA
What is SWRPA

• South Western Regional Planning Agency
• 1 of 14 RPOs in Connecticut
• Eight municipalities in Fairfield County
  • Darien, Greenwich, New Canaan, Norwalk, Stamford, Weston, Westport, Wilton
• 364,519 population, 210 sq. mi.,
• Distinguishing characteristics:
  • Traffic, and lots of it
  • Transit riders
  • High housing costs
  • Wealthy, well-educated workforce
  • Diverse population
• Focus areas:
  • Transportation
  • Land use, environment, housing, emergency management
Connecticut's South Western Region
GIS @ SWRPA

• 3 GIS users in office
• 2 ArcGIS, 1 ArcInfo, 1 Spatial Analyst
• South Western Region GIS user group
  • 7 of 8 SWR municipalities have GIS
  • 5 of 8 have very good GIS
• Use GIS for:
  • Mapping more than analysis
  • Transportation
  • Environment
  • Land Use
  • Emergency management
Travel Speed: Southbound AM (7:00 am - 9:00 am)

South-Western Region Travel Time Monitoring Program - Spring 2011 Congestion Management Process

Figure 3

Travel Speeds (MPH)
- > 60
- 50 - 60
- 40 - 50
- 30 - 40
- 20 - 30
- < 20

- Local Street
- Highway
- Metro-North Railroad
- Municipal Boundary
- State Boundary

Traffic Volume and Volume-to-Capacity Ratio by Route Segment, 2009

2010 Congestion Screening and Monitoring Report
Connecticut Department of Transportation

Figure 1

Volume-to-Capacity Ratio
- Severe Congestion (V/C = > 1.0)
- Moderate Congestion (V/C = 0.8 - 1.0)
- Marginal Congestion (V/C = 0.6 - 0.8)
- No Congestion (V/C = < 0.8)

Traffic Volume (ADT)

<table>
<thead>
<tr>
<th>Traffic Volume (ADT)</th>
<th>100,000 - 100,000</th>
<th>90,000 - 100,000</th>
<th>80,000 - 90,000</th>
<th>70,000 - 80,000</th>
<th>60,000 - 70,000</th>
<th>50,000 - 60,000</th>
<th>40,000 - 50,000</th>
<th>30,000 - 40,000</th>
<th>20,000 - 30,000</th>
<th>10,000 - 20,000</th>
<th>&lt; 10,000</th>
</tr>
</thead>
</table>

Volume-to-Capacity Ratio is a measure of traffic demand on a facility (expressed as volume) compared to its traffic-carrying capacity. A V/C ratio of 0.7, for example, indicates that a traffic facility is operating at 70% of its capacity.

Table:

<table>
<thead>
<tr>
<th>Route</th>
<th>Direction</th>
<th>AM/PM</th>
<th># Runs</th>
<th>Mean Travel Time</th>
<th>Min. Travel Time</th>
<th>Max. Travel Time</th>
<th>Mean Speed</th>
<th>Max. Speed</th>
<th>Min. Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-95</td>
<td>S</td>
<td>AM</td>
<td>5</td>
<td>1.02 55</td>
<td>0.50 13</td>
<td>1.18 24</td>
<td>33 41</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>CT 15</td>
<td>S</td>
<td>AM</td>
<td>5</td>
<td>1.01 22</td>
<td>0.54 11</td>
<td>1.16 45</td>
<td>37 42</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>US 7</td>
<td>S</td>
<td>AM</td>
<td>5</td>
<td>0.48 18</td>
<td>0.41 13</td>
<td>0.48 24</td>
<td>27 28</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>US 7</td>
<td>N</td>
<td>PM</td>
<td>5</td>
<td>1.31 49</td>
<td>0.55 18</td>
<td>1.34 63</td>
<td>29 40</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>CT 15</td>
<td>N</td>
<td>PM</td>
<td>5</td>
<td>0.56 07</td>
<td>0.44 59</td>
<td>1.26 56</td>
<td>40 50</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>US 7</td>
<td>N</td>
<td>PH</td>
<td>4</td>
<td>0.41 49</td>
<td>0.35 07</td>
<td>1.06 12</td>
<td>30 36</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

Extent of corridor studied: I-95 = 34.54 miles; CT 15 = 27.52 miles; US 7 = 33.59 miles
Source: South-Western Region Travel Time Monitoring Program - Spring 2011
Highlights

- Bicycle and pedestrian safety
- Online mapping
- Evacuation planning
- Regional land use and zoning inventory
Bicycle and Pedestrian Safety

Downtown Stamford
### Bicycle and Pedestrian Safety (cont.)

<table>
<thead>
<tr>
<th>Corridor Name</th>
<th>Municipality</th>
<th>Route From</th>
<th>Street</th>
<th>Route To</th>
<th>Street</th>
<th>Length (mile)</th>
<th>Speed Limit (mph)</th>
<th>Average ADT</th>
<th>Bike</th>
<th>Ped.</th>
<th>Total / Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenwich</td>
<td>Greenwich</td>
<td>1</td>
<td>Benedict Place</td>
<td>Indian Field Road</td>
<td></td>
<td>1.39</td>
<td>30</td>
<td>21,316</td>
<td>7</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Tresser Boulevard</td>
<td>Stamford</td>
<td>1</td>
<td>Rose Park Ave</td>
<td>Greyrock Place</td>
<td></td>
<td>0.65</td>
<td>25 (‐30)</td>
<td>21,400</td>
<td>7</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>Washington Boulevard</td>
<td>Stamford</td>
<td>137 / 493</td>
<td>Station Place</td>
<td>Broad Street</td>
<td></td>
<td>0.66</td>
<td>25</td>
<td>22,733</td>
<td>7</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>East Main Street</td>
<td>Stamford</td>
<td>1</td>
<td>Broad Street</td>
<td>Standish Road</td>
<td></td>
<td>0.89</td>
<td>30</td>
<td>21,002</td>
<td>5</td>
<td>26</td>
<td>31</td>
</tr>
<tr>
<td>Connecticut Avenue</td>
<td>Norwalk</td>
<td>1</td>
<td>Shop Rite I</td>
<td>S 95 exit 14</td>
<td></td>
<td>0.37</td>
<td>35</td>
<td>25,300</td>
<td>2</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Main Street</td>
<td>Norwalk</td>
<td>123</td>
<td>Cross Street</td>
<td>Ohio Ave</td>
<td></td>
<td>0.55</td>
<td>30</td>
<td>14,100</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Westport</td>
<td>Westport</td>
<td>33 / 1</td>
<td>Riverside Ave</td>
<td>Powers Court</td>
<td></td>
<td>0.55</td>
<td>25 (‐30)</td>
<td>20,049</td>
<td>2</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>
Bicycle and Pedestrian Safety (cont.)

Westport Safety Corridor - US 1 (Beantown Road) / CT 22 (Riverside Avenue)

<table>
<thead>
<tr>
<th>Safety Corridor</th>
<th>Route</th>
<th>Mile Post</th>
<th>Case #</th>
<th>Day</th>
<th>Time</th>
<th>Light Condition</th>
<th>Road Surface</th>
<th>Fault Vehicle</th>
<th>Non Fault Vehicle(s)</th>
<th>Contributing Factor</th>
<th>Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westport</td>
<td>33</td>
<td>1.60</td>
<td>100958</td>
<td>Friday</td>
<td>18.11</td>
<td>Dark Lighted</td>
<td>Dry</td>
<td>Automobile</td>
<td>Pedestrian</td>
<td>Violated Traffic Control</td>
<td>Non-Incapacitating Evident Injury</td>
</tr>
<tr>
<td>Westport</td>
<td>33</td>
<td>1.60</td>
<td>148483</td>
<td>Thursday</td>
<td>09.00</td>
<td>Daylight</td>
<td>Dry</td>
<td>Automobile</td>
<td>Pedestrian</td>
<td>Failed to Grant Right of Way</td>
<td>Possible Injury</td>
</tr>
<tr>
<td>Westport</td>
<td>1</td>
<td>19.35</td>
<td>157751</td>
<td>Thursday</td>
<td>10.44</td>
<td>Daylight</td>
<td>Dry</td>
<td>Automobile</td>
<td>Pedestrian</td>
<td>Failed to Grant Right of Way</td>
<td>Non-Incapacitating Evident Injury</td>
</tr>
<tr>
<td>Westport</td>
<td>1</td>
<td>19.39</td>
<td>129435</td>
<td>Thursday</td>
<td>18.19</td>
<td>Daylight</td>
<td>Dry</td>
<td>Pedalcycle</td>
<td>Automobile</td>
<td>Violated Traffic Control</td>
<td>Non-Incapacitating Evident Injury</td>
</tr>
<tr>
<td>Westport</td>
<td>1</td>
<td>19.44</td>
<td>135165</td>
<td>Monday</td>
<td>11.39</td>
<td>Daylight</td>
<td>Dry</td>
<td>Automobile</td>
<td>Pedestrian</td>
<td>Driver Lost Control</td>
<td>Possible Injury</td>
</tr>
<tr>
<td>Westport</td>
<td>1</td>
<td>19.50</td>
<td>177103</td>
<td>Thursday</td>
<td>14.52</td>
<td>Daylight</td>
<td>Dry</td>
<td>Automobile</td>
<td>Pedestrian</td>
<td>Failed to Grant Right of Way</td>
<td>Incapacitating Injury</td>
</tr>
<tr>
<td>Westport</td>
<td>1</td>
<td>19.57</td>
<td>158968</td>
<td>Friday</td>
<td>14.34</td>
<td>Daylight</td>
<td>Dry</td>
<td>Pedestrian</td>
<td>Automobile</td>
<td>Following Too Closely</td>
<td>Possible Injury</td>
</tr>
<tr>
<td>Westport</td>
<td>1</td>
<td>19.61</td>
<td>150210</td>
<td>Wednesday</td>
<td>16.18</td>
<td>Daylight</td>
<td>Dry</td>
<td>Pedalcycle</td>
<td>Automobile</td>
<td>Driving on Wrong Side of Road</td>
<td>Possible Injury</td>
</tr>
<tr>
<td>Westport</td>
<td>1</td>
<td>19.71</td>
<td>132820</td>
<td>Tuesday</td>
<td>16.35</td>
<td>Daylight</td>
<td>Wet</td>
<td>Automobile</td>
<td>Pedestrian</td>
<td>Failed to Grant Right of Way</td>
<td>Not Injured</td>
</tr>
</tbody>
</table>

Note: This map is intended for general planning purposes only.

Online Mapping

• Goals:
  • Present data relevant to public
  • Use a simple mapping interface
  • Take an incremental approach
  • Staff updates

• Google Maps chosen for ease of use, cost

• Showcase:
  • Online TIP map
Online TIP Map (cont.)

Process:
1. Obtain list from CTDOT
   • Create unique IDs, clean up list
2. Digitize features in ArcGIS
   • Join to list
   • Export to KML
3. Import to Google Maps
   • Add attributes to KML features
     • Project description
     • Financial / schedule info
     • Images
     • Hyperlink to database / report
4. Maintenance
   • Quarterly Updates
Online TIP Map (cont.)

1. Obtain list
   - New TIP every 2-3 years
   - Updates every 2-3 months

2. Clean up list
   - ArcGIS compliant column headers

3. Create unique IDs:
   - One project may have multiple records
     - Year, phase, project number
     - One-to-One relationship

4. Add list to geodatabase

<table>
<thead>
<tr>
<th>SWRPA ID</th>
<th>Region</th>
<th>Proj#</th>
<th>Temp#</th>
<th>AQCd</th>
<th>Rte/Sys</th>
<th>town</th>
</tr>
</thead>
<tbody>
<tr>
<td>SWRPA ID</td>
<td>Region</td>
<td>ProjNUM</td>
<td>TempNUM</td>
<td>AQCd</td>
<td>Rte_SYS</td>
<td>Town</td>
</tr>
<tr>
<td>Proj_Name/Description</td>
<td>Project Description</td>
<td>FTA/FHWA/Other</td>
<td>Bike/Ped</td>
<td>Freight</td>
<td>CMP</td>
<td>Incident Management</td>
</tr>
<tr>
<td>P_NAME</td>
<td>Proj_DESC</td>
<td>FTA/FHWA/Other</td>
<td>Bike_Ped</td>
<td>Freight</td>
<td>CMP</td>
<td>Inc_Mgmt</td>
</tr>
<tr>
<td>Corridor Management</td>
<td>ITS</td>
<td>Air Quality Benefit</td>
<td>EJ/LEP</td>
<td>Illustrative (priority, state and local)</td>
<td>Hyperlink</td>
<td></td>
</tr>
<tr>
<td>Cor_Mgmt</td>
<td>ITS</td>
<td>Air_Qual</td>
<td>EJ_LEP</td>
<td>Illust</td>
<td>Hyperlink</td>
<td></td>
</tr>
<tr>
<td>SWRPA ID</td>
<td>Region</td>
<td>FA Code</td>
<td>Proj.</td>
<td>Proj.</td>
<td>Town</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>10-008</td>
<td>73</td>
<td>STPB</td>
<td>0015-0348</td>
<td>X6</td>
<td>URBAN PROGRAM</td>
<td>DESIGN ACTIVITIES: STPB URBAN PROGRAM</td>
</tr>
<tr>
<td>16-008</td>
<td>73</td>
<td>STPB</td>
<td>0015-0348</td>
<td>X6</td>
<td>URBAN PROGRAM</td>
<td>DESIGN ACTIVITIES: STPB URBAN PROGRAM</td>
</tr>
<tr>
<td>01-001</td>
<td>01</td>
<td>STPT</td>
<td>0035-0170</td>
<td>X8</td>
<td>HOLLY POND</td>
<td>DAREN TIDAL WETLAND RESTORATION OF HOLLY POND, REMOVE SED &amp; INSTALL</td>
</tr>
<tr>
<td>02-002</td>
<td>01</td>
<td>STPB</td>
<td>0056-0301</td>
<td>X8</td>
<td>RIVERSVILLE RD</td>
<td>REPLACE BRIDGE 0514, RIVERSVILLE RD OVER BYRAM RV.</td>
</tr>
<tr>
<td>02-007</td>
<td>1</td>
<td>STPA</td>
<td>0056-0305</td>
<td>X8</td>
<td>US ROUTE 1</td>
<td>GREENWICH REPLACE BR 01672 O/G GREENWICH CREEK</td>
</tr>
<tr>
<td>02-004</td>
<td>01</td>
<td>STPA</td>
<td>0056-0306</td>
<td>X8</td>
<td>CT 15</td>
<td>GREENWICH REHABILITATE BR 02135 O/CONVERSE POND BROOK (U-20)</td>
</tr>
<tr>
<td>02-005</td>
<td>01</td>
<td>STPA</td>
<td>0056-0307</td>
<td>X8</td>
<td>CT 15</td>
<td>GREENWICH REHABILITATE BR 02138 O/HORSENECK BROOK (CULVERT)</td>
</tr>
<tr>
<td>02-003.1</td>
<td>01</td>
<td>STPB</td>
<td>056-0310</td>
<td>X6</td>
<td>MILLBANK AVE &amp; EAST ELM ST</td>
<td>GREENWICH PAVEMENT IMPROVEMENTS ON MILLBANK AVE AND EAST ELM ST</td>
</tr>
<tr>
<td>02-003.1</td>
<td>04</td>
<td>STPB</td>
<td>056-0310</td>
<td>X6</td>
<td>MILLBANK AVE &amp; EAST ELM ST</td>
<td>GREENWICH PAVEMENT IMPROVEMENTS ON MILLBANK AVE AND EAST ELM ST</td>
</tr>
<tr>
<td>04-001</td>
<td>01</td>
<td>STPB</td>
<td>0102-0027</td>
<td>M</td>
<td>EAST AVE</td>
<td>NORWALK RECONSTRUCTION OF EAST AVE AT METRO-NORTH RAILROAD BRIDGE #</td>
</tr>
<tr>
<td>04-001</td>
<td>01</td>
<td>STPB</td>
<td>0102-0027</td>
<td>M</td>
<td>EAST AVE</td>
<td>NORWALK RECONSTRUCTION OF EAST AVE AT METRO-NORTH RAILROAD BR #42.14</td>
</tr>
<tr>
<td>04-012</td>
<td>01</td>
<td>NHRB</td>
<td>0102-0017</td>
<td>X8</td>
<td>CT 15</td>
<td>NORWALK REHAB BRIDGE 02187 O/ SILVERMINE RIVER</td>
</tr>
<tr>
<td>04-003</td>
<td>01</td>
<td>CMAQ</td>
<td>0102-0028</td>
<td>X8</td>
<td>VARIOUS</td>
<td>NORWALK TRAFFIC SIGNAL SYSTEM UPGRADE PHASE 1</td>
</tr>
<tr>
<td>04-003</td>
<td>01</td>
<td>CMAQ</td>
<td>0102-0028</td>
<td>X8</td>
<td>VARIOUS</td>
<td>NORWALK TRAFFIC SIGNAL SYSTEM UPGRADE PHASE 1</td>
</tr>
<tr>
<td>04-004</td>
<td>01</td>
<td>SRRC</td>
<td>0102-0029</td>
<td>X8</td>
<td>STRAWBERRY HILL</td>
<td>NORWALK PEDESTRIAN/CYCLE SAFETY IMPR. ON STRAWBERRY HILL AVE</td>
</tr>
<tr>
<td>04-005</td>
<td>01</td>
<td>I-M</td>
<td>0102-0031</td>
<td>X8</td>
<td>X8</td>
<td>NORWALK SUPERSTRUCTURE</td>
</tr>
<tr>
<td>04-005</td>
<td>01</td>
<td>I-M</td>
<td>0102-0031</td>
<td>X8</td>
<td>X8</td>
<td>NORWALK SUPERSTRUCTURE</td>
</tr>
<tr>
<td>04-006</td>
<td>01</td>
<td>HPP</td>
<td>0102-0034</td>
<td>X8</td>
<td>WEST/BELDEN AVE</td>
<td>NORWALK TRAFFIC SIGNAL UPGRADE ALONG WEST AND BELDEN AVENUES</td>
</tr>
<tr>
<td>04-011</td>
<td>01</td>
<td>STPB</td>
<td>0103-0030</td>
<td>X8</td>
<td>ROWAYTON AVE</td>
<td>NORWALK RECONSTRUCTION OF ROWAYTON AVE IN VICINITY OF RR</td>
</tr>
<tr>
<td>04-011</td>
<td>01</td>
<td>STPB</td>
<td>0103-0030</td>
<td>X8</td>
<td>ROWAYTON AVE</td>
<td>NORWALK RECONSTRUCTION OF ROWAYTON AVE IN VICINITY OF RR</td>
</tr>
<tr>
<td>04-009</td>
<td>01</td>
<td>CMAQ</td>
<td>0102-0011</td>
<td>X8</td>
<td>VARIOUS</td>
<td>NORWALK SODA PARKING GUIDANCE SYSTEM - FY2008 CMAQ</td>
</tr>
<tr>
<td>05-008</td>
<td>01</td>
<td>STPB</td>
<td>0135-0270</td>
<td>X8</td>
<td>CT 15</td>
<td>STAMFORD RESURFACING, BRIDGE AND SAFETY IMPROVEMENTS FROM TL TO CT 124</td>
</tr>
<tr>
<td>05-001</td>
<td>01</td>
<td>STPB</td>
<td>0135-0295</td>
<td>X8</td>
<td>STILLWATER DR</td>
<td>STAMFORD STILLVIEW RD</td>
</tr>
<tr>
<td>05-002</td>
<td>01</td>
<td>STPB</td>
<td>0135-0297</td>
<td>X8</td>
<td>HOPE ST</td>
<td>STAMFORD WIDENING, MINI VALLE ROAD TO NORTHILL ST</td>
</tr>
<tr>
<td>05-003</td>
<td>01</td>
<td>SRRC</td>
<td>0135-0298</td>
<td>X8</td>
<td>COVE RD</td>
<td>STAMFORD PEDESTRIAN IMPROVEMENTS IN VIC. OF K.T. MURPHY SCHOOL</td>
</tr>
<tr>
<td>05-004</td>
<td>01</td>
<td>STPB</td>
<td>0135-0300</td>
<td>X8</td>
<td>SR 483</td>
<td>STAMFORD RECONSTRUCTION WASHINGTON BLVD., ROUTE 1 TO DIV. STREET,</td>
</tr>
<tr>
<td>05-006</td>
<td>1</td>
<td>STPA</td>
<td>0135-0307</td>
<td>X8</td>
<td>US ROUTE 1</td>
<td>STAMFORD REHAB BRIDGE 00315 O/NORTON RIVER (LIST 21)</td>
</tr>
<tr>
<td>05-005</td>
<td>01</td>
<td>HPP</td>
<td>0135-0310</td>
<td>X8</td>
<td>WEST MAIN ST</td>
<td>STAMFORD WEST MAIN STREET BRIDGE REPLACEMENT</td>
</tr>
</tbody>
</table>
Online TIP Map (cont.)

2

• Digitize features
  • Point, line, and polygon features
    • Some features have no geography
  • Identify project boundaries
  • Digitize to OSET Dynamap street layer
  • Save features to project geodatabase

• Join features to list

• KML Export tool
  • Export some attributes
Online TIP Map (cont.)

3.

- Import to Google Maps
- Adjust symbology
- Add attributes to KML features
  - Description
  - Project graphic, if available
  - Funding and timeline table
    - Difficult to edit
    - Solution: image of table
  - Link to project websites and other information

<table>
<thead>
<tr>
<th>Estimated Costs (thousands of dollars)</th>
<th>Key Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; Engineering (PE)</td>
<td>Final Design Plans (FDP)</td>
</tr>
<tr>
<td>Right of Way (ROW)</td>
<td>Design Complete (DCD)</td>
</tr>
<tr>
<td>Construction (CON)</td>
<td>Advertisement (ADV)</td>
</tr>
<tr>
<td>Other (OTH)</td>
<td>Award (AWD)</td>
</tr>
<tr>
<td>Total</td>
<td>Construction Complete (CCD)</td>
</tr>
</tbody>
</table>
Online TIP Map (cont.)

- Maintenance
- Quarterly Updates
- Full TIP Update (every 2-3 yrs)
Online Mapping Future

- swrpa.org incompatible with Google Maps
  - Soon to be fixed
- Consider posting other datasets online
- Provide data to others
- Upgrade:
  - Link online TIP to TIP database
  - More / better rail parking info
  - More proficiency with Google Maps
  - Defined Queries
  - Consider another online mapping platform

Source: http://xkcd.com/763/

I'll often encourage relatives to try to solve computer problems themselves by trial and error. However, I've learned an important lesson: If they say they've solved their problem, never ask how.
Evacuation Planning
Pilot Project – City Of Norwalk

**Purpose:** Identify preliminary routes from evacuation areas to sheltering locations for Category 1 and Category 3 hurricanes

**Process:**

1. **Best practice research**
2. **Data collection**
   - Preliminary data review with EMD
   - Identify primary and secondary sheltering locations and staging areas
3. **Develop evacuation routes**
   - Review and modify based on input from EMD & available local resources

*Source: NOAA’s National Weather Services [www.weather.gov]*
Evacuation Planning (cont.)

1

• Best Practices & Literature Search
  • State
  • Local
  • Regional
• Minimum and desired data
Evacuation Planning (cont.)

2

• Minimum data
  • Accurate centerlines/roads
  • Functional classification
  • Transit routes
  • SLOSH data
  • Flood zones
  • Pick up & shelter locations

• Desired Data
  • Critical facilities
  • Population density
  • Vulnerable populations
  • Community facilities
Evacuation Planning (cont.)

3 • Develop Routes
   • *Routes to each of 3 Shelter Locations for a Category 1 and Category 3 Hurricane for 3 coastal neighborhoods.*
   • Assumptions:
     • 30 x 30 foot raster grid based on average road size 30 feet.
     • Functional Classification: principal arterials would be the primary source of vehicular evacuation by non-sheltering residents.
     • Transit operators & evacuees would be more familiar with existing bus routes.
     • Areas prone to flooding and within the SLOSH model may become impassable.
     • Only existing roadway can be used for evacuation routes.
     • Minimum cost to travel = best route.
Evacuation Planning (cont.)

3

- Evacuation Routes Developed Using Model Builder
  - Conversion to Raster (30’x30’)
  - Map Algebra
  - Cost Distance
  - Cost Path

**Cost to Shelter Model expression:**

\[
1.0/ \left( \text{Cat1} \times \left( \frac{\text{Emergency Routes} + \text{Priority Func.nc. Class.} + \text{Roads} + \text{NTD}}{\text{Flood Zone}} \right) \right)
\]
• What We Found:
  • 2 Staging Areas in Flood Areas
  • Need for additional staging areas
  • Sequential evacuation
  • A Category 1 storm could exceed primary shelter resources
Regional Land Use & Zoning

Process:

1. Best practice research
   • Drafted categories
2. Professional consultation
   • Presentation to Region planners
3. Municipal data request
   • Data creation
   • In-house review
4. Municipal review
   • Dissemination
Regional Land Use & Zoning (cont.)

1. Best Practice Research
   - Land use/comp plans
   - APA’s Land-Based Classification Standards
   - Database of potential categories

Zoning Categories
   - Residential
   - Commercial
   - Industrial
   - Mixed Use
   - Institutional/Governmental
   - Park/Conservation/Recreation
   - Planned/Design District
   - Parking

→ Land Use Categories
   - Residential
   - Commercial
   - Mixed Use
   - Industrial
   - Institutional/Governmental
   - Park/Conservation/Recreation
   - Agricultural
   - Transportation/Utilities/Communication
   - Other/Vacant
   - Water
Regional Land Use & Zoning (cont.)

1 Generalized Zoning Categories

**Residential**
- One Family (<1 acre)
- One Family (1-2 acres)
- One Family (>2 acres)
- Multi-Family – Low Density
- Multi-Family – High Density
- Mobile Homes
- Group Quarters

**Industrial**
- Heavy Industrial
- Light Industrial
- General Industrial
- Industrial Park
- High-tech Industry

**Institutional/Governmental**
- Government/Non-Profit
- School
- Health/Medical
- Cemetery
- Religious

**Mixed**
- Residential/Commercial
- Residential/Industrial

**Planned/Design Districts**
- Planned Development/PUD
- Design Development

**Commercial**
- General Business
- Neighborhood Business
- Office
- Retail
- Business Park
- Downtown/CBD
- Village

**Park/Conservation**
- Park
- Conservation
- Recreation

**Right-of-Way**

**Water**

**Parking**

---

South Western Regional Planning Agency
Generalized Land Use Categories

Residential
One Family
Two Family
Three-Four Family
Multi-Family
Mobile Homes
Group Quarters

Commercial
Commercial/General
Office
Retail

Mixed
Residential/Commercial

Industrial
Heavy Industrial
Light Industrial
Manufacturing
Wholesale Trade
Warehouse & Storage
Extractive

Institutional/Governmental
Government/Non-Profit
School
Health/Medical
Cemetery
Religious

Park/Conservation
Park
Open Space
Recreation

Transportation/Utilities
Transportation Services
Utilities & Utility Service
Communications & Information

Agricultural
Crops
Livestock
Nursery

Water
Freshwater
Wetlands

Other
Vacant

Regional Land Use & Zoning (cont.)
Regional Land Use & Zoning (cont.)

2

- Professional consultation
  - Meetings with Region planners
  - Meetings with extra-regional GIS professionals
- Presentation to Region planners
- Modified categories based on comments and suggestions received.
3. Requested zoning, parcel and assessor data from Region towns.
   - Coded each zoning district for a generalized zoning category.
   - Coded each assessor’s land use code for a generalized land use category.
   - Used ‘join’ function to match coded value with specific shape in ArcGIS.
   - Used ownership information to refine classifications.
   - Used aerial imagery to review the draft land use data.
     - Google Earth was especially convenient.
Regional Land Use & Zoning (cont.)

- Mailed hard-copies of maps to each town’s Planning Director and GIS staff.
- Made necessary revisions based on comments received.
- Made maps and data available to the public via website.
  - Pdf maps
  - Shapefiles
  - Google Earth .kml

The purpose of this project is to develop a GIS database of both generalized land use and generalized zoning patterns across the South Western Region. These data are used as background to the land use section of the Long Range Transportation Plan, as well as other planning projects and studies in the future. The generalized zoning map is a unique product because not many towns or regions display their zoning districts in such a way. The generalized land use map is created from parcel data provided by the Region’s municipalities, and therefore is very precise, since each parcel in the Region is coded for its specific land use.

Below are documents which provide more information on the project as well as the final maps of generalized land use and zoning.

- Generalized Land Use Map (7.68 Mb)
- Generalized Zoning Map (1.04 Mb)
- Brief Project Methodology (110 Kb)
- Description of Land Use and Zoning Categories (45 Kb)
- Table of Regional Land Use Acreage and Percentage (210 Kb)

Below are links to download the data of the Regional Land Use component of the project, available in both ArcGIS shapefile and Google Earth formats.

- Regional Land Use - ArcGIS shapefile (5.04 Mb)
- Regional Land Use - Google Earth .kml (40.9 Mb)

For more information, contact Will Palmquist (palmquist@swrpa.org or 203-316-5130).
Questions? Comments!

- Work Examples
  - Time Travel Monitoring
  - Bicycle and Pedestrian Safety

- Online TIP Map

- Evacuation Planning
  Pilot Project – City Of Norwalk

- Regional Land Use and Zoning