The Trade-offs between Population Density and Households' Transportation-housing Costs

Haizhong Wang
Oregon State University

Let us know how access to this document benefits you.

Follow this and additional works at: http://pdxscholar.library.pdx.edu/trec_seminar

Part of the Transportation Commons, Urban Studies Commons, and the Urban Studies and Planning Commons

Recommended Citation
http://pdxscholar.library.pdx.edu/trec_seminar/70

This Book is brought to you for free and open access. It has been accepted for inclusion in TREC Friday Seminar Series by an authorized administrator of PDXScholar. For more information, please contact pdxscholar@pdx.edu.
The Trade-Offs between Population Density and Household’s Transportation-Housing Costs

Presented by

Haizhong Wang, Ph.D.
Assistant Professor

Contributions from Matthew Palm and Rachel Vogt

Oregon State University (OSU)
Corvallis, OR
Oct. 23rd, 2015

PART I: DENSITY PROMOTING SMART GROWTH
Definitions

– Depended variable: “Housing Costs”--The amount a household spends on housing.
  – For Home owners: Mortgage + utilities + insurance + taxes
  – For Renters: Rent + insurance + utilities
The Motivation

- Integration of Land Use (housing) and Transport planning:
  - CA: SB 375
  - OR: SB 100
  - MRCOG: Proposed BRT lines
  - US: HUD’s TOD Investment

http://agbeat.com/housing-news/interactive-housing-transportation-affordability-maps/
The Method, Data, and Variables:

- **Data**: from **Public Use Micro-Sample (PUMS)** data
- **Limitations**: only units in urbanized **Public Use Micro Sample Areas (PUMAs)** in 22 most metropolitan states

![Legend](Legend.png)
The Method, Data, and Variables

• Questions:
  – Does density correlate with housing costs?
  – Does proximity to transit use correlate with housing costs?
  – Do PUMA SOV commute times correlate with housing costs?

• Model Format:
  – Log-Log: results produce an elasticity of rent with respect to density, transit, commute times.

Model Disaggregation:

• Two models predicting Gross Rent: one for Single Family Renters, one for Apartments
• Two models predicting Single family home owner costs: one for housing unit value, one for monthly mortgage payment
Tracts versus PUMAs

http://www2.census.gov/geo/maps/dc10map/tract/st06_ca/c06075_san_francisco/DC10CT_C06075_004.pdf
<table>
<thead>
<tr>
<th>State-Indicator Model Runs</th>
<th>Label</th>
<th>Multi-Family Rent</th>
<th>Single Family Rent</th>
<th>Single Family Mortgage (Owned &lt;1 yr)</th>
<th>Single Family Unit Value (Owned &lt;1 yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Beta</td>
<td>Beta</td>
<td>Beta</td>
<td>Beta</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.05***</td>
<td>.04***</td>
<td>.05***</td>
<td>.04***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.07***</td>
<td>.03***</td>
<td>.04***</td>
<td>.08***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-.05*</td>
<td>-.06**</td>
<td>-.20**</td>
<td>-.45**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.03***</td>
<td>.04***</td>
<td>.08***</td>
<td>.11***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.38</td>
<td>.42</td>
<td>.44</td>
<td>.53</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>.06***</td>
<td>.05***</td>
<td>.06***</td>
<td>.08***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.08***</td>
<td>.04***</td>
<td>.06***</td>
<td>.07***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.12**</td>
<td>-.01</td>
<td>-.29**</td>
<td>-.45***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>.36</td>
<td>.41</td>
<td>.48</td>
<td>.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>.504,371</td>
<td>.267,483</td>
<td>.108,229</td>
<td>.116,050</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1015</td>
<td>1015</td>
<td>1010</td>
<td>1010</td>
</tr>
</tbody>
</table>

Not Shown: Indicator variables, other independent control variables
# MSA-Specific Elasticities*

<table>
<thead>
<tr>
<th>MSA-Indicator Model Runs</th>
<th>Label</th>
<th>New York City</th>
<th>San Francisco</th>
<th>Los Angeles</th>
<th>Charlotte</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PUMA Pop. Density Beta</td>
<td>-.11***</td>
<td>-.04***</td>
<td>-.07***</td>
<td>-.05***</td>
</tr>
<tr>
<td></td>
<td>Fixed Route Commuter</td>
<td>-.02***</td>
<td>-.02</td>
<td>.03</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Avg SOV Commute Time</td>
<td>-.02</td>
<td>-.21**</td>
<td>-.44***</td>
<td>.15**</td>
</tr>
<tr>
<td></td>
<td>R-Squared</td>
<td>.22</td>
<td>.27</td>
<td>.26</td>
<td>.38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MSA-Indicator Model Runs</th>
<th>Label</th>
<th>San Diego</th>
<th>Seattle</th>
<th>Indianapolis</th>
<th>Houston</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PUMA Pop. Density Beta</td>
<td>-.46***</td>
<td>.03***</td>
<td>.01</td>
<td>.03***</td>
</tr>
<tr>
<td></td>
<td>Fixed Route Commuter</td>
<td>.39***</td>
<td>-.19***</td>
<td>.21</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Avg SOV Commute Time</td>
<td>.03</td>
<td>.41</td>
<td>-.68***</td>
<td>.37</td>
</tr>
<tr>
<td></td>
<td>R-Squared</td>
<td>.26</td>
<td>.42</td>
<td>.42</td>
<td></td>
</tr>
</tbody>
</table>
Takeaways(1)

• Housing costs may be very inelastic with respect to density

• Impacts of “density” on “affordability” often cited may in fact be the impacts of density and regional economies of scale as opposed to density promoting policies alone like infill development.

Infill in San Francisco

≠

Infill in Corvallis
Takeaways (2)

• The “transit premium” can be captured just by identifying units with FRT commuters.
  – Our elasticities of .03 to .07 are going to be underestimates.

• PUMS data useful in measuring affordable housing goals over time
Takeaways (3)

• Home owners in neighborhoods with lower SOV commute times pay higher mortgages
  – This is especially true and more significant in the sunbelt.

Policy Implications

• "Density" itself is not a major driver of prices
  – Certain types of policies intended to promote density may increase housing in the medium term (0-30 years), particularly urban growth boundaries.
  – Other policies may yield less negative impacts

• Construction of Fixed Route Transit systems may significantly change affordability along routes
  – This has not been proven or explored for Bus Rapid Transit, however.

PART II: BICYCLE SAFETY
Bicycle Usage and Safety
Motivation

![Graph showing the number of students from 2008 to 2012: 718 in 2008, 628 in 2009, 623 in 2010, 682 in 2011, and 726 in 2012.](image)
# 2007-2011 Oregon Crash Summary

## Summary of Oregon Crash Data

<table>
<thead>
<tr>
<th>Crashes</th>
<th>Injury Type</th>
<th>2011</th>
<th>2010</th>
<th>2009</th>
<th>2008</th>
<th>2007</th>
<th>5 Year Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle</td>
<td>Fatal</td>
<td>15</td>
<td>7</td>
<td>8</td>
<td>11</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Injury (A+B+C)</td>
<td>917</td>
<td>872</td>
<td>759</td>
<td>754</td>
<td>614</td>
<td>783</td>
</tr>
<tr>
<td></td>
<td>PDO</td>
<td>30</td>
<td>31</td>
<td>35</td>
<td>20</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>962</td>
<td>910</td>
<td>802</td>
<td>785</td>
<td>657</td>
<td>823</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>Fatal</td>
<td>48</td>
<td>60</td>
<td>38</td>
<td>51</td>
<td>50</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Injury (A+B+C)</td>
<td>795</td>
<td>730</td>
<td>613</td>
<td>555</td>
<td>526</td>
<td>644</td>
</tr>
<tr>
<td></td>
<td>PDO</td>
<td>6</td>
<td>2</td>
<td>11</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>849</td>
<td>792</td>
<td>662</td>
<td>610</td>
<td>580</td>
<td>699</td>
</tr>
<tr>
<td>Motor Vehicle</td>
<td>Fatal</td>
<td>247</td>
<td>225</td>
<td>285</td>
<td>307</td>
<td>346</td>
<td>282</td>
</tr>
<tr>
<td></td>
<td>Injury (A+B+C)</td>
<td>22,175</td>
<td>19,277</td>
<td>17,681</td>
<td>16,731</td>
<td>17,360</td>
<td>18,645</td>
</tr>
<tr>
<td></td>
<td>PDO</td>
<td>24,820</td>
<td>22,890</td>
<td>21,841</td>
<td>23,382</td>
<td>25,219</td>
<td>23,630</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>47,242</td>
<td>42,392</td>
<td>39,807</td>
<td>40,420</td>
<td>42,925</td>
<td>42,557</td>
</tr>
</tbody>
</table>

Source: Chris Monsere
Bicycle Level of Traffic Stress (BLTS)

- 1, 2, 3, 4—based on four “types” of bicyclists

### Table 4. Criteria for Level of Traffic Stress in Mixed Traffic

<table>
<thead>
<tr>
<th>Speed Limit</th>
<th>2-3 lanes</th>
<th>4-5 lanes</th>
<th>6+ lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 25 mph</td>
<td>LTS 1(^a) or 2(^a)</td>
<td>LTS 3</td>
<td>LTS 4</td>
</tr>
<tr>
<td>30 mph</td>
<td>LTS 2(^a) or 3(^a)</td>
<td>LTS 4</td>
<td>LTS 4</td>
</tr>
<tr>
<td>35+ mph</td>
<td>LTS 4</td>
<td>LTS 4</td>
<td>LTS 4</td>
</tr>
</tbody>
</table>

(Mekuria, Furth and Nixon 2012) pp. 21

- LTS 1: Anybody would bike on it, (Your younger children, nieces and nephews)
- LTS 2: For your basic adult cyclist, (friends of people in this room not as ‘fanatical’ about biking as we are)
- LTS 3 or 4: For Advanced Cyclists, (probably most people in this room...)
Level of Traffic Stress
Case Study Locations

Concord
- Crashes: 102
- Population: 42,419

Manchester
- Crashes: 309
- Population: 110,378

Nashua
- Crashes: 177
- Population: 87,137

Portsmouth
- Crashes: 55
- Population: 21,440
Number of Collisions on LTS Road Segments by City

- Concord: Total: 102
  - LTS 1: 40.2%
  - LTS 2: 30.4%
  - LTS 3: 25.5%
  - LTS 4: 4.0%

- Manchester: Total: 309
  - LTS 1: 28.8%
  - LTS 2: 48.5%
  - LTS 3: 19.7%
  - LTS 4: 3.0%

- Nashua: Total: 177
  - LTS 1: 16.9%
  - LTS 2: 32.2%
  - LTS 3: 13.6%
  - LTS 4: 37.3%

- Portsmouth: Total: 55
  - LTS 1: 25.5%
  - LTS 2: 52.7%
  - LTS 3: 7.3%
  - LTS 4: 14.5%
Severity of Collision by City

- **Concord**
  - Total: 102
  - Injury: 89.2%
  - Other: 6.1%
  - Property Damage Only: 4.7%

- **Manchester**
  - Total: 309
  - Fatal: 89%
  - Injury: 6.1%
  - Other: 4.7%
  - Property Damage Only: 0.2%

- **Nashua**
  - Total: 177
  - Fatal: 88.1%
  - Injury: 7.9%
  - Other: 3.6%
  - Property Damage Only: 0.4%

- **Portsmouth**
  - Total: 55
  - Fatal: 85.5%
  - Injury: 7.3%
  - Other: 7.3%
  - Property Damage Only: 0.8%
Collision Roadway Attributes

Collision Location

Road Alignment

Road Type

Road Condition
Collision Environment Attributes

Weather
- Blowing Material: 8.7%
- Clear: 19.9%
- Cloudy: 69.5%
- No Adverse Conditions: 1.3%
- Rain: 0.5%
- Snow: 0.5%
- Unknown: 0.3%

Lighting
- Dark-No Street Light: 79.2%
- Dark-Street Light Off: 14.2%
- Dark-Street Light On: 6.6%
- Dawn: 0.2%
- Daylight: 0.2%
- Dusk: 0.2%
- Other: 0.2%
- Unknown: 0.2%

Day of the Week
- FRI: 11.5%
- MON: 16.5%
- THU: 13.2%
- TUE: 17.4%
- WED: 15.4%
- SAT: 17.4%
- SUN: 17.4%

Surface Condition
- Dry: 85.7%
- Wet: 12.6%
- Snow/Slush: 1.7%
- Ice: 0.2%
- Sand/Dust/Oil: 0.2%
- Unknown: 0.2%
Collisions on LTS Road Segments by Severity

Fatal
Total: 4

Injury
Total: 569

Property Damage Only
Total: 46

Unknown
Total: 24
GIS Visual Analysis

City of Concord
# City of Nashua Strava Data

<table>
<thead>
<tr>
<th>LTS</th>
<th>Bike Miles Traveled</th>
<th>BMT per Day</th>
<th>Total Miles %</th>
<th>Total Trip %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2,889,522</td>
<td>7,916.50</td>
<td>29.60%</td>
<td>6.10%</td>
</tr>
<tr>
<td>1</td>
<td>2,830,179</td>
<td>7,753.91</td>
<td>14.80%</td>
<td>12.10%</td>
</tr>
<tr>
<td>2</td>
<td>34,070,217</td>
<td>93,343.06</td>
<td>44.40%</td>
<td>48.40%</td>
</tr>
<tr>
<td>3</td>
<td>2,687,017</td>
<td>7,361.69</td>
<td>7.40%</td>
<td>23.00%</td>
</tr>
<tr>
<td>4</td>
<td>623,510</td>
<td>1,708.25</td>
<td>3.80%</td>
<td>10.40%</td>
</tr>
</tbody>
</table>
## List of Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SeverityID</td>
<td>Value representing severity of the collision where 1=Fatal, 2=Injury, and 3=PDO</td>
</tr>
<tr>
<td>Accident</td>
<td>Indicator variables for a bicycle collision</td>
</tr>
<tr>
<td>DriveAccess</td>
<td>Indicator variables for a collision occurring along the road both at a driveway or access point or not</td>
</tr>
<tr>
<td>Intersection</td>
<td>Indicator variables for a collision occurring at an intersection or is intersection related</td>
</tr>
<tr>
<td>Alignment</td>
<td>Indicator variables for a collision occurring on a straight and level segment of road</td>
</tr>
<tr>
<td>Grade</td>
<td>Indicator variable for a collision occurring on a segment of road with grade</td>
</tr>
<tr>
<td>Condition</td>
<td>Indicator variable for a normal roadway condition</td>
</tr>
<tr>
<td>2WayTraffic</td>
<td>Indicator variable for two way on the road where the collision occurred</td>
</tr>
<tr>
<td>NoTrafficControl</td>
<td>Indicator variable for a collision occurring at an intersection with no traffic control</td>
</tr>
<tr>
<td>Signal</td>
<td>Indicator variable for a collision occurring at an intersection with a traffic signal</td>
</tr>
<tr>
<td>StopSign</td>
<td>Indicator variable for a collision occurring at an intersection with a stop sign</td>
</tr>
<tr>
<td>Surface</td>
<td>Indicator variable for dry surface conditions when the collision occurred</td>
</tr>
<tr>
<td>Daylight</td>
<td>Indicator variable that the collision occurred in daylight</td>
</tr>
<tr>
<td>DarkStreetLight</td>
<td>Indicator variable that the collision occurred at night but near a street light</td>
</tr>
<tr>
<td>Weather</td>
<td>Indicator variable for clear weather at the time of the collision</td>
</tr>
<tr>
<td>Weekday</td>
<td>Indicator variable for a collision occurring on Tuesday, Wednesday, or Thursday</td>
</tr>
<tr>
<td>Time</td>
<td>Value representing the time after midnight that the collision occurred</td>
</tr>
<tr>
<td>PeakHours</td>
<td>Indicator variable for a collision occurring between peak traffic hours (6-9am and 4-6pm)</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>Indicator variable for the City of Portsmouth</td>
</tr>
<tr>
<td>LTS1</td>
<td>Indicator variable for a collision occurring on a road segment with LTS 1</td>
</tr>
<tr>
<td>LTS2</td>
<td>Indicator variable for a collision occurring on a road segment with LTS 2</td>
</tr>
<tr>
<td>LTS3</td>
<td>Indicator variable for a collision occurring on a road segment with LTS 3</td>
</tr>
<tr>
<td>LTS4</td>
<td>Indicator variable for a collision occurring on a road segment with LTS 4</td>
</tr>
</tbody>
</table>
Linear Regression Model

Bicycle Collision

\[ Y = a + b_1(\text{Condition}) + b_2(\text{2WayTraffic}) + b_3(\text{Surface}) + b_4(\text{DarkStreetLight}) + b_5(\text{Weekday}) + b_6(\text{Time}) + b_7(\text{PeakHours}) + b_8(\text{Intersection}) + b_9(\text{LTS2}) + b_{10}(\text{Injury}) + b_{11}(\text{Property Damage Only}) \]
## Model Coefficients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient$^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>0.1577</td>
</tr>
<tr>
<td>2WayTraffic</td>
<td>-0.0583 *</td>
</tr>
<tr>
<td>Surface</td>
<td>0.0962 **</td>
</tr>
<tr>
<td>DarkStreetLight</td>
<td>-0.0179 .</td>
</tr>
<tr>
<td>Weekday</td>
<td>-0.0673 **</td>
</tr>
<tr>
<td>Time</td>
<td>0.0001 ***</td>
</tr>
<tr>
<td>PeakHours</td>
<td>0.0483 *</td>
</tr>
<tr>
<td>Intersection</td>
<td>0.2247 ***</td>
</tr>
<tr>
<td>LTS2</td>
<td>0.0724 **</td>
</tr>
<tr>
<td>Injury</td>
<td>0.1947 **</td>
</tr>
<tr>
<td>Property Damage Only</td>
<td>0.2335 ***</td>
</tr>
</tbody>
</table>

$^1$Significant codes: 0 ‘****’ 0.001 ‘***’ 0.01 ‘**’ 0.05 ‘*’ 0.1 ‘.’
Possible Takeways

• First, there is likely a relationship between LTS 4 and fatal bicycle collisions and secondly, LTS 2 may have a larger impact on collision severity than previously thought.

• As expected, ‘Injury’ type collisions are the most common in all four cities accounting for about 88% of all collision types.

• More collisions occurred on Mondays and Fridays (17%) than any other day and the fewest collisions occurred on Sunday (7%). More collisions occurred during peak hours (69%).
Possible Takeways

• Additionally, roadway segments without bike lanes, speed limits of 30 mph to 35 mph, 2-4 lanes, more than 10,000 AADT, and parking were more likely to have “injury” type collisions.

• The results of the simple linear regression model found that normal road conditions, dry road surfaces, peak hours, intersections, LTS 2, ‘Injury’ type collisions, and ‘Property Damage Only’ type collisions are more likely to involve a bicyclist, while two-way traffic, dark with streetlight on, and weekdays were less likely to involve a bicyclist.

• These results are generally consistent with the literature and the visual maps, although they are difficult to compare because the visual maps do not show time variables or road and surface conditions.
Special thanks to:

Oregon Department of Transportation

New Hampshire Bike Walk Alliance

New Hampshire Department of Transportation
I couldn’t have done it without you...

Thank you.

Q & A!
Collision Location by LTS

- **LTS 1**
  - Total: 45

- **LTS 2**
  - Total: 267

- **LTS 3**
  - Total: 167

- **LTS 4**
  - Total: 164
Road Alignment by LTS

LTS 1
Total: 45

LTS 2
Total: 267

LTS 3
Total: 167

LTS 4
Total: 164
Road Condition by LTS

LTS 1
Total: 45
97.8%

LTS 2
Total: 267
98.5%

LTS 3
Total: 167
99.4%

LTS 4
Total: 164
97%
Road Design by LTS

LTS 1
Total: 45

LTS 2
Total: 267

LTS 3
Total: 167

LTS 4
Total: 164
Traffic Control by LTS

LTS 1
Total: 45

LTS 2
Total: 267

LTS 3
Total: 167

LTS 4
Total: 164
Surface Condition by LTS

LTS 1
Total: 45

LTS 2
Total: 267

LTS 3
Total: 167

LTS 4
Total: 164
Lighting Condition by LTS

<table>
<thead>
<tr>
<th>LTS</th>
<th>Total</th>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTS 1</td>
<td>45</td>
<td>Dark-Street Light On</td>
<td>77.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dark-No Street Light</td>
<td>12.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Daylight</td>
<td>4.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dusk</td>
<td>1.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td>6.1%</td>
</tr>
<tr>
<td>LTS 2</td>
<td>267</td>
<td>Dark-Street Light On</td>
<td>80.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dark-No Street Light</td>
<td>12.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Daylight</td>
<td>4.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dawn</td>
<td>2.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dusk</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>0.7%</td>
</tr>
<tr>
<td>LTS 3</td>
<td>167</td>
<td>Dark-Street Light On</td>
<td>79.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dark-No Street Light</td>
<td>16.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Daylight</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dusk</td>
<td>0.8%</td>
</tr>
<tr>
<td>LTS 4</td>
<td>164</td>
<td>Dark-Street Light On</td>
<td>77.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dark-No Street Light</td>
<td>14.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Daylight</td>
<td>5.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dusk</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>0%</td>
</tr>
</tbody>
</table>
Weather by LTS

LTS 1
Total: 45

LTS 2
Total: 267

LTS 3
Total: 167

LTS 4
Total: 164
Day of Collision by LTS

LTS 1
Total: 45

LTS 2
Total: 267

LTS 3
Total: 167

LTS 4
Total: 164