HSM Urban/Suburban Case Study

Pacific Ave SE in Thurston County, WA

Learning Outcomes:

Apply the HSM

► Urban Multilane Roadway Segments
► Urban Multilane Intersections
Pacific Avenue SE Project

Location: Lacey city limits to Steilacoom Ave SE
Length: Mp 3.528 to Mp 4.383 = 0.855 mi (4,514 ft)
Five-lane including a center TWLTL (5T) with curbs
5-ft bike lanes and sidewalks on both sides
Posted speed limit = 40 mph
2010 AADT: 14,652 (just east of Ranger Dr SE)
2030 AADT: 18,000 (+/-)
Pacific Avenue NE

Project Location

Pacific Avenue SE

Photolog
Aerial Photo
Pacific Ave SE CMF Data:

- Lane width = 11 ft with 11 ft TWLTL
- No on-street parking or automated enforcement
- Roadside fixed object distance = 10 ft
- Roadway and intersection lighting (partial)
- All left turn lanes; no right turn lanes
- 36 Driveways (8 minor commercial; 2 major industrial; 2 minor indust.; 24 minor residential
- 1 bus stop within 1,000 ft of all intersections
- School [Seahawk, David, Ranger, Union Mills]
- Alcohol [Lake Lois, Kinwood, Seahawk, David]

Pacific Ave SE Crash Data, 2005 - 2009

Fatal = 0; Injury = 18 (18); PDO = 45; Total = 63
12 SV; 48 MV; 3 Bicycle
1 Semi-truck; 2 Motorcycle; 57 Car/Pickup
19 Nighttime; 44 Daylight/Dusk/Dawn
6 Alcohol; 4 Ice/Snow; 20 Wet; 39 Dry
32 roadway segment related; 31 intersection related
Segment Severity = 22% (29% for facility)
Intersection Severity = 36%
Weighted AADT = 14,106; Length = 0.855 mi
Segment MVMT = 4.402; Crash Rate = 7.3 (14.3)
### Summary of Crash Data (2005-2009)

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Segment</th>
<th>Begin MP</th>
<th>End MP</th>
<th>Length mi</th>
<th>Length ft</th>
<th>AADT</th>
<th>vpd</th>
<th>SY Injury</th>
<th>SV PDD</th>
<th>MV PDD</th>
<th>Ped</th>
<th>BINS</th>
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### Existing Cross Section (5T)

![Existing Cross Section Diagram]
Roadway Segment Alternatives

1. Raised median (convert 5T to 4D with left turn lanes)
2. Road diet (convert 5T to 2D with left and right turn lanes)
3. Full roadway lighting
4. Other roadway safety countermeasures

4-Lane Divided Cross Section Alt.
2-Lane Divided Cross Section Alt.

5’ 5.5’ 6’ 13.5’ 16’ 13.5’ 6’ 5.5’ 5’

5.5’ 6’ 11’ 11.5’ 4’ 4’ 12.5’ 5’ 11’ 5.5’

Left Turn Lane

Right Turn Lane
Pacific Avenue SE Intersection Traffic Data

<table>
<thead>
<tr>
<th>Location</th>
<th>AADT&lt;sub&gt;major&lt;/sub&gt;</th>
<th>AADT&lt;sub&gt;minor&lt;/sub&gt;</th>
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<tbody>
<tr>
<td></td>
<td>2030 = 18,000</td>
<td>2030 = 300</td>
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<tr>
<td>Kinwood St.</td>
<td>Average 2005 – 2009 = 5,239</td>
<td>2009 = 240</td>
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<td>2030 = 6,700</td>
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<td>2030 = 4,500</td>
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<td>2030 = 9,200</td>
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<td>Lake Lois Rd.</td>
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<td>Woodland Green Park</td>
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<td>Seahawk St.</td>
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<td>David St.</td>
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<tr>
<td>Ranger St.</td>
<td>2009 = 1,356</td>
<td>2030 = 1,700</td>
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</table>

Intersection Alternatives

1. Right-turn lane on Pacific WB at Kinwood
2. Right-turn lane on Pacific EB at Union Mills Rd
3. Replace Kinwood traffic signals with a modern roundabout
4. Replace Union Mills Rd & Steilacoom Ave traffic signals with a modern roundabout
5. Full intersection lighting
6. Ped-Activated Hybrid Beacon at Ranger
7. Other intersection safety countermeasures
Using Excel Spreadsheets for Roadway Segments Crash Frequency Prediction

Demonstration of Excel Spreadsheets

Group Exercise for HSM Crash Prediction

Alternatives Discussion

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Pacific Ave SE Roadway Segments Crash Prediction Outcomes

Roadway Segments:
- $N_{predicted-2005-2009}$ (existing) =
- $N_{predicted-2030}$ (existing) =
- $N_{predicted-2030}$ [with alternative changes] =
Intersection Crash Prediction Outcomes:

Kinwood Avenue (3SG):
► $N_{\text{predicted-2005-2009}}$ (existing) =
► $N_{\text{predicted-2030}}$ (existing) =
► $N_{\text{predicted-2030}}$ [with alternative changes] =

Intersection Crash Prediction Outcomes:

Union Mills Road (3SG):
► $N_{\text{predicted-2005-2009}}$ (existing) =
► $N_{\text{predicted-2030}}$ (existing) =
► $N_{\text{predicted-2030}}$ [with alt. changes] =

Steilacoom (3SG):
► $N_{\text{predicted-2005-2009}}$ (existing) =
► $N_{\text{predicted-2030}}$ (existing) =
► $N_{\text{predicted-2030}}$ [with alt. changes] =
Learning Outcomes:

Apply the HSM to Local Agency Projects
► Urban Multilane Roadway Segments
► Urban Multilane Intersections

Questions and Discussion