COLLISIONS WITH TREES IN HAZARDOUS LOCATIONS

NCHRP Report 500, Vol. 3

Trees are 22% of fatal crashes

EXHIBIT I-1
Total and Fixed-Object Fatal Tree Crashes in 1999
Other Fatal Tree Crashes

- 56% of fatal tree crashes occurred at night
- Nearly half fatal crashes occurred on curved roads (most road mileage is tangent)
- Of 1,562 fatal tree crashes suspected of alcohol use, 45% were cited

Objective I

Prevent trees growing in hazardous locations
Strategy A

- Develop, revise and implement planting guidelines to prevent placing trees in hazardous locations
  - Guideline features
    - Should be dependent on purpose and operation of the road
    - Minimum placement distances from the travel way as a function of speed limit
    - Conditions for offset based on road curvature, tree size, design speed (operating speed for existing facilities), steepness of side slopes
    - Other issues
      - Large or small trees, tree species, overhead environment

Strategy B

- Develop, revise and implement mowing and vegetation control guidelines
  - Purpose
    - To prevent natural growth of trees in hazardous locations
    - To prevent trees from developing into sight obstruction or overhead hazard
Objective II

Eliminate the hazardous condition and/or reduce the severity of crash

Strategy C

• Remove trees in hazardous locations
  – Tree removal involved identifying and removing trees that have been hit or are likely to be hit
  – Often, involved overcoming public resistance to removing trees
  – Upon removal;
    • Stumps should not be left
    • Remove stumps on side slopes
    • Fill deep depressions
Pennsylvania DOT Crash Reduction Factors

Trees in Medians

- Cal Poly, SLO show trees in medians are significant hazard
- Reduce tree size to .4 in. diameter
Strategy D

- Provide guardrail to shield motorists from striking trees
  - Guardrails are 4th most frequently struck fixed object
  - Guardrail end treatments add additional costs and risks
  - Consult the AASHTO Roadside Design Guide (2002) and associated software

Guardrail

- Guardrail in front of trees may decrease severity, but increase frequency of crashes
- Guardrails are employed above steep side slopes to shield vehicles;
  - 3:1 to 4:1 side slope – vehicle travel to bottom of slope
  - Greater than 3:1 – vehicles may roll over
- Trees at bottom of steep slope may be in jeopardy
Strategy E

- Modify Roadside Clear Zone in Variety of Trees
  - Change in side slope or roadside clear zone to reduce chances of hitting a tree
  - Side slope flattening reduces probability of roll-over and fixed object collisions

EXHIBIT V-9 Expected Percent Crash Reduction from Sideslope Flattening

<table>
<thead>
<tr>
<th>Sideslope in Before Condition</th>
<th>Sideslope in After Condition</th>
</tr>
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<tbody>
<tr>
<td>3:1</td>
<td>4:1</td>
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<tr>
<td>2:1</td>
<td>2</td>
</tr>
<tr>
<td>3:1</td>
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<tr>
<td>4:1</td>
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<tr>
<td>5:1</td>
<td>-</td>
</tr>
<tr>
<td>6:1</td>
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</tbody>
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Strategy F

- Delineate Trees in Hazardous Locations
  - If no other alternative exists, delineate the tree
  - Pennsylvania uses a 4 in. band of reflective tape around the trunk

EXHIBIT V-10 Reflective Band on a Tree
• Slide from John Meranda, ODOT.
• File too small to enlarge