Remarks and Instructions

The complete manual, revision packages, and individual chapters can be accessed at www.wsdot.wa.gov/publications/manuals/m22-87.htm.

For updating printed manuals, page numbers indicating portions of the manual that are to be removed and replaced are shown below.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Remove Pages</th>
<th>Insert Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title Page</td>
<td>i – ii</td>
<td>i – ii</td>
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<td>9-5 – 9-6</td>
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<tr>
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<td>9-21 – 9-22</td>
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</tbody>
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Please contact Rhonda Wiest at 360-705-7318 or WiestR@wsdot.wa.gov with comments, questions, or suggestions for improvement to the manual.

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Utilities, Railroads, and Agreements Section
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Olympia, WA 98504-7329
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(2) **Determining the Control Zone Distance for Various Highway Geometric Conditions**

Control Zone distance at a particular location is determined using the following methods. Choose one of the six Conditions with matching highway section characteristics and follow the listed steps and instructions. The table referred to in this section is the Clear Zone Distance Table (see Figure 900-9).

(3) **Cut Sections: Conditions 1, 2, 3, and 4**

(a) **Cut Section: Condition 1**

- No ditch
- Backslopes of 3H:1V or flatter

The Control Zone is read directly from the table based on posted speed, average daily traffic (ADT), and backslope.

**Step 1:** Locate posted speed  
**Step 2:** Locate ADT  
**Step 3:** Locate backslope  
**Step 4:** Read CZ directly from table

**Example:**

![Diagram of Control Zone Cut Section: Condition 1](Figure 900-3)

- 12 ft Lane
- CZ = 13 ft
- Edge of traveled way

Step 1:  Speed is 45 mph  
Step 2:  Traffic is 1900 ADT  
Step 3:  Backslope is 4H:1V  
Step 4:  Read 13 feet directly from table  
**Control Zone = 13 feet**
(b) Cut Section: Condition 2

- Ditch foreslopes of 4H:1V or flatter
- For all backslopes, use 10H:1V cut section in calculations

The Control Zone distance is the greater of:

1. Read directly from the table based on posted speed, average daily traffic (ADT), and a backslope of 10H:1V.
   - **Step 1:** Locate posted speed
   - **Step 2:** Locate ADT
   - **Step 3:** Use backslope of 10H:1V
   - **Step 4:** Read directly from table

2. Five feet beyond the roadside width.
   - **Step 1:** Locate roadside width
   - **Step 2:** Add 5 feet to the roadside width

**Example:**

![Control Zone Cut Section: Condition 2](image)

1. **Step 1:** Speed is 55 mph
   - **Step 2:** Traffic is 4200 ADT
   - **Step 3:** Foreslope 4H:1V or flatter: use a backslope of 10H:1V (from table)
   - **Step 4:** Read 23 feet directly from table

2. **Step 1:** Roadside width is 17 feet
   - **Step 2:** 17 feet plus 5 feet = 22 feet

Solution = Greater of: 1. = 23 feet or 2. = 22 feet

Control Zone = 23 feet
(2) Cost-Effective Selection Procedure

A Location II Object may be reclassified to Location III by meeting the following guidelines.

(a) Roadway Embankments

In a roadway embankment area, check Figure 900-16. If guardrail is warranted, the object may be considered not cost-effective to relocate.

(b) Cost-Effective Selection Procedure

Complete the Cost-Effective Selection Procedure for objects not in an area recommended for guardrail using the AASHTO formula or the "ROADSIDE" or "Roadside Safety Analysis Program (RSAP)" programs. The lateral placement from the traveled way to the objects (for both the existing object and the relocated object) should be multiplied by the slope factors in the following table.

<table>
<thead>
<tr>
<th>Slope Ratio</th>
<th>Slope Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>3H:1V</td>
<td>1.5</td>
</tr>
<tr>
<td>4H:1V</td>
<td>1.2</td>
</tr>
<tr>
<td>5V:1V</td>
<td>1.1</td>
</tr>
<tr>
<td>Flat</td>
<td>1.0</td>
</tr>
<tr>
<td>5H:1V</td>
<td>0.8</td>
</tr>
<tr>
<td>4H:1V</td>
<td>0.7</td>
</tr>
<tr>
<td>3H:1V</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Adjusted lateral distance = (lateral distance – shoulder width) x slope factor + shoulder width. (Each lateral segment between the shoulder and the object should be adjusted by its slope factor.)

(c) Variables for the Cost-Effective Selection Procedure (CESP)

The following AASHTO cost factors\(^1\) will be used in the CESP formula until otherwise notified by WSDOT:

- Fatality collision: $4,165,000
- Severe injury collision: $350,000
- Moderate injury collision: $75,000
- Slight injury collision: $40,000
- Property Damage Only (PDO) collision: $7,000

Use the following guidance when calculating with the CESP formula:

- Traffic Growth Rate: Use 5% unless otherwise indicated by WSDOT.
- Severity Index: 3.6 for 40 mph, 4.2 for 50 mph, 5.0 for 60 mph, and 6.0 for 70 mph.
- Project Life: Life of the existing or new pole.
- Discount Rate: The rate shall be equal to the weighted rate average cost of capital for each utility.

\(^1\) The WSDOT Statewide Travel and Collision Data Office (STCDO) has applied inflation to the AASHTO cost factors to bring the numbers current as of July 2009.
• **Cost of Installation:** Determined by the utility for the installation being evaluated.

• **Cost of Repair:** Determined by the utility for the installation being evaluated.

• **Maintenance Cost per Year:** Determined by the utility for the installation being evaluated.

• **Salvage Value:** Determined by the utility for the installation being evaluated.

(d) **Initial Encroachment Frequency**

The initial encroachment frequency factors should be as follows:

<table>
<thead>
<tr>
<th>Highway Type</th>
<th>Initial Encroachment Frequency (encroachment/mile/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Interstate</td>
<td>0.0009 ADT</td>
</tr>
<tr>
<td>Rural Multilane Divided Highway</td>
<td>0.00059 ADT</td>
</tr>
<tr>
<td>Wide Rural Two-Lane Highway (Roadbed &gt; 36 ft)</td>
<td>0.000742 ADT</td>
</tr>
<tr>
<td>Narrow Rural Two-Lane Highway (Roadbed &lt; 36 ft)</td>
<td>0.00121 ADT</td>
</tr>
<tr>
<td>Urban Interstate</td>
<td>0.0009 ADT</td>
</tr>
<tr>
<td>Urban Multilane Divided Highway</td>
<td>0.0009 ADT</td>
</tr>
<tr>
<td>Urban Street</td>
<td>0.00133 ADT</td>
</tr>
</tbody>
</table>

**Encroachment Frequency Factors**

*Figure 900-17*

900.14 **The 5/15 Rule for Location II Objects**

Requests for reclassification of existing or relocated utility objects complying with all the following requirements may supersede the Engineering Analysis and Cost-Effective Selection Procedure requirements of the reclassification process.

(1) **Requirements**

- There are no feasible alternative measures for compliance with Control Zone Objective 2 (see 900.03).

- The utility object must be located 15 feet or more from the edge of the through lane.

- The utility object must be located within 5 feet of the highway right of way line.

- The utility object must not be located within an area of concentrated utility object accidents.

- The utility object must not have a recorded accident history.

In these situations, it will be considered cost-effective for Location II Objects to remain within the highway right of way. The Engineering Analysis will consist of a utility-provided written statement that all of the above conditions are met.