Clip it and Chip it

Vermont Agency of Transportation

Agenda

- Introduction
- Specific Things to Check
- Keeping Traffic Control Devices Visible
- Stopping Sight Distance
- Intersection Sight Distance
- Mowing for Safety
- Thinning and Trimming
- Suggested Maintenance Steps
- Hi-Visibility Apparel
- Temporary Traffic Control

Introduction

- Objective
  - Safety is a main concern for highway and street agencies. In fact, roadway safety cannot be achieved without a good maintenance program.
    - Trees close to the road can present a fixed object hazard.
    - Grass, weeds, brush and tree limbs can obscure or limit a driver's visibility
    - Controlling vegetation helps reduce crashes and injuries.
      - It should be noted that the information that is presented is not intended to be a design guide; if further clarification is needed, maintenance personnel should consult an engineer

- Goals of vegetation control for safety include
  - Keeping signs visible to drivers
  - Keeping road users (vehicles, bicycles, pedestrians, equestrians) visible for drivers
  - Improving visibility to road side hazards:
    - Trees
    - Wildlife
    - Livestock
  - Improving winter maintenance
  - Improving drainage systems function as designed
  - Controlling noxious weeds in accordance with local and State laws and ordinances

Introduction
Continued

- Road Side Vegetation Management
  - An integrated roadside vegetation management program consists of eliminating or controlling vegetation through a variety of strategies including mowing, brush cutting (mechanical and hand), use of herbicides, grazing of livestock, cultivating desirable vegetation, and re-vegetation.

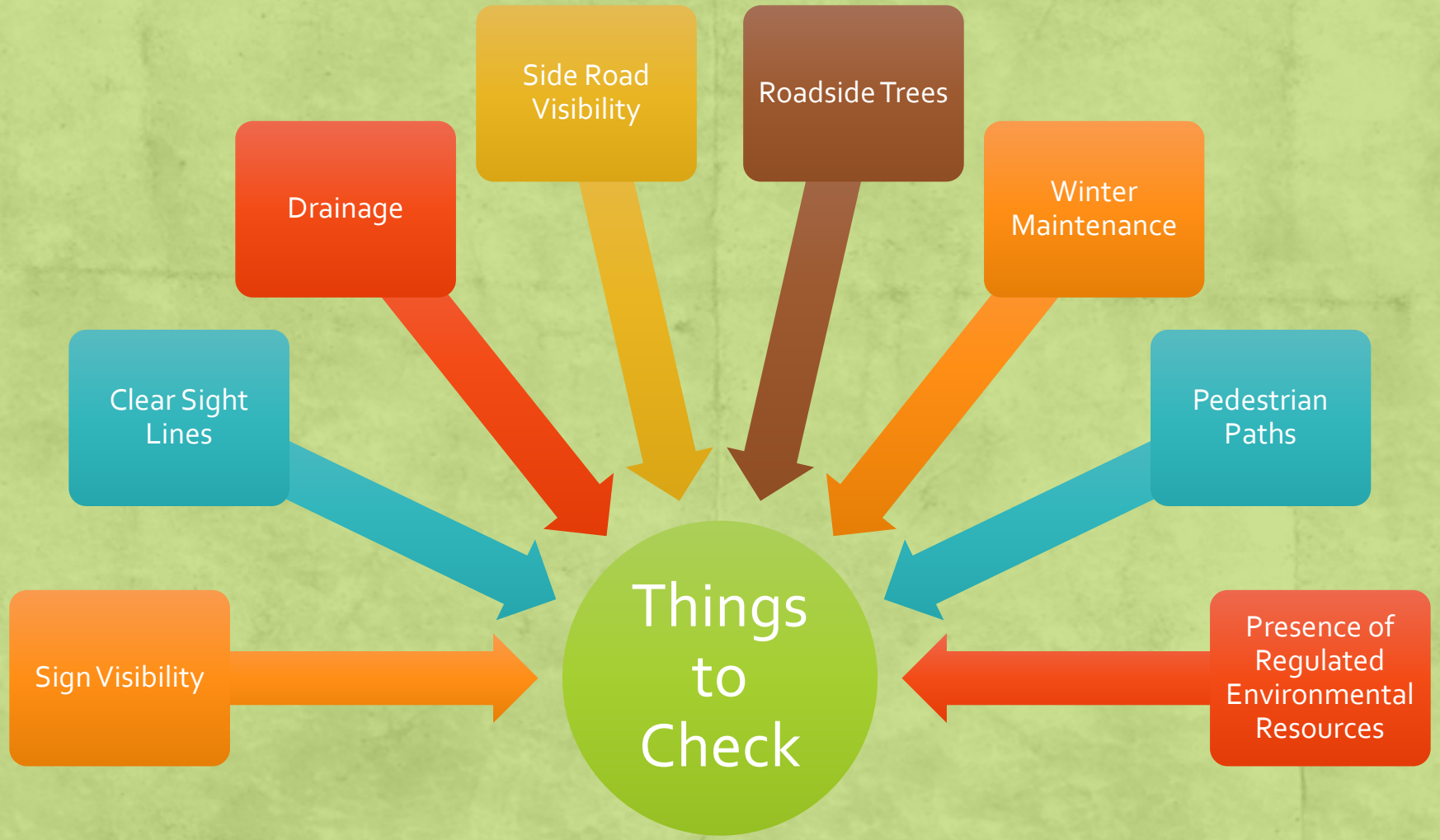
  - Be sure you know your State's laws and regulations dealing with environmental protection and vegetation control, and record-keeping and reporting requirements. Consult with your local weed control specialist to determine the type of vegetation and the best way to control it. Also use of herbicides may not be permitted by Vermont Agency of Agriculture or local ordinances or a plant or animal on the Threatened and Endangered Species list may be present.

    The Agency of Agriculture pesticide web page:
    http://agriculture.vermont.gov/pesticide_regulation

    Specific information regarding working within the right-of-way (ROW)
    http://agriculture.vermont.gov/pesticide_regulation/pesticide_permitting/row

    Vermont Fish and Wildlife Endangered and Threated Species (i.e. bats)
    http://www.vtfishandwildlife.com/cms/one.aspx?portalid=73163&pageid=268450

Specific Things to Check



Keeping Traffic Control Devices Visible

- Drivers need an unobstructed line of sight to any side road signs or roadway hazards far enough ahead for them to react safely to each situation.
- The distances for critical signs are based on stopping sight distance; the distance from other signs are based on allowing 4 seconds to detect, read, and respond to the sign.

Table 1. Clear Distance to See Sign

Speed Limit (mph)	Critical Signs (feet)	Non-critical Signs (feet)
30	250	150
40	350	200
50	450	250
60	600	300

These distances are to be considered minimum distances, longer distances are preferable.

Source: Vegetation Control for Safety; A Guide for Local Highway and Street Maintenance Personnel, 2008

Stopping Sight Distance

- Roads are safer when drivers can see as far ahead as it takes to stop their vehicles.
- The Distance it takes to notice a problem, realize a stop is necessary and come to a complete stop is called stopping sight distance.
- Stopping sight distance is important along all roadways. Where vegetation is close to the road, special attention needs to be given to stopping sight distance on the inside of curves

Table 2. Required Stopping Sight Distance

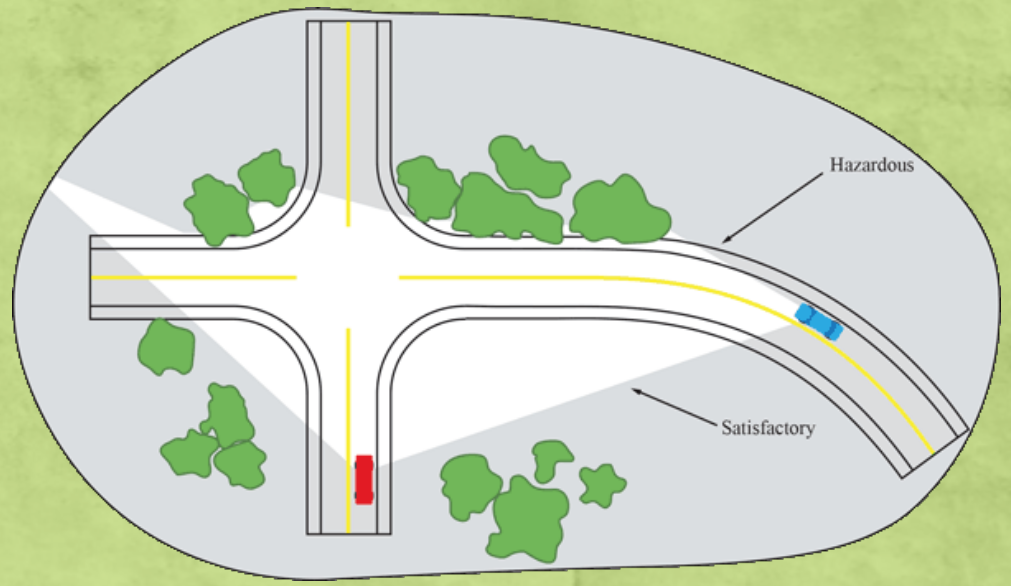
Speed Limit (MPH) (or Design Speed)	Stopping Sight Distance (FT)						
	0%	Downgrades			Upgrades		
	Grade	3%	6%	9%	3%	6%	9%
25	155	158	165	173	147	143	140
30	200	205	215	227	200	184	179
35	250	257	271	287	237	229	222
40	305	315	333	354	289	278	269
45	360	378	400	427	344	331	320
50	425	446	474	507	405	388	375
55	495	520	553	593	469	450	433
60	570	598	638	686	538	515	495
65	645	682	728	785	612	584	561

Source: American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, 2011

Intersection Sight Distance

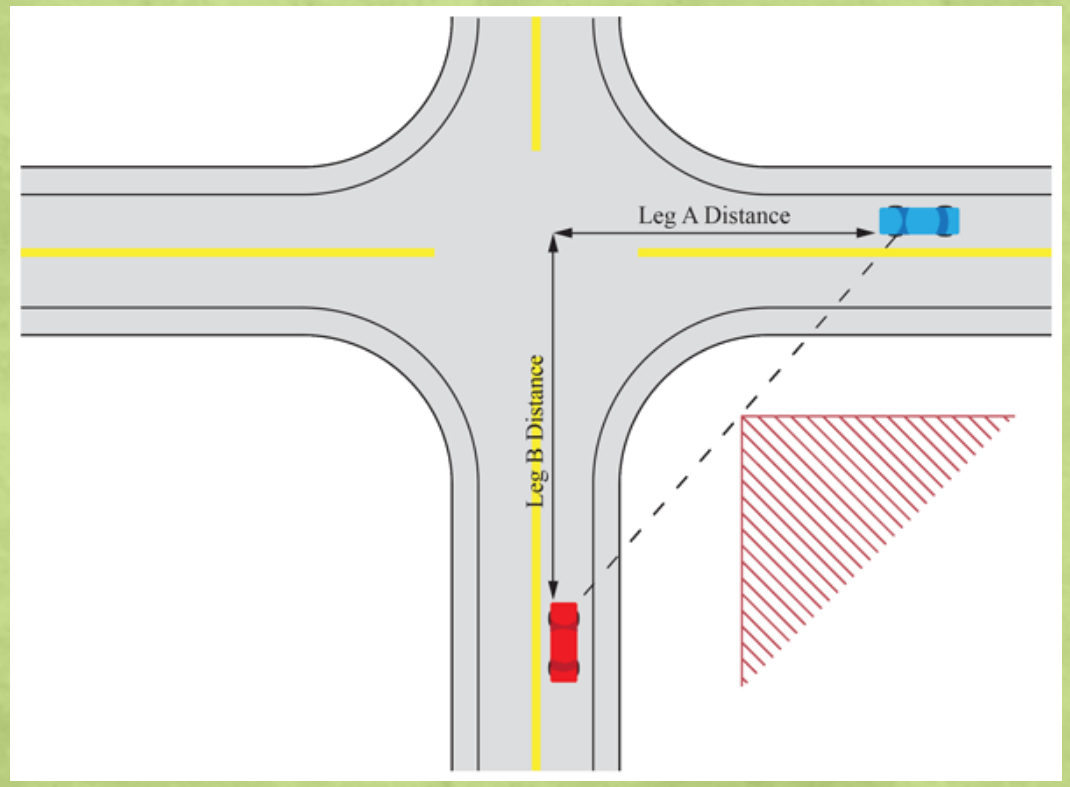
- Drivers approaching an intersection need a clear line of sight to the intersection and along the crossroads early enough to see any conflicting vehicles, bicyclist and pedestrians to avoid a crash.
- Sight triangles can be limited by the presences of:
  - horizontal and/or vertical curves
  - Buildings
  - Parked vehicles
  - Signs
  - Parked Vehicles
  - Offset curbs
  - Vegetation

The dimensions of the legs of the sight triangle depend on speed of the intersecting roadways and the type of traffic control used at the intersection.



Intersection Sight Distance

Defining clear sight triangle at intersection



Intersection line-of-sight distance ≥ Stopping Sight Distance

Table 3. Required Length of Leg for No Traffic Control

Speed Limit (MPH)	length of Leg (FT)
25	115
30	140
35	165
40	195
45	220
50	245
55	285
60	325
65	365

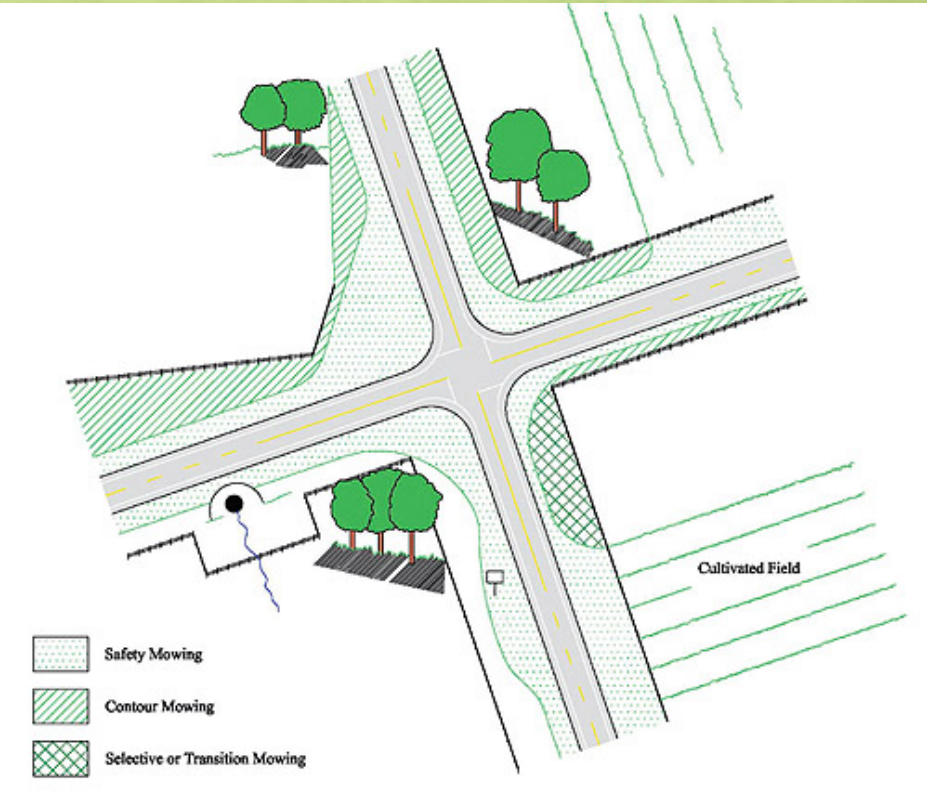
*Table 4. Intersection Sight Distance for Left Turn form Stop**

Speed Limit (MPH)	Intersection Sight Distance (FT)
25	280
30	335
35	390
40	445
45	500
50	555
55	610
60	665
65	720

* For passenger cars turning left onto two-lane, two-way roadway and level grades

For more detailed information on intersection sight distance for all types of intersection control (signal, stop or yield) and for vehicle types consult the American Association of State Highway and Transportation officials (AASHTO), *A Policy on Geometric Design of Highways and Street, 2011*.

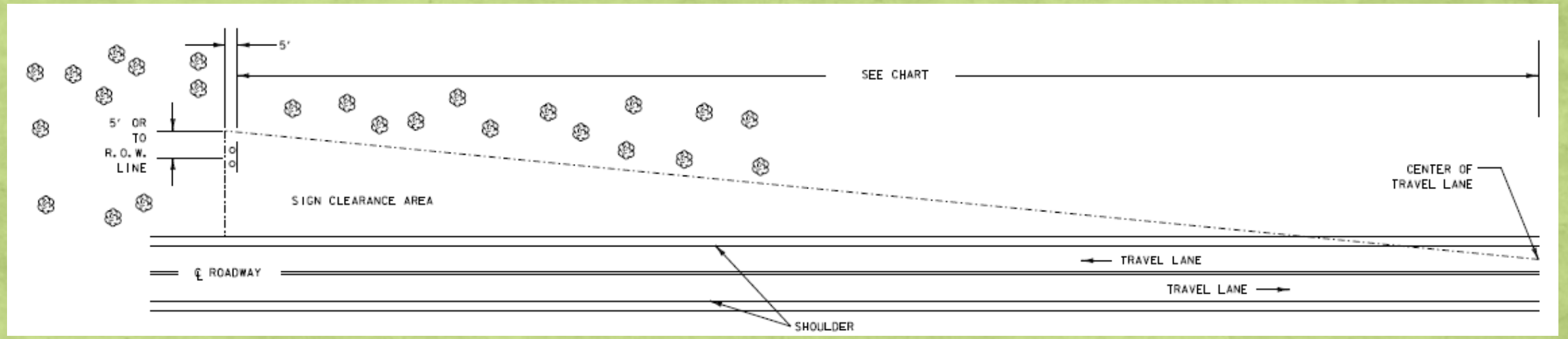
Mowing for Safety



Three Classes of Mowing

- Safety
  - Make sure signs and other traffic control devices can be seen
  - Provides good sight distance for drivers approaching intersections and maneuvering through curves
- Transition
  - A smooth change form narrow to wide mowing widths when right-of-way widths differ.
- Contour or selective
  - Natural blending with native or planted growth
  - Shows off landscaping or wildflower areas or dresses up an interchange entrance

Thinning and Trimming for Signs Detail



For Agency Sign Projects –

1. The Contractor shall remove all woody stemmed growth including brush, saplings and tree limbs growing within or projecting into the clearance area and down to ground level or at least 10 feet below the bottom of the sign. Payment will be made under 201.31 "Thinning and Trimming for Signs" and paid for each. No Chemicals (poisons or defoliants) allowed.

2. Selective cutting of brush or tree branches in the immediate vicinity of a sign may be necessary to provide full visibility for any existing (retained) or new sign locations. This work will be preformed at the direction of the Engineer and paid for under contract item 201.31 "Thinning and Trimming for Signs". This work shall be done at the same time the sign is installed, or as directed by the Engineer. All signs shall be fully visible from the approaching travel lane for a minimum distance of 300 feet.

Minimum Sign Sight Distance Chart	
Approach Speed (MPH)	Sight Distance (feet)
30 or less	300
35	350
40	400
45	450
50	500
55	550

Suggested Maintenance Steps

1. When on routine maintenance patrol, look for signs and other traffic control devices (including chevron signs in curves) blocked by brush, trees, grass, and weeds. ***It should be noted that both state and local agencies are required to follow federal and state requirements for Indiana bats, northern long-eared bats , and other state listed bat species when tree cutting is required***.

   http://vtrans.vermont.gov/sites/aot/files/highway/documents/environmental/Regulated%20Bat%20Guidance.pdf

2. Pull maintenance vehicles off the traveled way and place temporary traffic control devices

3. Cut or trim trees, brush, weeds or grass to clear a driver's line of sight to the sign or traffic control device. ***Always wear appropriate personal protective equipment and apparel!***

4. WATCH FOR OVEHEAD POWER LINES and electrical farm fences when cutting brush. Notify your utility company when crews encounter trees that are in conflict with power/phone lines, preventing crews form trimming.

5. Paint or spray stubs of brush or small weeds with an approved weed killer solution to keep it from growing back. ***Contact the Agency of Agriculture for more information***.

Suggested Maintenance Steps
Continued

6. Collect limbs and large brush to haul away for disposal or run them through a chipper, if available. Reclaim trees as mulch or bark rather than burning. Refer to Vermont Department of Forest, Parks and Recreations regulations for transporting wood and quarantine rules preventing or slowing the spread of non-native pest to new locations.

   Forest Pest Quarantine Regulations
   http://fpr.vermont.gov/forest/forest_health/forest_pest_regulations

   Immediately report evidence of Emerald Ash Borer and diseased trees. Do not transport these infected trees from where they are cut.
   Refer to the Vermont's Plant and Pest Quarantines.
   http://agriculture.vermont.gov/plant_pest/plant_weed/plant_pest_quarantines

   http://vtinvasives.org/dontmovefirewood

7. Watch for moving traffic when removing the temporary traffic control and leaving the site.

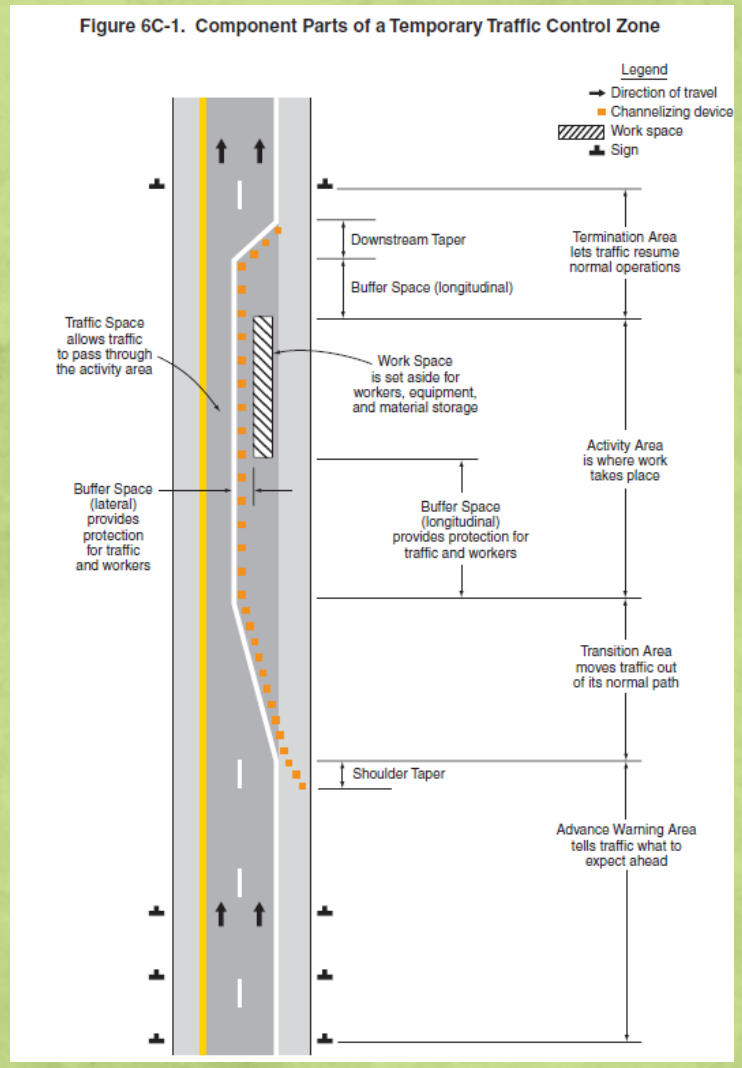
Hi-Visibility Apparel

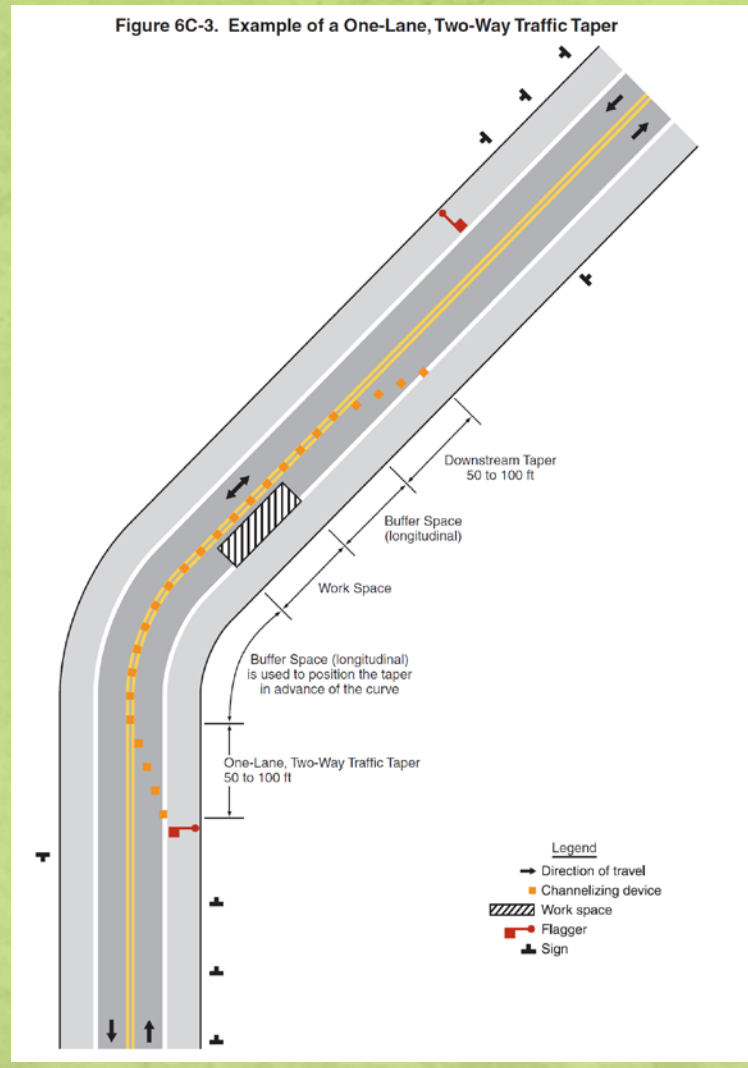
2009 MUTCD Requirements

- In Part 6D.03 requires that "***All workers***, *including emergency responders, within the right-of-way who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment within the TTC zone shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standards for High-Visibility Safety Apparel and Headwear" (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004 standard performance for Class 2 or 3 risk exposure, except as provided in Paragraph 5. A person designated by the employer to be responsible for worker safety shall make the selection of the appropriate class of garment."*

Performance Class 2	Performance Class 3	Performance Class E
	 	 
* Minimum background material: 775 in sq. * Miminum Retroreflective material: 201 in sq. * Provides ehanced visibility fduring inclement weather * Intended for workers whose tasks divert their attetntion from approaching traffic	* Minimum background material: 1240 in sq. * Miminum Retroreflective material: 310 in sq. * Provides ehanced visibility for workers who who have tasks that placethem in imminent danger from approaching * Provides maximum visibility when the wearermust be conspicuous at a maximum distance of 1,280 feet	* Trousers or gaitors intended to be worn in combination with a Performance Class 2 or 3 apparel to provide a full range of body movements

Temporary Traffic Control





Source: 2009 MUTCD

Temporary Traffic Temporary Traffic Control
continued

Figure 6C-2. Types of Tapers and Buffer Spaces

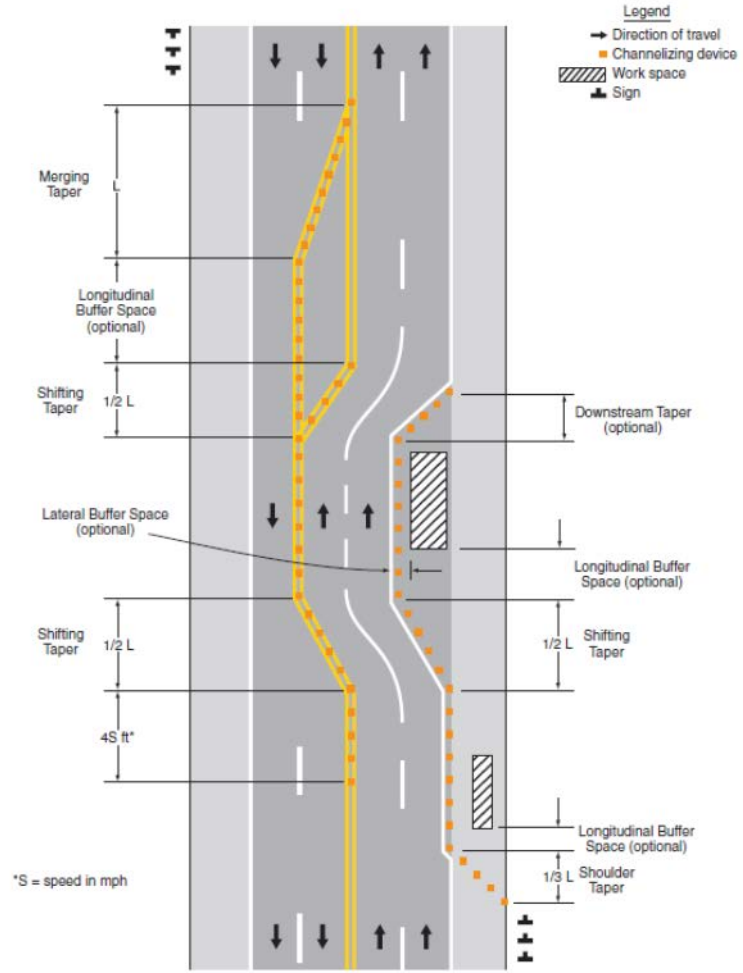


Table 6C-1. Recommended Advance Warning Sign Minimum Spacing

Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed)*	100 feet	100 feet	100 feet
Urban (high speed)*	350 feet	350 feet	350 feet
Rural	500 feet	500 feet	500 feet
Expressway / Freeway	1,000 feet	1,500 feet	2,640 feet

* Speed category to be determined by the highway agency
** The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-46. The A dimension is the distance from the transition or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The "first sign" is the sign in a three-sign series that is closest to the TTC zone. The "third sign" is the sign that is furthest upstream from the TTC zone.)

Table 6C-3. Taper Length Criteria for Temporary Traffic Control Zones

Type of Taper	Taper Length
Merging Taper	at least L
Shifting Taper	at least 0.5 L
Shoulder Taper	at least 0.33 L
One-Lane, Two-Way Traffic Taper	50 feet minimum, 100 feet maximum
Downstream Taper	50 feet minimum, 100 feet maximum

Note: Use Table 6C-4 to calculate L

Table 6C-4. Formulas for Determining Taper Length

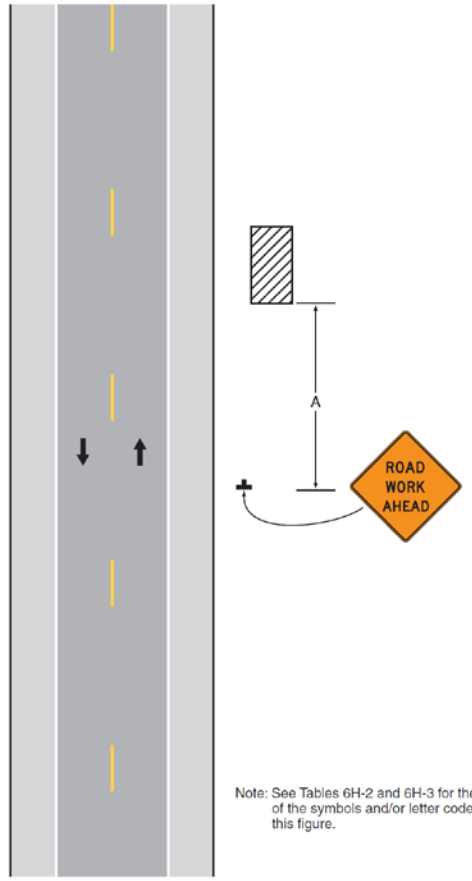
Speed (S)	Taper Length (L) in feet
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or more	$L = WS$

Where: L = taper length in feet
W = width of offset in feet
S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

Source: 2009 MUTCD

Temporary Traffic Control
continued

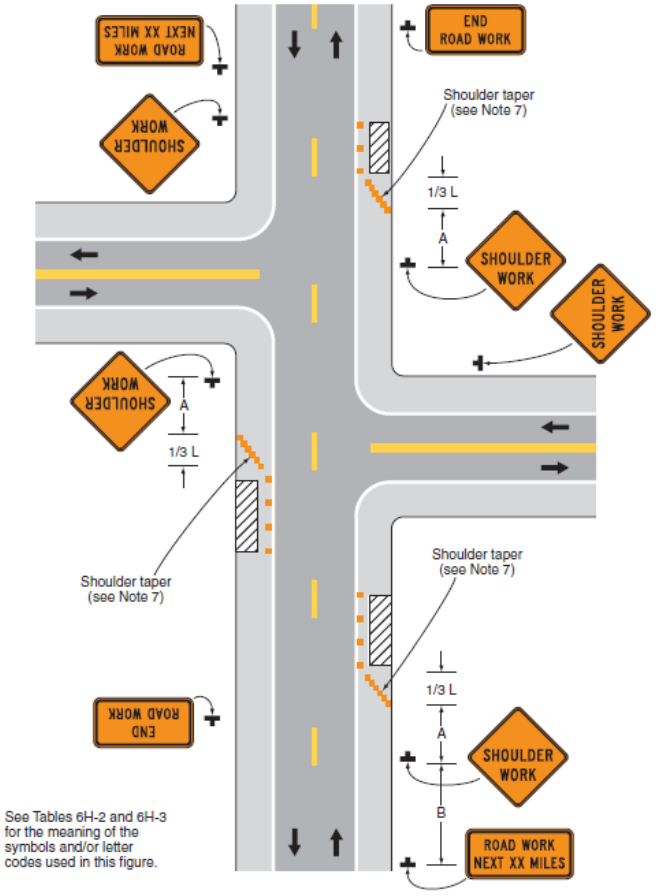
Figure 6H-1. Work Beyond the Shoulder (TA-1)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 1

Figure 6H-3. Work on the Shoulders (TA-3)



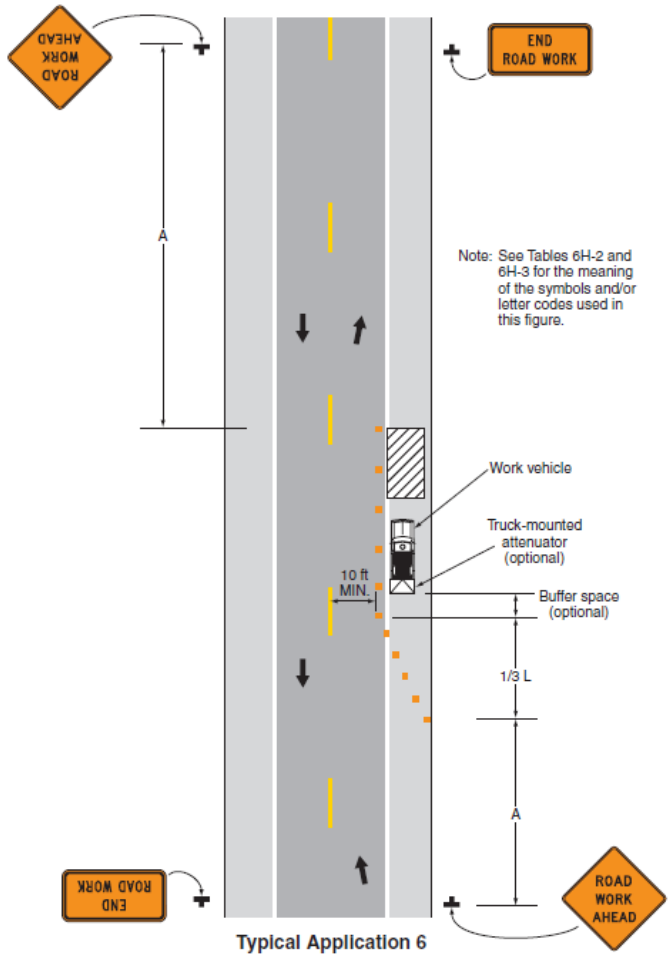
Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 3

Source: 2009 MUTCD

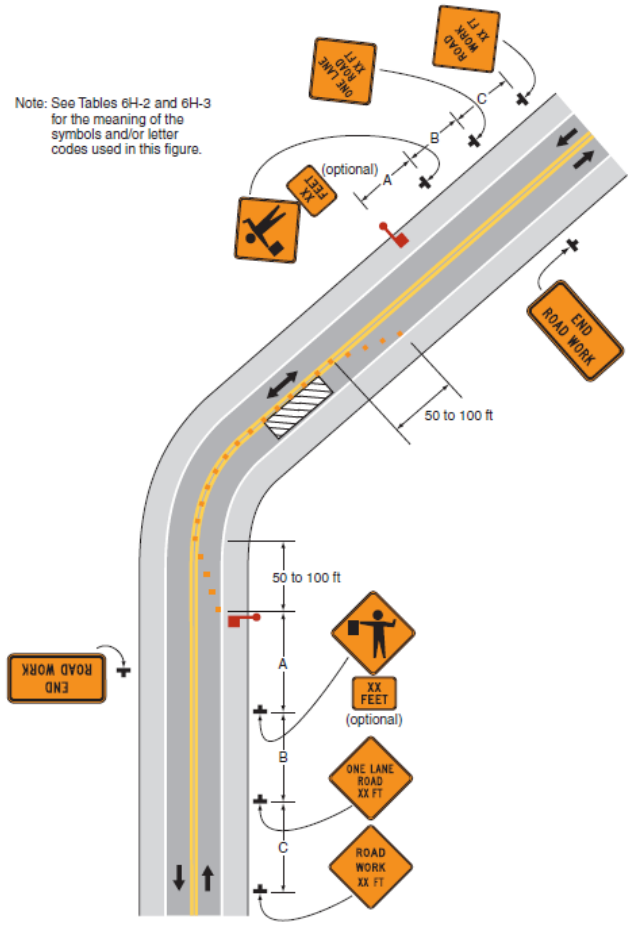
Temporary Traffic Control
continued

Figure 6H-6. Shoulder Work with Minor Encroachment (TA-6)



Typical Application 6

Figure 6H-10. Lane Closure on a Two-Lane Road Using Flaggers (TA-10)



Typical Application 10

Source: 2009 MUTCD