

Roadside Work Safety

CSUEB 2009

Lesson Plan

- Standards, Regulations, & Guidelines
- Work Zone Fatalities
- Principles of Safe Traffic Control
- Stages of the Roadwork Zone
- Three Key Elements – Application, Cone Placement, Buffer Zone
- Tools, PPE, Signs
- Removal or termination

Roadwork Fatalities

ROAD CONSTRUCTION SITES

Fatal occupational injuries at road construction sites by selected characteristics, 2004-2008

Characteristics	2004	2005	2006	2007	2008
Total	119	165	139	106	101

- Each year over 100 workers are killed at roadwork construction sites.
- Accidents increase as lane widths decrease.
- Accidents increase after 6 pm.
- Accidents increase as speeds deviate from posted speed limits.

Standards and Regulations

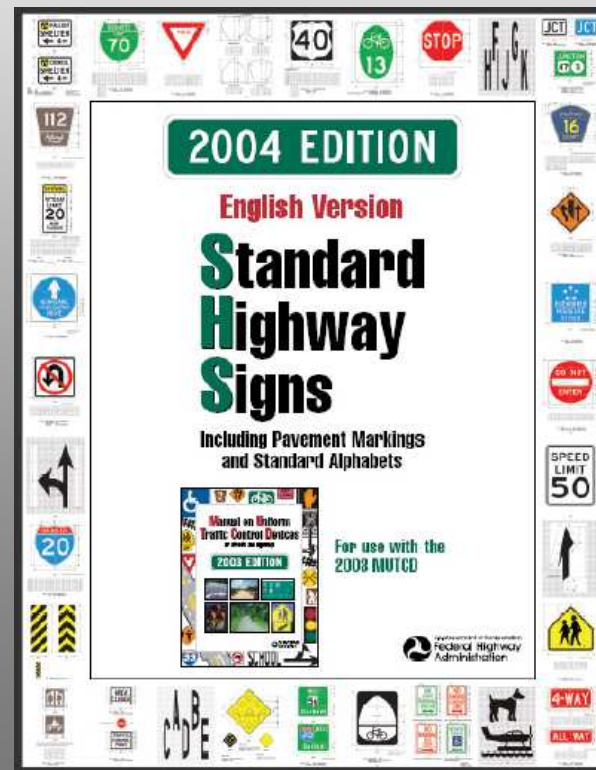
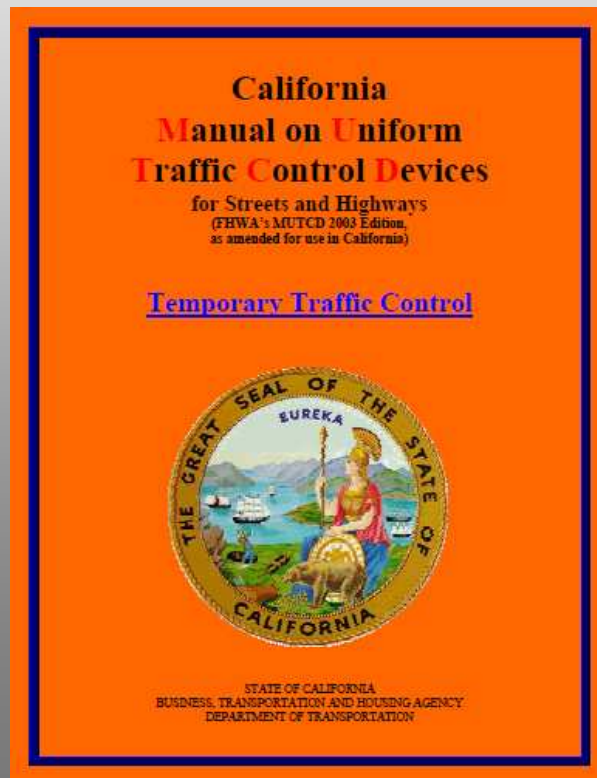
- Maintenance operations in and around traffic are regulated by the following:
 - Code of Federal Regulations (CFR) Title 23 Highways 655.603
 - California Code of Regulations (CCR) Title 8 §1598 Traffic Control for Public Streets and Highways
 - California Manual of Uniform Traffic Control Devices for Streets and Highways, September 26, 2006
 - CSUEB Traffic Control Manual

Manuals & Guidelines

Managers must use these guidelines when developing a Temporary Traffic Control (TTC) Workplan:

http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/ca_mutcd.htm

http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm



Principles of Safe Traffic Control

1. Have a Temporary Traffic Control (TTC) Plan
2. Keep traffic moving with as little impact as possible
3. Communicate to motorist that you are there working
4. Monitor that the plan is working, adjust if it is not, drive the affected area to see if plan is working
5. Plan for the worst, such as inclement weather
6. Train everyone so they know the procedures and their roles
7. Always take into consideration worker safety first

Work Plan Criteria

Criteria to consider when setting up a work zone

1. Work Plan – work plan is always required. There is only one exemption: 1 hour duration and 15 feet from the roadway
2. Work Duration - provide for the efficient completion of whatever activity suspended normal use of the roadway
3. Work Location - Effective temporary traffic control must be provided for the workers, pedestrians.
4. Roadway Type – traffic speed and volume
5. Other considerations – underground utilities, power lines, persons with disability, bicycles, visibility, (hills, curves, weather).

Work Plan Criteria

Other considerations

1. Assign a responsible person in charge when ever there are two or more employees working on the side of the road
2. Does the work require someone to act as a look-out? See CSUEB for requirements
3. Notify UPD of the work plan and schedule
4. Review the plan and procedures before beginning the work
5. Be sure you have all the right equipment and PPE

Types of Roads

1. Freeway - a divided highway with full control of access;
2. Expressway - a divided highway with partial control of access;
3. Conventional Road - a street or highway other than a low-volume road (as defined in Section 5A.01), a freeway, or an expressway;
4. Special Purpose Road - a low-volume, low-speed road that serves recreational areas or resource development activities, or that provides local access.

Low Volume Road

A low-volume road is defined as:

- Lies outside of built-up areas of Cities, towns, and communities, and it shall have a traffic volume of less than 400 AADT*.
- Shall not be a freeway, expressway, interchange ramp, freeway service road, or a road on a designated State highway system. In terms of highway classification, it shall be a variation of a conventional road or a special purpose road as defined in Section 2A.01.
- Shall be classified as either paved or unpaved.

*AADT – Average Automobile Daily Trips

Campus Road Types & Conditions

Conventional Road: Carlos Bee Blvd, Harder Road, East Loop

- 25 – 35 mph (excessive speeding can be an issue)
- Weather conditions – slippery when wet, steep
- Curves and steep hills create blind spots
- Island divide work
- Animals

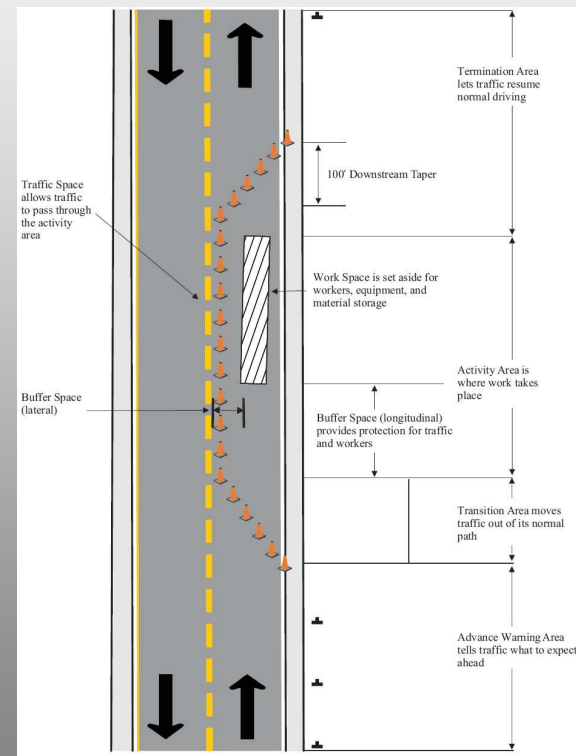
Special Purpose Road: Access Road

- Low-volume, low-speed road
- Serves recreational areas or resource development activities or
- Provides local access
- Curves and hills create blind spots
- Animals

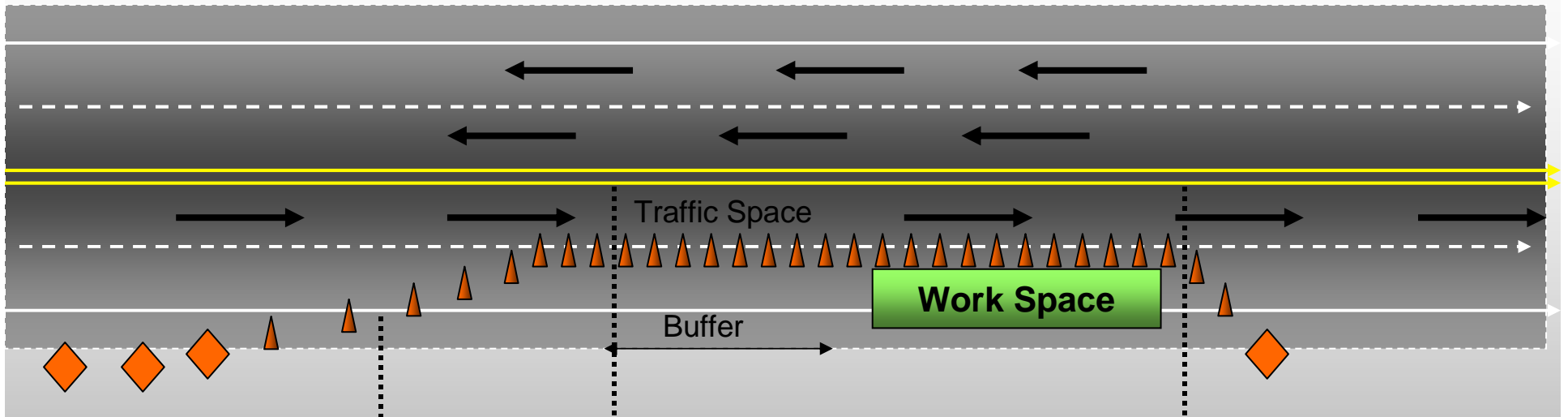
TTC Plan

4 Stages of Road Work Zone

1. Advance Warning
2. Transition
3. Activity
 - Buffer Space
 - Worker Space
 - Traffic Space
4. Termination



Work Zones



1. Advance Warning	2. Transition	3. Activity	4. Termination
Communicates to drivers that you are working up ahead	Moves traffic out of normal path of travel	Where the work takes place 1. Buffer space provides protection 2. Work space 3. Traffic space	Area lets traffic resumes to normal
Signs Cones Flaggers		Workers are separated from the traffic	

WZ – Advance Warning Zone

Table 6C-1. Suggested Advance Warning Sign Spacing

Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed)*	30 (100)	30 (100)	30 (100)
Urban (high speed)*	100 (350)	100 (350)	100 (350)
Rural	150 (500)	150 (500)	150 (500)
Expressway / Freeway	300 (1,000)	450 (1,500)	800 (2,640)

* Speed category to be determined by highway agency

** Distances are shown in meters (feet). 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 third sign is the first one in a three-sign series encountered by a driver approaching a TTC zone.)

WZ – Transition & Taper Placement

Table 6C-3(CA). Taper Length Criteria for Temporary Traffic Control Zones
for 3.6 m (12 ft) Offset Width

Speed* S (mph)	Minimum Taper Length** for Width of Offset 12 ft (W)			
	Merging L (ft)	Shifting L/2 (ft)	Shoulder L/3 (ft)	Down Stream (ft)
20	80	40	27	100
25	125	63	42	100
30	180	90	60	100
35	245	123	82	100
40	320	160	107	100
45	540	270	180	100
50	600	300	200	100
55	660	330	220	100
60	720	360	240	100
65	780	390	260	100
70	840	420	280	100

* - Posted Speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed.

** - For other offsets use the following merging taper length formula for L:

For speeds of 65 km/h (40 mph) or less, $L = WSS/155$ ($L = WSS/60$)

For speeds of 70 km/h (45 mph) or more, $L = WS/1.6$ ($L = WS$)

WZ – Activity Zone

Activity Zone is where the work takes place and is comprised of three sub areas

1. Buffer space provides protection to the workers. No equipment or workers should be staged in this location. Emergency vehicles should not be in this space
2. Work space – equipment is staged, location of work performed
3. Traffic space – where the traffic is channeled

WZ – Termination Zone

This is where the activity ends and traffic can return to normal flow

Options:

- Place a taper and/or
- Sign with “End of Road Work”

Termination of the Work

1. Work from the Termination Zone backwards, removing cones and signage
2. Work signs on the shoulder of the in the “Advance Warning” area should be the last safety device removed.
3. Be sure to remove all signs when work is completed

Tools, PPE, Signs

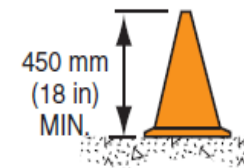
Cones:

Minimum 18"

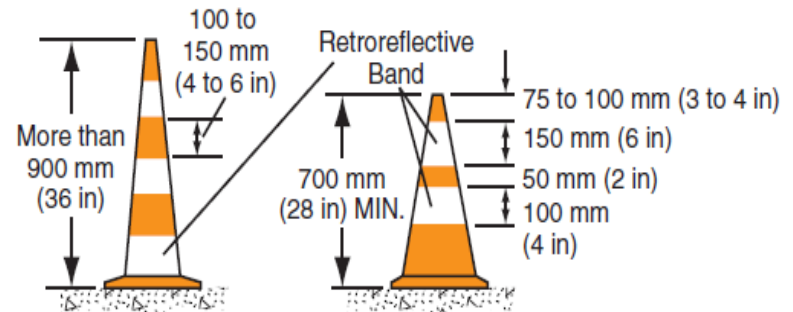
- Low-volume
- Daytime

Minimum 28" w/Retroreflective banding

- High volume
- Night time
- Need for "conspicuous guidance"



Day and Low-Speed
Roadway (≤ 60 km/h)
(≤ 40 mph)



Night and/or Freeway
High-Speed Roadway
(≥ 70 km/h) (≥ 45 mph)

Tools, PPE, Signs

Vests:

ISEA/ANSI Class 2

- Seen at a minimum of 1000
- Traffic equal to or exceeds 25 mph
- Need greater visibility in inclement weather.
- Retroflective tape on body



Tools, PPE, Signs

Vests:

ISEA/ANSI Class 3

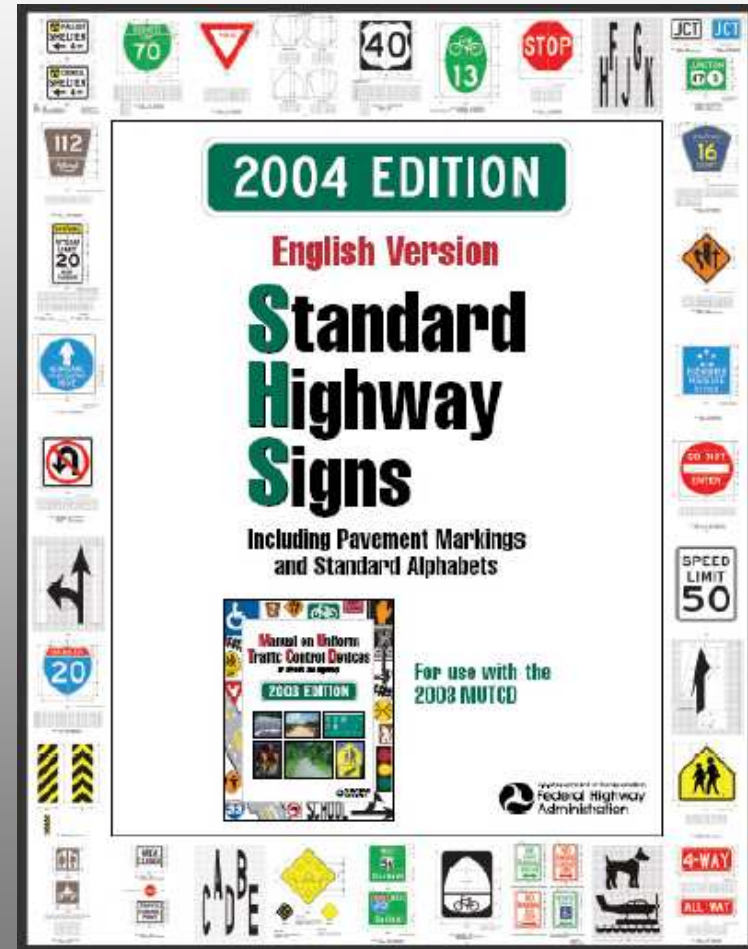
- Seen at a minimum of 1000
- Traffic exceeds 50 mph
- Provide the highest level of conspicuity for workers.
- Retroreflective tape on body and sleeves



Tools, PPE, Signs

Signs on public roadways must be built to these specification:

[Standard Highway Signs 2004 Edition, FHWA MUTCD](#)



Tools, PPE, Signs

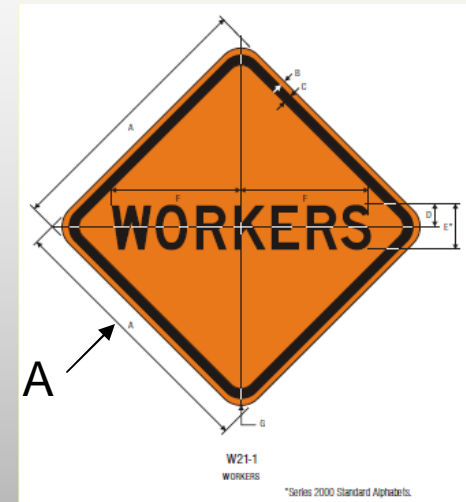
Example from:

Standard Highway Signs 2004 Edition, FHWA MUTCD



This means the sign size on a Conventional Road

Harder Road is classified as a Conventional Road, therefore, this sign on Harder Road would need to have at a minimum, 36" sides.



W21-1
WORKERS

*Series 2000 Standard Alphabets.

A	B	C	D	E	F	G
24	.375	.625	2	4 D	11.788	1.5
30	.5	.75	2.5	5 D	14.731	1.875
36	.625	.875	3	6 D	17.693	2.25
48	.75	1.25	4	8 D	23.577	3



TTC SIGN COLORS:
LEGEND — BLACK
BACKGROUND— ORANGE (RETROREFLECTIVE)