

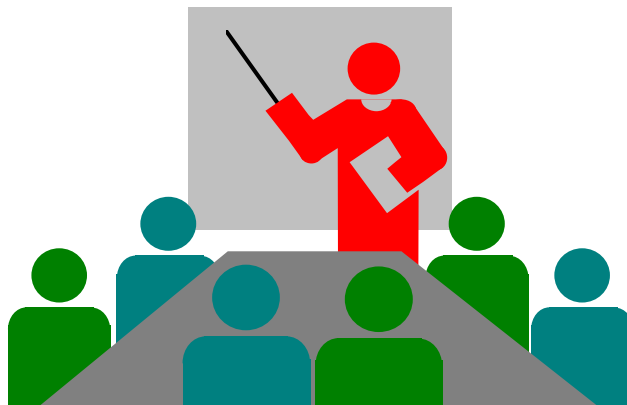
Welcome!

Thank you for attending. The purpose of this presentation is to introduce you to the fundamental principles of traffic control and Oregon OSHA's Division 3, Subdivision G, requirements.

This workshop is designed to include you as much as possible in the learning experience. The more you contribute, the more you will get out of this training. So please, don't hold back. Participate and have FUN!

Objectives:

1. Discuss the hazards of the roadway
2. Learn the fundamental principles of Traffic Control
3. Discuss the 10 steps to a safer work zone
4. Learn how to apply the fundamental principles in a Traffic Control Plan
5. Discuss hazard identification problems and solutions



Please note: This material, or any other material used to inform employers of compliance requirements of Oregon OSHA standards through simplification of the regulations should not be considered a substitute for any provisions of the Oregon Safe Employment Act or for any standards issued by Oregon OSHA.



Form Teams

Elect a Crew Foremen _____

Select a spokesperson _____

Everyone is a recorder _____

Planning and identifying needs

The most important element of construction worksite safety is planning. Hazards at worksites must be identified based on an evaluation of the processes, and the worksite overall before a plan can be developed. If proper planning isn't done before the work commences, time, materials, and, consequently, costs will rise. Planning makes the difference between the success or failure of any job and whether there is a profit, or a loss.

Proper and adequate placement of traffic control devices is the critical responsibility of those who are in charge over the particular roadway where the work zone is located. This responsibility must consist of pre-job planning which includes a written traffic control plan, initial and periodic inspection of existing devices and conditions throughout the project for compliance, and the safety of the motorist and the worker.

Before we can reduce or eliminate exposure to roadside hazards, we must first become familiar with the hazards, the fundamental principles, and their application before we can devise appropriate traffic control.



Part One

Hazards of the Roadway

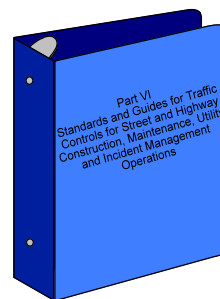
1. What is a work zone?

2. How do work zones create potential hazards for the motorist and the worker?

- A. _____
- B. _____
- C. _____
- D. _____

3. What does traffic control do ?

- Provides the maximum degree of safety by protecting both the public and the worker.
- Permits the maximum movement of traffic through work zones with the minimum amount of inconvenience, or movement out of the normal traffic pattern or flow.
- Allows for the construction activity to be conducted as efficiently and economically as possible.



4. What are traffic control devices?

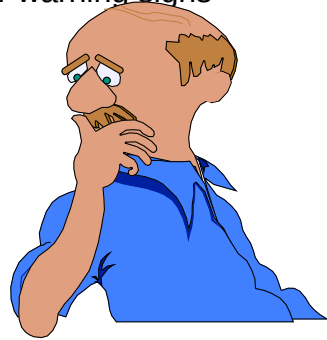
5. What is MUTCD?

The MUTCD will provide the design and application specifications of Traffic Control Devices. The criteria for design will vary based on environmental conditions such as illumination, weather, traffic speed, traffic volume. You will also find much of the same information in the pocketbook which you received at the start of the class.



For example turn to page 4 of the pocket book. Specifications for warning signs used at night, or on the freeway are that they be:

- diamond shaped,
- orange in color,
- retroreflective, and
- at least 48 inches x 48 inches in dimension.



For roads which have low speed and volume, the sign size may be reduced to:

- 36 inches x 36 inches for **day time** use.

The manual & pocket book also provide other useful information such as on page 9, how to determine the Average Daily Traffic Volume, (ADT). The definition of low volume is a rate which doesn't exceed 500 vehicles per day. Since traffic control work zone plans are calculated on the posted speed and the traffic volume this is an essential piece of information to have.



Page 9 gives you a ***rule of thumb***:

Count the number of vehicles that pass a single reference point over a five (5) minute period. If not more than 3 vehicles pass the reference point in that period, then the road can be considered low volume.

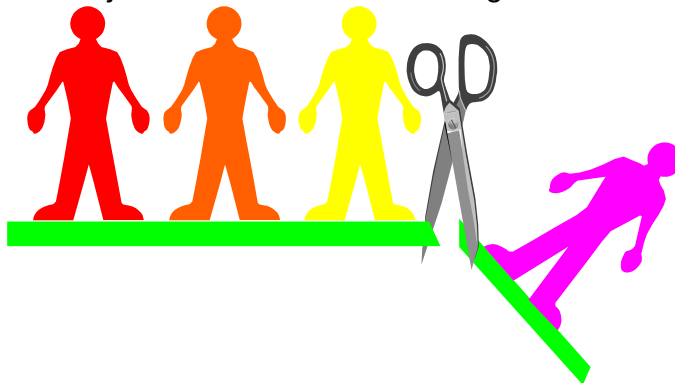
6. Are there any other rules applicable in Oregon?

7. Who is the “governing” authority on a given roadway?

What kinds of accidents are happening at the worksite?

Studies show:

- Rear end accidents account for 40% of all work zone related accidents.
- The most common work zone fatality is a vehicle to vehicle collision during the day.
- In urban areas, striking the barrier is the 3rd most common fatality. 85% of those fatalities occurred at night.
- 45% of fatalities occurred in urban areas
- 66% of fixed object fatalities occurred at night.



8. What type of traffic control would help eliminate or reduce the hazard of :

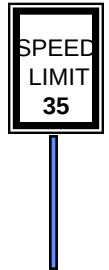
- Motorists striking fixed objects at night?
- Striking barriers at night?
- Vehicle to vehicle collisions in the day time?

Part Two

Fundamental Principles

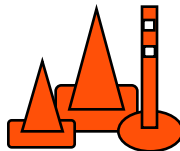
9. There are two types of traffic control:

- a. _____
- b. _____



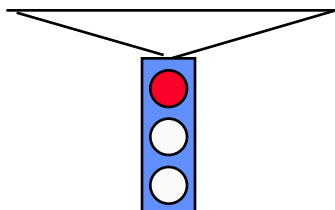
Permanent traffic control stays in place. It is designed to be part of a roadway to permanently direct motorists. These would include such items as traffic signals permanent intersection barriers, stop signs, yield signs, speed signs.

Temporary traffic control is used to direct traffic around construction zones during the construction phase. These would include cones, candle sticks and other channelization devices, advanced warning signs such as prepare to stop, flagger ahead, and line closure.

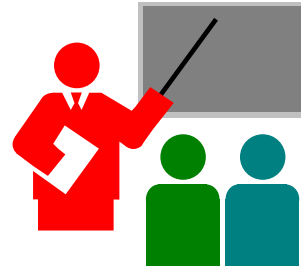


10. How can temporary traffic control be affected by permanent traffic control?

Although each work zone will have individual traffic control plans based on the type of worksite processes in progress, all traffic control plans will have similarities which are inherent to every work zone.



15 Fundamental Principles



Treat traffic control as a priority equal to the job being performed.

Design a temporary traffic control system that doesn't create confusion and is easy to navigate.

Have a plan that is suitable to the project.

Don't bother traffic any more than necessary. Work during off peak hours. Park and work off the travel way when possible.

Don't expect drivers to slow down until they see some kind of activity.

Don't make drivers think, respond, brake, or maneuver rapidly.

Develop a plan for work and emergency vehicles before it is needed.

Reduce the time workers are exposed to traffic to minimize danger.

Goal of traffic control is to guide drivers in a definite, clear manner.

Give plenty of advanced notice so that drivers have time to process the warning and respond appropriately to the changes.

Use flaggers to supplement the other traffic control measures to improve safety. Urban work zones are safer when flaggers are used.

Inspect as necessary, depending upon the complexity and length of the project. At least 2 x per day, and whenever you observe significant traffic pattern changes.

Don't assign untrained workers the responsibility for setting up and maintaining the system.

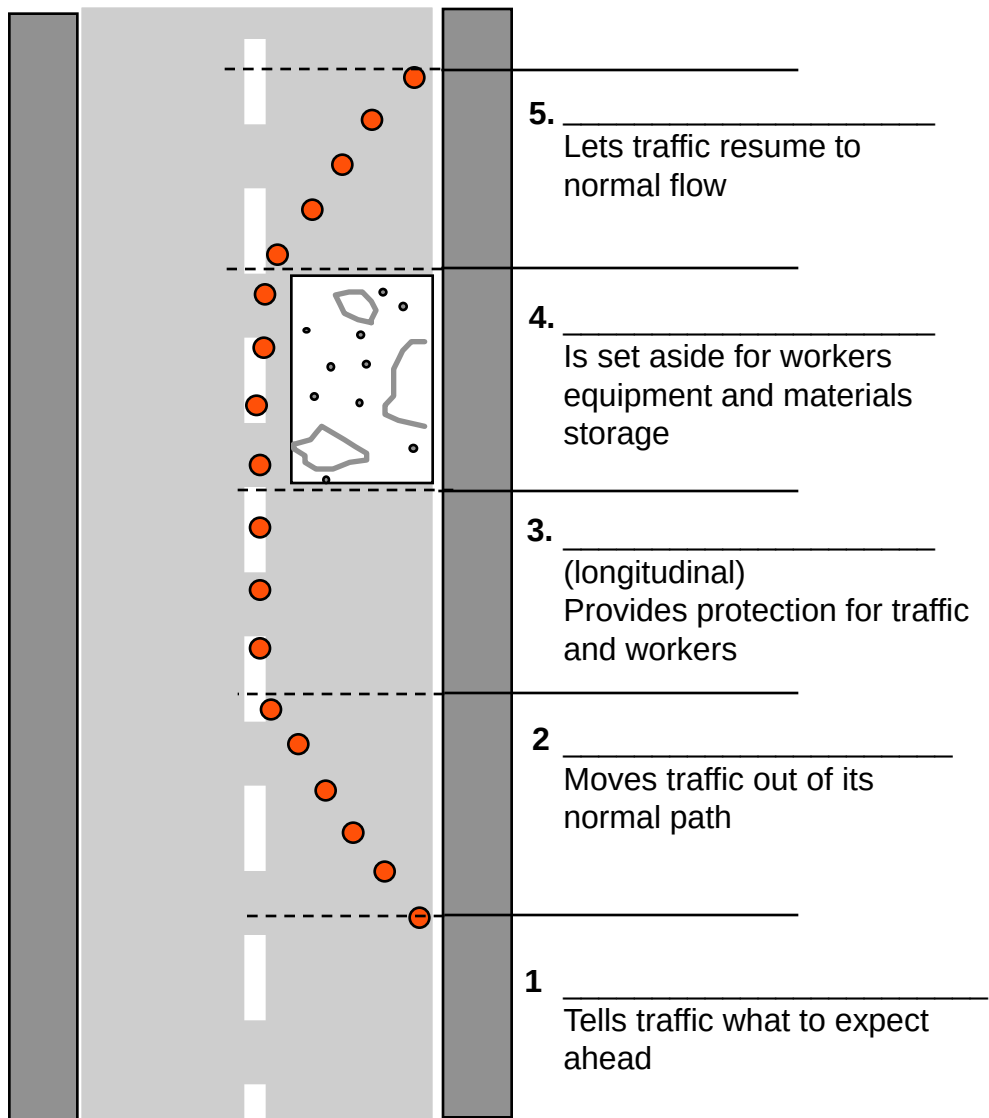
Changing weather and traffic conditions may make it necessary to modify the traffic control system so that it remains effective.

Be credible. Don't advise motorists of a condition that doesn't exist.

Work zones

11. There are **five** parts of a work zone:

- **Advance Warning Area**
- **Transition Area**
- **Buffer Area**
- **Work Area**
- **Termination Area**



Design of Work zones

The goal in the design of effective traffic control through work zones is to provide driving conditions that resemble, as closely as possible, the highway conditions under normal operation. Such a goal should help to prevent accidents within the work zone area.

Exercise:

Gather the crew. Each table will be assigned one of the five parts of the work zone. Read and discuss the section which applies to your assigned part. Summarize the purpose and importance of the individual part as it relates to worksite safety and record your answers on the worksheet on page 11.

1. Advance Warning Area

All traffic control zones should have an advance warning area. The advance warning area is important to alert drivers to potentially unusual or hazardous conditions so that driving speeds and driving practices can be adjusted in preparation for such conditions. The main traffic control devices used in the advance warning areas are diamond-shaped warning signs in the black-on-orange series specified for construction and maintenance operations.

2. Transition Area

A transition area is required when lanes are to be closed, the travel path shifted, or both, to accommodate the work space. It is the portion of the traffic control zone that commences at the downstream end of the advance warning area and extends to the beginning of the activity area.

To provide a smooth, effective transition for motorists, it is important to provide for adequate transition taper length, sufficient pavement markings, and adequate channelization.

3. Buffer Zone

Buffer space provides an additional element of safety prior to the actual work space. The buffer zone is the portion of the traffic control zone that commences at the downstream end of the transition zone.

It provides a recovery space for errant vehicles and separates traffic flow from the work activity. Work activities should not take place and equipment and materials should not be stored within the buffer area.

4. Work/Activity Area

The work/activity area is where the maintenance or construction work is taking place, including space for equipment and materials. The work/activity area is the portion of the traffic control zone that commences at the downstream end of the buffer zone.

The work space is the portion of the activity area set apart for the actual maintenance or construction work, equipment, and material storage. The work space area needs to be delineated to exclude vehicular and pedestrian traffic.

5. Termination Area

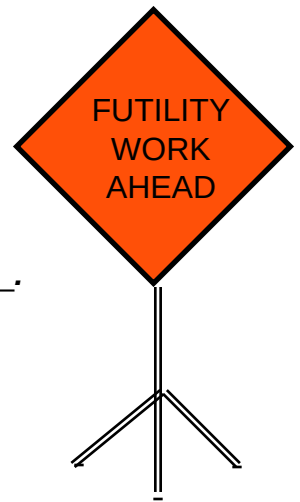
The termination area is used at work sites to allow traffic to clear the activity area and return to normal traffic operations. It is the final portion of the traffic control zone that extends from the downstream end of the activity area to the sign denoting the end of the work zone. If tapers are used in the transition area for lane closures, they will be required in the termination area and should adhere to the same principles as discussed in the transition area.

Exercise:

Each group will be assigned one of the five parts of the work zone. Answer these questions:

What is the specific purpose of this part of the work zone? Its importance?

How does this fit with the other parts of the work zone?



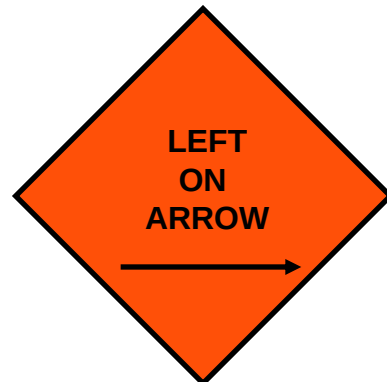
12. The advance warning area contains the warning _____.

13. Advance warning signs are usually in a series of _____ signs.

14. How far apart must signs be spaced?

- At speeds of 25 mph _____ feet spacing is allowed
- At speeds of 35 MPH and below, _____ feet is allowed.
- On a “standard road”, signs are spaced _____ feet apart.
- On freeways and express ways sign spacing is _____ ft, _____ ft, and _____ ft apart.

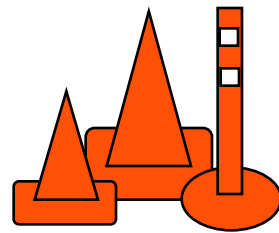
15. What is a standard roadway?



16. Why is it important to keep the buffer area free from stored materials and equipment?

17. How does the termination area increase worker safety?

18. When and where are cones used?



19. When and where are tubular markers used?

20. How tall must cones and tubular markers be for night and freeway work?

The single most important element within the system of traffic control devices is the taper provided for channelization. An inadequate taper will almost always produce undesirable traffic operations with resulting congestion and possible accidents through the area.

Like all provisions of work area safety in the MUTCD, the various traffic control techniques must be applied by qualified persons after appropriate engineering studies and with sound engineering judgment.



If it's not working, something's wrong with the traffic control!

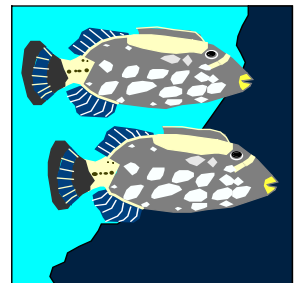
21. Why are tapers so important?

22. There are _____ types of tapers.

They are the:

- (1) Merging Taper: moves _____ traffic lanes into one lane.
- (2) Shifting Taper: moves traffic from _____ lane to another lane.
- (3) Shoulder Taper: used when the shoulder is _____ to traffic.
- (4) Two-way traffic Taper: used when traffic is controlled by f_____.
- (5) Downstream Taper: guides the motorist back into the previously _____ lane.

What is a downstream taper?



Determining the length of taper lengths is based on the width of the offset/lanes, and the posted speed, (round up to the nearest 5).

(1) (2) (3) (4) (5)

Cone Spacing

- Except for the two-way traffic and down stream tapers, the distance between cones should equal in feet the designated speed.
20 mph = 20' 40 mph = 40' etc.
- At speed of **40 mph and below**, the offset **will vary** with the lane width.
- At speeds of **45 mph** and above, cones in **merging, shifting, and shoulder tapers** should be offset **one foot**.
- Cones in **two-way traffic and downstream tapers** should be **spaced at 20ft intervals** with a **maximum length of 100 ft**. The offset is determined by the lane width.
- Six cones are usually used in the two-way and downstream tapers.

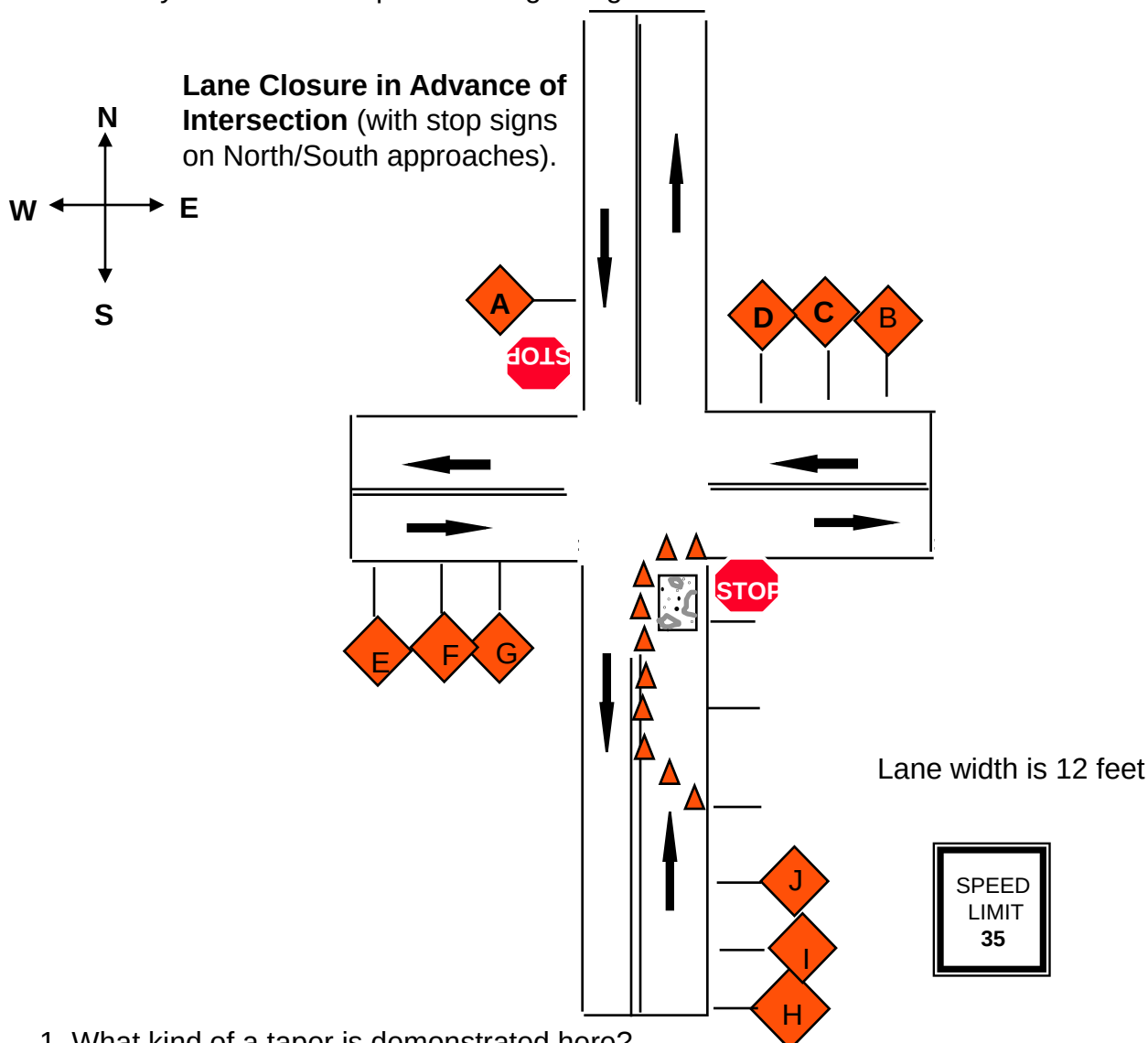
Speed (MPH)	Lengths for Merging and Shifting Tapers					
	10 ft width		11ft width		12 ft width	
	Merging	Shifting	Merging	Shifting	Merging	Shifting
20	70	35	75	40	80	40
25	105	55	115	60	125	65
30	150	75	165	85	180	90
35	205	105	225	115	245	125
40	270	135	295	150	320	160
45	450	225	495	250	540	270
50	500	250	550	275	600	300
55	550	275	605	305	660	330
60	600	300	660	330	720	360
65	650	325	715	370	780	390

It's OK to increase the safety factor of the taper, but never decrease it!

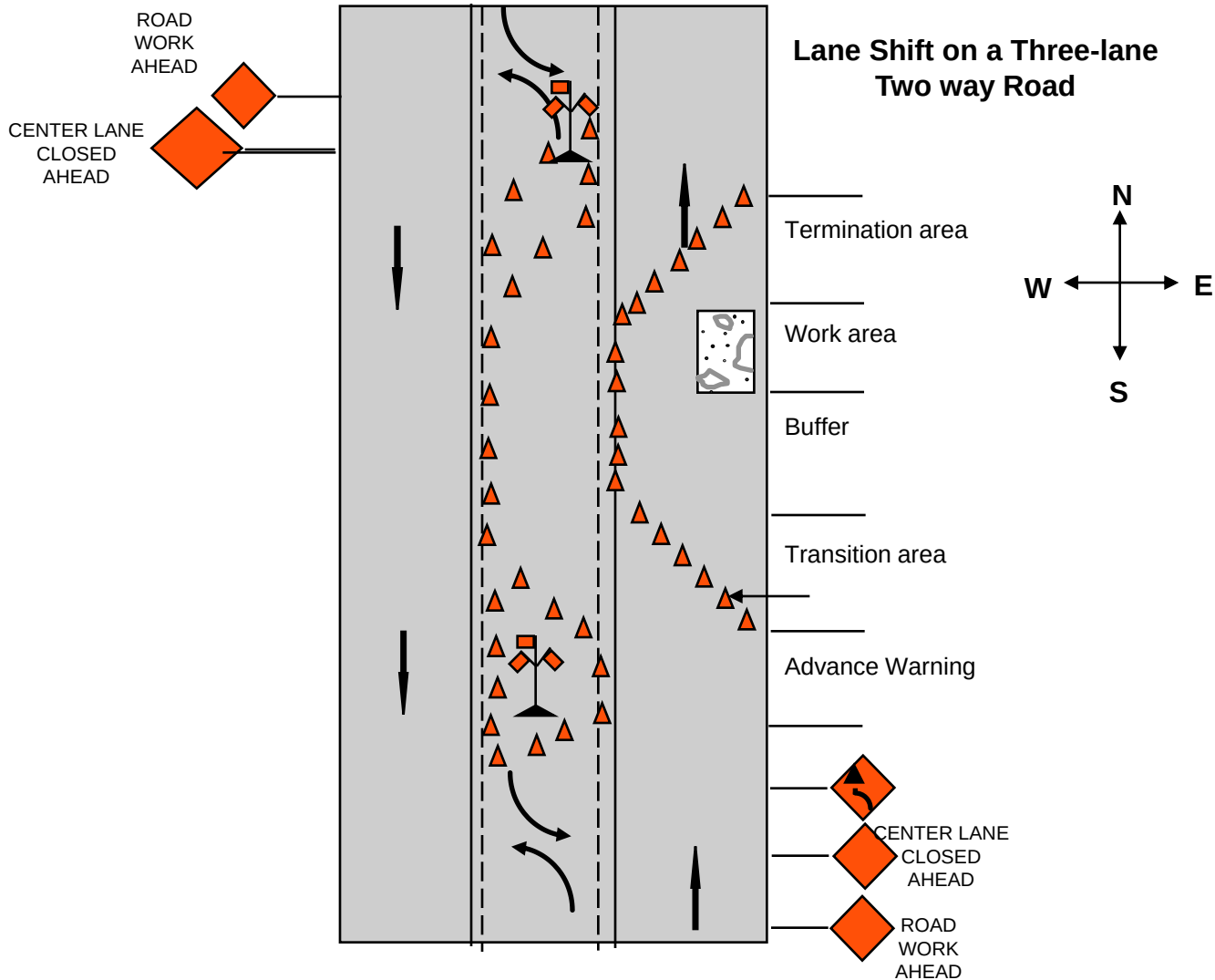
Shoulder Tapers (1/3 L)				
speed	4	6	8	10 feet
	feet	feet	feet	
45	60		120	150
50	70	90	140	170
55	75	100	150	185
60	80	110	160	200
65	90	120	175	220

Exercise:

In your teams, evaluate and discuss the following three diagrams. Answer the questions at the bottom of each page, and be prepared to discuss them with the class. You may use your resource book to help you answer the questions regarding the distances.



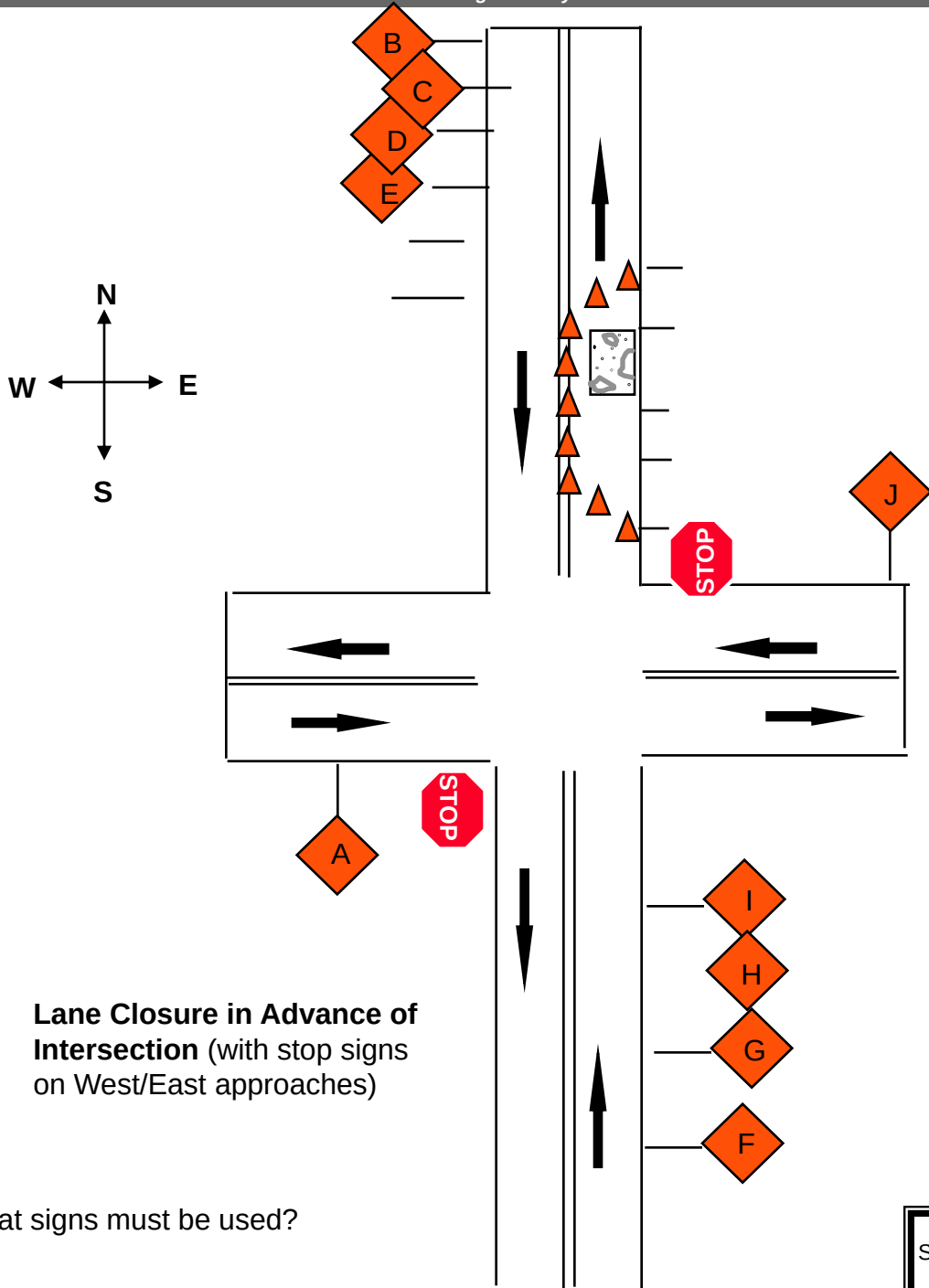
1. What kind of a taper is demonstrated here?
2. What are the taper distances?
3. What signs must be used?
4. What is the extra advanced warning sign Oregon requires?
5. Where should the appropriate signs be located? Identify them on the plan
A = , B = , C =
D = , E = , F =
G = , H = , I = J =
6. How many flaggers should there be and where are they located?



Lane width is 11 ft.

1. What types of tapers are demonstrated in this diagram?
2. What is the distance of the transition and the termination taper?
3. What is the distance between the signs? (*HINT See page 21 of the pocket book)
4. What is the size of the Buffer zone?

****Bonus question:** How many channelization devices will there be in the taper zone?



1. What signs must be used?

2. Where must the appropriate signs be located?

A = , B = , C =
 D = , E = , F =
 G = , H = , I = J =

3. Where should the flaggers be located?

4. What is the two way taper distance?

Part Three

Hazard Identification

Problems/Solutions

For any hazard, there are three strategies for elimination. They are:

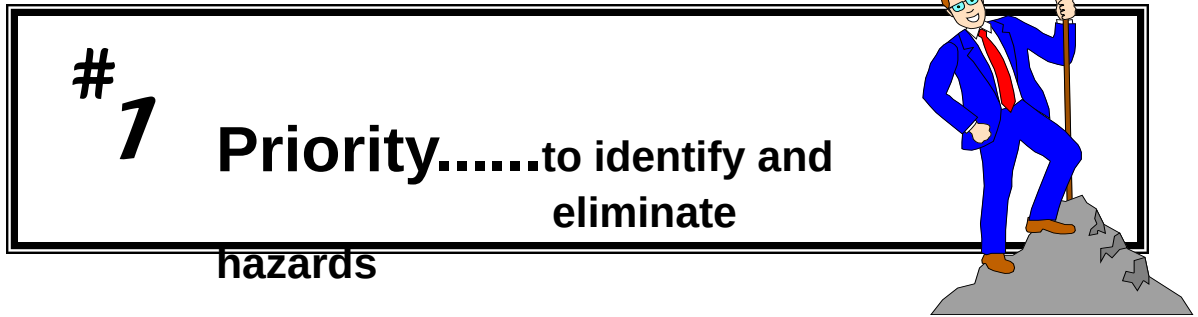
1. _____
2. _____
3. _____

1. Engineering Controls

- Should be considered first.
- Can be accomplished by eliminating or isolating the hazard from the worker through the redesign or replacement of equipment, tools, or workstation.

2. Administrative Controls

- Reduces duration, frequency, and severity of exposure.
- May include, but not be limited to:
 - Job rotation Adequate rest breaks
- Establishing safe work procedures
- Key elements:
 - Training Employee conditioning
 - Acclimation period Regular monitoring
 - Feedback Maintenance
 - Adjustments Modifications
 - Enforcement



3. Personal Protective Equipment

- Equipment to present a barrier between the worker and the hazard
- Last defense

23. What category does traffic control fall in?

All three :

_____ when roads are closed and traffic detoured in a direction which takes the flow of traffic away from the construction project.

_____ when use barriers, cones, tubular markers , flaggers as this only reduces the exposure.

_____ when using highly visible clothing



Remember

- If you inhibit traffic (such as on the shoulder) or
- encroach into the roadway

YOU MUST CONTROL THE TRAFFIC!

Pedestrian Safety Considerations

Pedestrians need protection from potential injury and a smooth, clearly delineated path. Every effort should be made to separate the movement of pedestrians from both the worksite activity and the adjacent traffic.



Three threshold considerations in planning for pedestrian safety:

- Pedestrians should not be led into direct conflicts with work site vehicles, equipment, or operations. Signs may be used to help direct pedestrians around the worksite.
- Pedestrians should not be led into direct conflicts with mainline traffic moving through or around the work site. Signs should be placed at intersections so that pedestrians aren't confronted with mid-block worksites which cause them to cross the block mid-way or to enter into the traffic lane.
- Pedestrians should be provided with a safe, convenient travel path that replicates as nearly as possible the desirable characteristics of sidewalks or footpaths.

Worker Safety Considerations

The safety of workers is of equal importance to the safety of the public traveling through the temporary traffic control zone. Work areas present temporary and constantly changing conditions that are unexpected by the driver. Work area conditions almost always present situations that are more confusing for the driver, which will create an even higher degree of vulnerability for the workers on or near the roadway. Remember, the more confusing the traffic flow, the more increased risk to the worker.

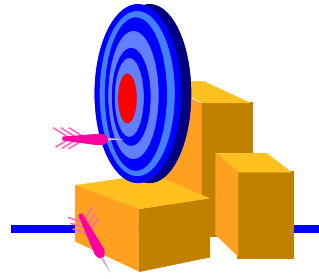
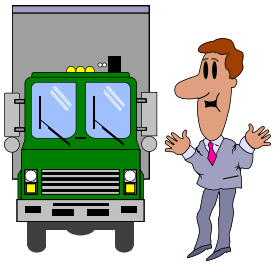
Worker clothing: **All workers exposed to traffic must be attired in bright, highly visible clothing, similar to flaggers.**

24. Why do all workers have to wear bright, highly visible clothing?

25. Why is high visibility clothing important?

High visibility clothing consists of:

- **For day time work:** a vest, shirt, or jacket, which is bright or fluorescent orange, yellow, strong yellow-green.
- **For night time work,** or work in low visibility light conditions, the garments must also be retroreflective material which is orange, yellow, white, silver, or strong yellow-green which are visible at a minimum of 1,000 ft.
- The **retroreflective clothing** shall be designed to clearly identify the wearer as a person and be visible through a wide range of body motions.
- **Uniformed law enforcement officers** may be used as flaggers in some locations including urban intersections, where enforcement of traffic movements is important.
- These **officers may also be used on freeways** where traffic is channeled around work sites and it is necessary to assure that advised and regulated speeds are being enforced.



26. What does “exposed to traffic” mean?

27. How would weather and lighting conditions affect the application of what high visible clothing is?

Training considerations

28. Who must be trained?

29. What are the two key elements of any safety training?

30. Why must workers be trained in the hazards and how to protect themselves from those hazards?

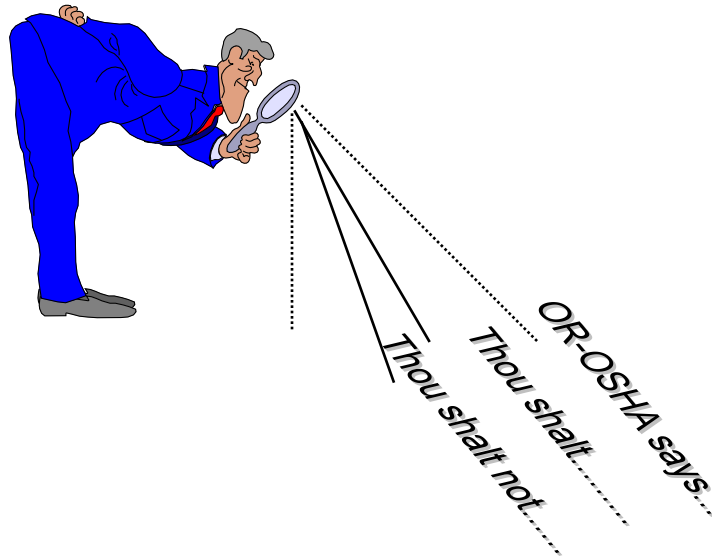
31. What other elements should workers be trained in?

- **Traffic control techniques**
- **Use of devices, and signs**
- **Placement of devices and signs**
- **Dealing with the public**
- **Who is in control of traffic control at the worksite**
- **Procedures to follow if traffic indicates the control is not adequate**
- **Signals to flaggers for the movement of equipment or construction vehicles**
- **Who is authorized to signal flaggers to stop traffic or move vehicles**
- **Provisions for the movement of emergency vehicles in or around the worksite**

32. What are motorists doing to create hazards in the work zone?



This tells us that “normal” driver distractions and actions exist in and out of work zones. These increase the likelihood of accidents and present new challenges to providing a “safe and healthful work place” in a traffic control zone. Although request for law enforcement services may assist in controlling issues such as speeding, reality dictates that some of these distractions while hazardous to workers, are not illegal activities which can be controlled through law enforcement regulations.



The challenge then is to move from dependence on literal interpretation of OR-OSHA standards to guide us (ignoring hazards which are not specifically addressed or spelled out) to one of providing a safe and healthful workplace based on the hazard regardless of regulatory guidance.

33. How do “normal” driver distractions affect our traffic control system?

34. How do work zones confuse people, or increase the likelihood of driver error?

35. What types of additional devices or methods are available that increase driver awareness ?
36. Why is a hazard identification/elimination program important to maintaining a safe work zone?
37. What should be covered in the hazard identification/elimination program?
- 1. Who is the person authorized to assure corrections are made?**
 - 2. What is the hazard?**
 - 3. What are the recommended corrective options?**
 - 4. Who is assigned to correct the hazard?**
 - 5. What date was the assignment given?**
 - 6. What is the date action is required?**
 - 7. What corrective action was taken and what date it was taken**
 - 8. Who is the person authorized to do follow up, and when was it done?**

38. Why should the program be in documented in writing?

39 . What are some symptoms of inadequate traffic control?

Who can identify them?

Who must resolve them?

40. When must hazards be eliminated?

41. What hazards have you seen in work zones?

As a driver? _____

As a worker? _____

42. What can be done about drivers speeding through the worksite?

43. How often must traffic control be evaluated?

44 Who must evaluate the traffic control?

45. What are some questions to ask during an evaluation?

46 . What is the purpose and the benefits of advanced publicity?

47. What are some methods of advanced publicity you've seen?

Worker Considerations

Key elements of traffic control management which should be considered for worker safety:

- **Training** - All workers should be trained in how to work next to traffic in a way that minimizes their exposure. In addition, workers with specific traffic control responsibilities should be trained in traffic control techniques, device usage, and placement.
- **Speed reduction**- In highly vulnerable situations, consideration should be given to reducing the speed of traffic through regulatory speed zoning, funneling, use of police, lane reduction, or flaggers.
- **Use of Police** - In highly vulnerable work situations, particularly those of relatively short duration, stationing police units heightens the awareness of passing traffic and will likely cause a reduction in travel speed.
- **Lighting** - for night time work, lighting the work area and approaches may allow the driver to better comprehend the requirements being imposed. Be careful to ensure that the lighting does not blind drivers.
- **Special devices** - Judicious use of special warning and control devices may be helpful for certain difficult work area situations. These include rumble strips, changeable message signs, hazard identification beacons, flags, and warning lights. Flagger activated audible warning devices may be used to alert workers to the approach of erratic vehicles. Misuse and overuse of special devices/techniques can greatly lessen their effectiveness.
- **Public information** - Provide information which covers the nature of the work, the time and duration of its execution, its anticipated effects upon traffic. Possible alternate routes and modes of travel through well prepared and complete public relations efforts may improve driver performance. Such programs have been found to result in a significant drop in traffic. That reduces the possible number of conflicts and may allow a temporary lane closing for additional buffer area.
- **Road closure** - If alternate routes are available to handle detoured traffic, the road may be closed temporarily during times of greatest worker exposure. In addition to offering maximum worker safety, it may facilitate quicker project completion and thus further reduce worker exposure.

Exercise:

Problem Solving. Get together in your groups to evaluate the situation and answer the following questions. Record your groups answer and be prepared to discuss the answers.

1. Your crew is working on a shoulder encroachment site, on a 4 lane two-way traffic roadway. The road has 11 foot wide lanes and the posted speed is 45 miles per hour. You have all traffic control up according to the MUTCD. However, cars are speeding, traveling so close that cones are being knocked over, and you notice traffic coming perilously close to workers and there have been several close calls with traffic and vehicles leaving the work site.

What are your options?

2. Your crew is working at a 4 way intersection of two-way, two lane traffic, which uses traffic signals to direct traffic. You are working in one lane of the intersection and are using flaggers at the appropriate spots, but traffic is occasionally failing to follow the flagger signals, or screeching to a halt. What's wrong and what must be done to eliminate the confusion?

3. Your crew is in the process of blasting a cliff adjacent to a 4 lane two-way road. The road has high volume traffic, 55 mph with no conveniently located alternate route. The roadway must be closed for approximately 20 minute time spans so that the charge can be detonated and the rock cleaned off of the roadway before traffic can pass. Traffic control is set in place and according to MUTCD guidelines. You are the project superintendent and have noticed that there are many unhappy, angry drivers. Many of the drivers have driven off with screeching tires. Finally in desperation one driver in the last group stopped, breaks out of the line, passes the stopped cars, races by the flagger and ignores the stop signal. What else can be done to help?

4. Your crew is scheduled to do road maintenance work to the Sellwood Bridge and S.E. Tacoma street. Scheduled work hours are 7:00am -5:00pm. Traffic is high volume. Posted speed is 35, but traffic routinely exceeds the posted speed. Traffic control devices are set up, and flaggers are being used. However traffic is backed up and causing lengthy delays for commuters.

Part Four

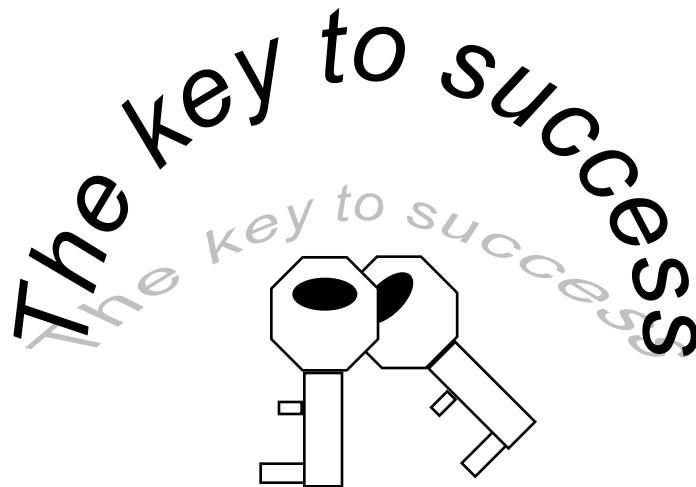
Planning

Now that we've learned the basics it's time to put it all together to achieve optimum results through adequate planning.

When it comes to road work, planning means designing a traffic control plan which meets the current MUTCD standards. Laying the design out on paper helps take the competent person, and the traffic control crew, through the work step by step and identifies significant factors which could affect the traffic control and thereby safety at the worksite.

We've studied the fundamental principles. Now let's apply those principles to the work site plan.

PLANNING



How to get started for any project:

- Get an overhead view of the roadway which you will be working on.
- List the types of processes, their locations within the roadway, and the locations of access and egress needs from construction related traffic.
- Identify significant intersections and access points which may intersect within the traffic control zone.
- Identify and contact businesses and other residents whose access points fall within the traffic control zone, or would otherwise be affected by the worksite, and assess their needs.
- Devise a written traffic control plan.

TEN STEPS TO A SAFER WORK ZONE

1. Have a traffic control p .
2. Follow the plan and specifications.
3. Minimize the d of traffic.
4. Promptly r warning signs when no longer needed.
5. T all who are involved with the project.
6. Have a routine schedule of i the work zone.
7. Use a report form to document inspections.
8. Identify h and develop appropriate corrective action.
9. Have adequate personnel and inventory.
10. v corrective action is taken.

Application Principles

1. Evaluate the _____ zone for the:
 - Type of work (stationary or moving).
 - Location (shoulder or roadway).
 - Length of time for the project (long term, short duration, etc.)

2. Provide adequate work _____.
 - Consider safe movement of equipment and workers.
 - Short term projects should not exceed one mile in length. Longer projects may be authorized for resurfacing projects. Shorter is better.
 - Vehicles may be used to protect workers. Turn wheels as needed.

3. Provide adequate warning _____ for motorists.
 - Don't surprise drivers with late warnings.
 - Consider road alignment, traffic volume and speed, light and weather conditions, cross traffic movement, and pedestrian traffic.
 - Avoid confusing messages.
 - Keep devices clean and in good condition.
 - Maintain credibility by using or removing devices as appropriate.

4. Provide _____ guidance for motorists.
 - Clearly guide and direct traffic through work area.
 - Channeling devices should produce long, even tapers.
 - Close calls generally indicate improper sign setup or ineffective traffic control elements.

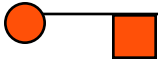
Before a written plan can be done we need to first become familiar with some of the symbols which will be used in a written plan.

Exercise:

Gather the team. Find the page in your spiral tablet which contains the typical application diagram and fill in the blank next to the picture as to what the type of device is, and what color, if any, each symbol is. These are some of the main symbols you will see used on traffic control plans.



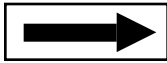
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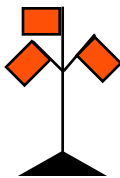
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48. Prior to occupying the roadway, who are some affected organizations and groups that the competent person should contact to assure proper coordination is arranged?

49. Why would residents need to be contacted?

50. How will the needs of commercial residents vary from private residents?

51. What are factors to consider for non-construction traffic when developing the work zone plan?

52. What are factors to consider for construction related traffic when developing the work zone plan?

53. What are some other considerations which should be part of the written plan?

54. What are some questions to ask and answer when doing a traffic control plan?

Lets look at the symbols in the pocketbook and in the appendix pages 58-59
Now that you're familiar with the symbols, let's put together a traffic control plan for various working conditions.

Exercise:

Using the appropriate symbols, determine what traffic control devices are needed, and where they must be located at. Add the symbols to the plan, and give the spacing according to the posted speed. Remember to add in any additional Oregon specific requirements. (*HINT: you can use your pocket book to help you). Answer the questions in your team, then we'll evaluate your answers with the entire group.

Your Crew will be working in the North bound, east lane. The lane will need to be closed because of the work, but you will still need to have two north bound lanes.

What type of tapers will you need?

What is the length of tapers?

How many channeling devices are needed?

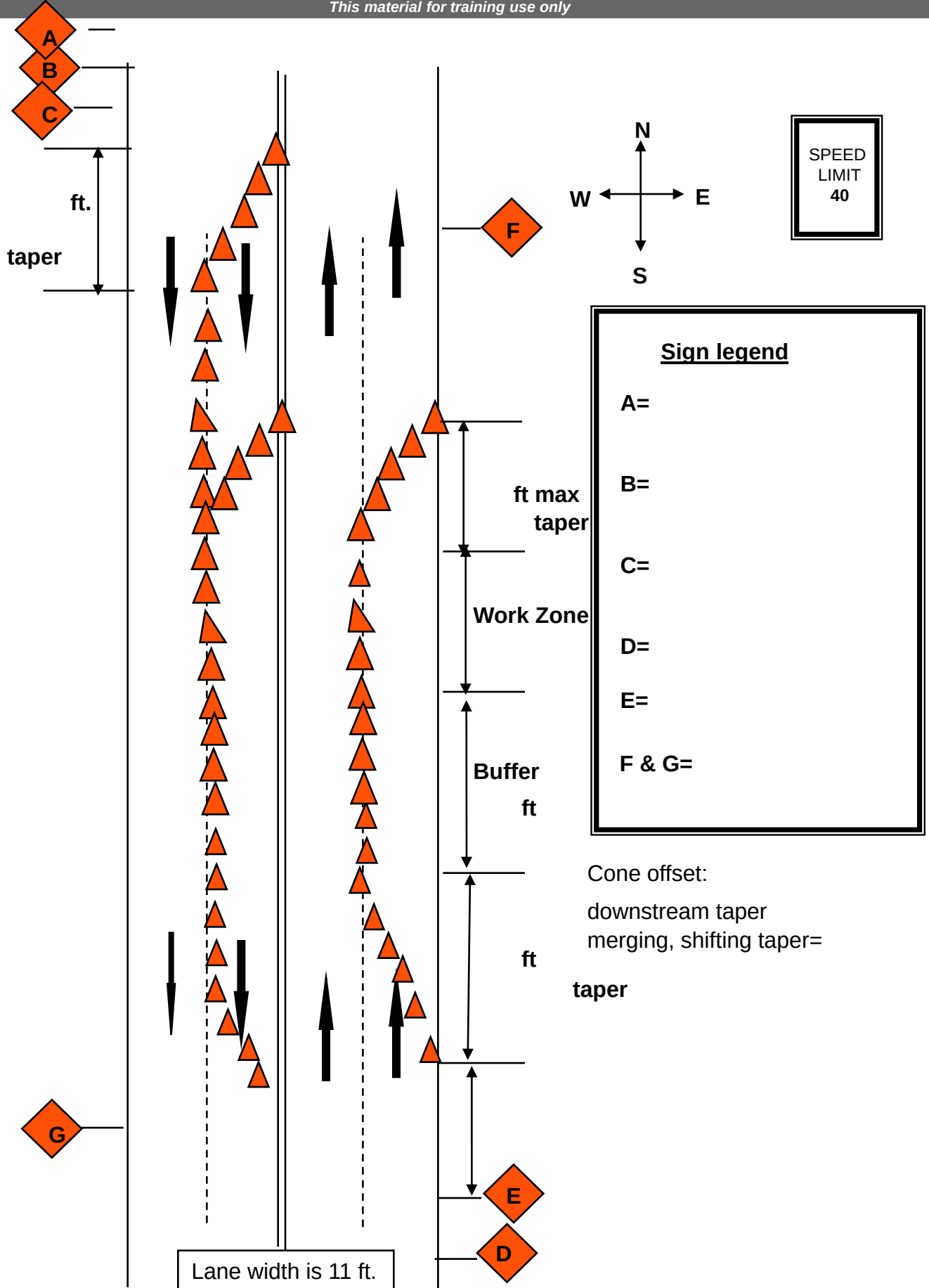
What is the distance between cones ?

Between signs?

What signs will you need?

On the north bound side:

On the south bound side:



Part Five

Hand-Signaling And Flagging



The two primary functions of traffic control procedures are to:

1. Move vehicles and pedestrians safely and as quickly as possible through or around temporary traffic control zones, and
2. Protect workers and on-site equipment.

To maintain the primary functions, flaggers are a critical component of worksite safety related to traffic control.

Studies have shown that worksites using flaggers are less likely to incur accidents when used in addition to other traffic control devices, and yet the job of flagger itself is probably the most dangerous and challenging position in the work zone.

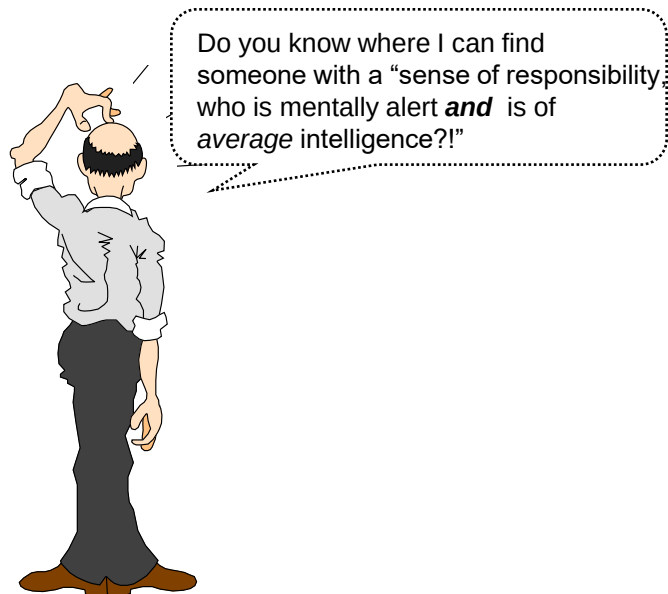
Flaggers often stand for hours at a time, and must remain alert to subtle changes in a driver's pattern, while staying aware of worksite activity and the needs of the worksite and the traffic.

FLAGGER QUALIFICATIONS

Flaggers are responsible for public safety. Of all roadway workers, they make the greatest number of public contacts. It is necessary therefore that flaggers meet certain minimum qualifications.

Flaggers must:

- Have a sense of responsibility for the safety of the public and workers.
- Be trained in safe traffic control practices.
- Have average intelligence.
- Be in good physical condition, including vision and hearing.
- Be mentally alert and have the ability to react quickly in an emergency.





Exercise:

Let's take a look at and think about the following questions.

1. To determine if they are qualified, what questions will you ask flagger applicants?

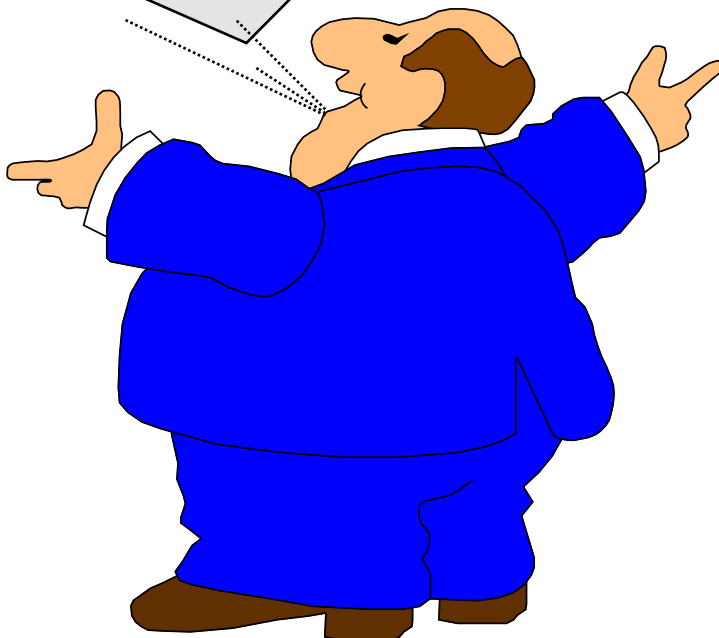
2. Where else might you check to get information which would be helpful to determine whether or not to hire?

55. What is the biggest hazard for the flagger?

56. How can the hazard of being hit be reduced?

The THREE Main points for flagger safety:

- Wear high visibility clothing
- Stay off the roadway and out of the path of oncoming traffic
- Use only the stop/slow paddle to direct traffic





HAND SIGNALING DEVICES

Hand signaling devices are an essential part of controlling traffic in temporary control zones. While stop/slow paddles and red flags are allowed to be used as hand signaling devices for flagging operations under OR-OSHA regulation, the Oregon Department of Transportation allows flags to be used only in emergency situations.

57. Why is the STOP/SLOW paddle the primary hand signaling device?
58. The MUTCD gives clear guidance for the design criteria of a stop/slow paddle. What requirements are there?
- That it be ____ inches square with letters at least ____ inches high.
 - That it is _____ in shape.
 - The paddle must be _____.
 - That the stop sign be _____ with _____ letters, and border.
 - The slow side of the paddle must be _____ with _____ letters and border.
 - That it be _____ for night use.

Alternately flashing white high intensity lamps may be added to the paddle.

Limits for hand signaling devices: Flag use should be limited to emergency situations and at low-speed and/or low-volume locations that can best be controlled by a single flagger. Flags used for signaling shall be a minimum of 24 inches square made of good grade of red material, and securely fastened to a staff at least 3 feet long. The free edges should be weighted so that the flag will hang vertically, even in heavy winds. Also night flags shall be retroreflective red.

The hand signaling devices not only have required design dimensions, but have required methods of use. These methods are designed to keep the flagger out of the way of traffic, and yet give the traffic direct visible guidance as to the action which the flagger is desiring. It is very important to know how to use the STOP/SLOW paddles and flags correctly. The most important thing all flaggers must remember is to **NEVER** place your body or any part of your body in the path of a motor vehicle.



Exercise:

Time to get the team together and determine what description, (a, b, or c) matches which instruction in each of these situations.

1. To stop traffic- _____
2. To direct stopped traffic to proceed- _____
3. To alert of slow traffic- _____
 - a. The flagger shall face traffic with the *SLOW* sign paddle held in a stationary position with the arm extended horizontally away from the body. The flagger may motion up and down with the free hand, palm down, indicating that the vehicle should slow down.
 - b. The flagger shall face traffic with the *SLOW* sign paddle held in a stationary position with the arm extended horizontally away from the body. The flagger should motion with the free hand for traffic to proceed.
 - c. The flagger shall face traffic and extend the *STOP* sign paddle in a stationary position with the arm extended horizontally away from the body. The free arm should be raised with the palm toward approaching traffic.

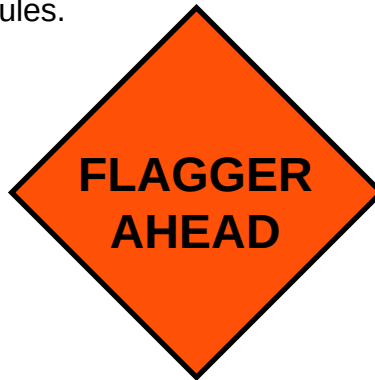
BONUS POINTS: DO one of the following two:

1. Practice each of the three situations and then demonstrate them for the class during class discussion. OR
2. Discuss and define what facing the traffic means.

Flagger Stations

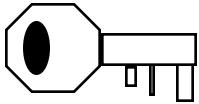
Flagger stations must be located far enough ahead of the work space so that approaching traffic has sufficient time to stop before entering the work zone. The distance is related to variables like approach speed, friction factors, pavement type, and conditions and tire capabilities.

The flagger should stand either on the shoulder adjacent to the traffic being controlled or in the barricaded lane. At a “spot” construction, a position may have to be taken on the shoulder opposite the barricaded section to operate effectively. A flagger should **NEVER** stand in the path of on coming traffic to give direction, but may move into the lane after the traffic has stopped if they need to communicate with the driver or need to be visible to other traffic. However, careful consideration should be given to avoid entering the traffic lane even with the traffic stopped. More than one flagger has been struck when the oncoming traffic has rear ended the stopped vehicle thrusting it forward and onto the flagger. Whatever the case, flaggers should be clearly visible to approaching traffic at all times. Based on accidents which have occurred, some experts are suggesting that the flagger also have an escape route to use in the event a vehicle does break all the rules.



A STUDY THROUGH THE STATE OF VIRGINIA SHOWS:

- The most effective combination of traffic control devices for work zones on multi-lane highways is cones, flashing arrows, and flaggers.
- The most effective combination of devices for urban two-lane highways is cones and flaggers, or signs and flaggers.
- The use of flaggers is a very effective means of traffic control at work zones on urban, two-lane highways. Any combination of traffic control devices not including flaggers is far less effective than one including flaggers.



Key Point Summary:

- Traffic control devices must conform to MUTCD.
- Planning and coordination with other agencies and emergency units may be needed to reduce unexpected and unusual traffic operation situations.
- The fundamental principles described in the MUTCD provide a guiding philosophy of workable temporary traffic control measures.
- Traffic and worker safety is a high priority element from planning through completion of the project.
- Traffic movement should be restricted as little as practicable.
- Drivers and pedestrians should be guided in a clear and obvious manner throughout the work zone.
- Inspections of the controls and working conditions should be completed at least twice a day, and as needed based on performance of the devices to guide traffic safely. Inspections at a minimum should be done before work begins and mid-day.
- Each person whose actions affect work zone safety should receive training relative to the required duties.
- Adequate warning must be given to the motorists so they have time to interpret the warning and respond appropriately.
- Workers exposed to traffic must be seen by motorists.

- If warning lights are to be used, use steady burning lights for channelization and flashing lights for warning.
- Use barriers whenever there is a need for positive protection as determined by an engineering analysis.
- Periodically inspect the devices. Repair or replace any damaged or missing devices. All devices should be clean.
- Keep accurate records. If an accident occurs, make note of it, including whether or not any control devices were involved and what devices were used before and after the accident.
- Do not mislead the public. Remove or cover all signs or devices that are not in use.

Look ahead with confidence!



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Cut and paste rules on this
and next page

Supervisors check list

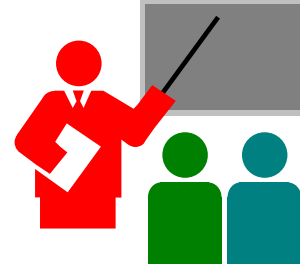
1. Is there a written traffic control plan?
2. Do traffic control devices conform with the MUTCD?
3. Does traffic flow smoothly and safely, are there any “symptoms”?
4. Are workers safely protected from traffic?
5. Are provisions for pedestrians adequate?
6. Are equipment, materials, workers, and vehicles kept away from traffic?
7. Is advance warning appropriate to work in progress?
8. Is design and maintenance of temporary bypass or detour adequate (including the posting of directional signs)?
9. Is traffic protected from abrupt drop-off?
10. Are temporary pavement markings used effectively?
11. Are old pavement stripes obliterated?
12. Are traffic control devices properly positioned, in sound condition, and well maintained?
13. Are flaggers used as needed, using appropriate equipment, and performing well?
14. Are permanent traffic control devices covered or turned off when they conflict with temporary traffic control at the worksite?
15. Are signs properly reflectorized and readable?
16. Are signs covered or removed when out of use?
17. Are hazards properly shielded?
18. Are adequate signs and barricades at intersections?
19. Are there provisions made for the movement of emergency vehicles?
20. Have you driven through the traffic safety zone to determine for yourself whether it works?



Fundamental Principles for Planning

The following is a list of 15 principles to remember when planning, setting up, and maintaining a traffic control zone.

1. Safety is primary. Use whatever controls are necessary to be sure traffic, pedestrians, and workers will be safe.
2. Signs need to be seen to be obeyed. Increase the size or height of the signs to make them more visible. Portable signs should be at least 1 ft. above the roadway.
3. Larger and taller devices are more visible than those that are minimum sizes.
4. Increase the length of the warning area when traffic is backed up, when there is a curve, hill or other obstruction, and on high-speed, high-volume roads.
5. Allow room for the buffer space for additional protection of traffic and workers.
6. Remind drivers to use caution on long areas. The work zone should be no longer than necessary to accommodate the work which must be done. Driver delay and the potential for accidents are also considerations. Additional safety and warning is needed when traffic is diverted into lanes normally used by opposing traffic.
7. Channeling devices should break or collapse when hit. Do not use concrete or other materials that may be hazardous on devices. Do not use rigid bracing for barricades.



Fundamental Principles for Planning

8. Most warning signs are diamond-shaped. Rectangular “Road Work Ahead” signs are not acceptable, for example. For exceptions to the diamond shape requirement, see Section 6B-13 of the MUTCD.
9. All devices used at night should be reflectorized or illuminated.
10. Remove confusing pavement markings as soon as practical. Pavement markings serve as a primary source of guidance for drivers. Use temporary markings that can be easily removed to outline a new path.
11. If warning lights are to be used, use steady burning lights for channelization and flashing lights for warning.
12. Use barriers whenever there is a need for positive protection as determined by an engineering analysis.
13. Periodically inspect the devices. Repair or replace any damaged or missing devices. All devices should be clean.
14. Keep accurate records. If an accident occurs, make note of it, including whether or not any control devices were involved and what devices were used before and after the accident.
15. Do not mislead the public. Remove or cover all signs or devices that are not in use.

Where to get: **Flagging Course Information**

Evergreen Safety Council (for Oregon and Washington)

401 Pontius Avenue, North
Seattle, WA 98109
1-800-521-0778

Chemeketa Community College (for Oregon only)

Training and Economic Development (TED) Center
365 Ferry Street, S.E.
Salem, Oregon 97302
1-503-399-5181

Pedestrian Safety Diagrams from MUTCD

Pedestrian Safety Diagrams from MUTCD

How to get a Free Copy of 1994 MUTCD

Please send a copy of the 1994 MUTCD, Part VI to:
(Please print)

NAME _____

COMPANY _____

MAILING ADDRESS _____

CITY _____ STATE _____ ZIP _____

cut along dotted line

Send Completed form to:

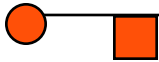
**Federal Highway Administration
Research & Technology Report Center
6300 Georgetown Pike
Room A200
McLean, Virginia 21101**

**Phone(703)285-2144 or (703)285-2145
FAX(703)285-2919**

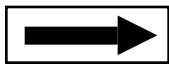
Other Symbols used in written traffic control plan

Other Symbols used in written traffic control plan

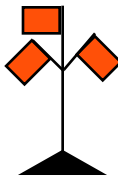
 = Channeling Device

 = Flagger

 = Portable sign Support

 = Flashing Arrow Sign

 = Flashing Vehicle Light

 = High Level Warning Device

 = Work Area

 = Warning Sign, Specific:
Flagger Ahead

Example: ODOT spotter Performance and Training Guidelines

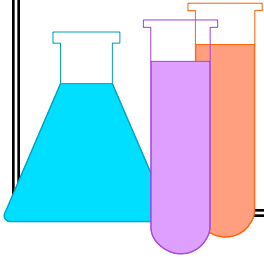
OR-OSHA Letter to ODOT RE: Flagger Training

ODOT Letter RE: Flagging at Intersections with Traffic Signals

OR-OSHA Letter to ODOT Safety Dept RE: Use of Alternate colors for Flagger Vests

April 12, 1995 Press Release RE: Traffic Safety in Construction Zones

The formula for a taper:



L = Taper length in feet

W = Width of offset in feet

S = posted speed

40 mph or less $L = \frac{W S^2}{60}$

45 mph or greater $L = W \times S$

Merging Taper:	L	Minimum
Shifting Taper:	$\frac{1}{2} L$	Minimum
Shoulder Taper	$\frac{1}{3} L$	Minimum
Two-Way Traffic Taper:	50-100'	Maximum
Downstream Taper:	100'	Maximum

For Example:

In order to calculate the taper length you will need to know the width of the lane, and the posted speed. In this example the lane width is 12 feet, the posted speed is 35. The formula would be $\frac{12 \times 35^2}{60}$ or $12 \times 1,225 = \frac{14,700}{60} = 245$ feet.

So using the above taper specifications:

- Merging taper the length would be 245 feet
- Shifting taper length would be $\frac{245}{2} = 123$ feet.
- Shoulder taper length would be $\frac{245}{3} = 82$ feet

****(Or to really make it easy, look on page 20)***

28 WORK ZONE SAFETY TIPS

Designed by a special Washington DOT Work Zone Safety Task Force which examined work zone safety in the state after several fatal accidents occurred.

Worker Protection

1. Review and update work zone safety apparel. Use high-visibility vests or individual strobe lights. Wear high visibility rain suits when needed.
2. Use more innovative devices such as water filled barriers, transfer/transport vehicle barriers, and truck mounted attenuators. Find innovative ways to fund the purchase.
3. Be sure at least one DOT or contractor employee at each site has and can use a two way communication device.

New Products

4. Continue testing new work zone safety devices, including SHRP's portable speed bumps and light stop paddles; warning lights on vehicles, signs, flagging vests, and barriers; intrusion alarms, tubes and detectors; and radar detection triggering devices.

Education

5. Initiate partnering with the public to heighten driver awareness of work zone activities and problems. This includes *Give 'em a Brake* programs and positive public service statements about projects.
6. Distribute information about effective work zone devices to maintenance superintendents, project engineers, and others.
7. Communicate project locations, start dates, and completion dates to the media and various associations.
8. Add work zone safety related materials to driver's license manuals and tests.
9. In urban areas, develop a public relations campaign to publicize driver responsibility and risk in the work zone.

28 WORK ZONE SAFETY TIPS

Education

10. Heighten driver awareness of proper driving procedures and rules while in a work zone, as well as penalties for speeding, violating work zone rules, and so on.
11. Develop a work zone safety slide show for public use.
12. Add work zone safety information to driver's training classes.

Operating Procedures

13. Use a committee to establish recommended work zone practices, device use, and procedures.
14. Look at alternative messages on the stop/slow sign.
15. Find ways to fund review recommendations.

Traffic Control/Design

16. Be sure contractors meet their responsibilities, including site patrol and maintenance, traffic control, site monitoring, and personnel safety training.
17. Review routine night time traffic control.
18. Establish a priority/evaluation checklist process early in the project design stage. This includes proposed traffic diversion, night work, positive barriers, pilot cars, staging of multiple projects, and number of contract working days.
19. Designate (at the district level) an office or individual to prepare all work zone traffic control plans, coordinate field application, review field operations, and maintain consistency of plans.

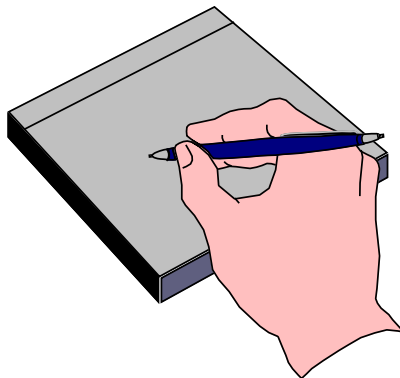
28 WORK ZONE SAFETY TIPS

Training

- 20. Set up a work zone supervisor course.
- 21. Provide more emphasis on work zones in safety meetings.
- 22. Develop a personnel class on the basics of work zone safety meetings.
- 23. Expand state regulations for flagger certification to include certification of flagging instructions.
- 24. Develop a work zone safety program that teaches the basics of plan design.

Reporting

- 25. Establish a way for the Major Accident Investigation Team to notify the Laborers Health and Safety Fund of North America regarding serious work zone accidents for further investigation.
- 26. Develop a statewide incident reporting and tracking system.
- 27. More clearly define a work zone for consistency in reporting accidents.
- 28. Work with the legislature and others to make work zones safer by supporting helpful legislation.



Workshop Title: _____ Date: _____ Instructor: _____

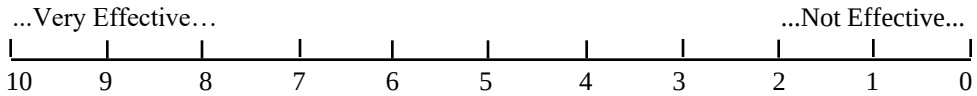
WE VALUE YOUR COMMENTS

	Management ☐	Worker ☐	Agree ☐	Disagree ☐
1. I found the course information easy to understand and useable.				
2. The information I learned today will help me reduce hazards and prevent work-related injuries and illnesses at my workplace.				
3. The course materials (workbooks, overheads, slides, etc.) were helpful.				
4. Please rate the overall effectiveness of this workshop in helping you to understand your safety and health problems and needs:				



Comments: **Please take the time to explain all “No” or “Not Effective” responses.**

1. The instructor provided quality training (relevant, interesting, applicable, etc.) and was knowledgeable about occupational safety and health.	☐	☐
2. The instructor was able to answer questions adequately or make an appropriate referral.	☐	☐
3. The instructor encouraged participation.	☐	☐
4. Please rate the overall effectiveness of the instructor in helping you to understand your safety and health problems and needs:		



Comments: **Please take the time to explain all “No” or “Not Effective” responses.**

Facility Comments:



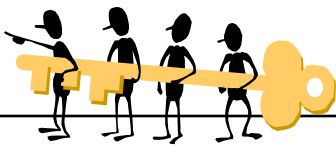
Traffic Control Safety



OR-OSHA 305

9607-01

Presented by
The Public Education Section
Oregon Occupational
Safety and Health Division (OR-OSHA)



**One key to safety success -
Partner with Oregon OSHA Services!**

OR-OSHA Services

Oregon OSHA offers a wide variety of safety and health services to employers and employees:

Consultative Services (At all field offices)

- * Offers no-cost on-site safety and health assistance to Oregon employers for help in recognizing and correcting safety and health problems in their workplaces; and
- * Provides consultations in safety, industrial hygiene, ergonomics, programs and business assistance.

Training (Portland, Salem Central, Eugene)

- * Conducts statewide training classes and workshops in a wide variety of safety and health subjects; and
- * Conducts conferences, seminars and satellite (Oregon ED-Net), online training, and on-site training; and
- * Provides assistance to companies in developing safety and health training programs.

Standards and Technical Resources (Salem Central)

- * Provides technical advice on and interpretations of codes; and
- * Provides copies of all OR-OSHA codes; and
- * Publishes booklets, pamphlets, and other materials to assist in the implementation of safety and health codes and programs; and
- * Operates a resource center containing books, topical files, technical periodicals, video and film lending library, and more than 200 technical data bases.

Enforcement (At all field offices)

- * Offers pre-job conferences for construction employers; and
- * Provides abatement assistance to employers who have received citation, and compliance and technical assistance by phone; and
- * Inspects places of employment for occupational safety and health rule violations, and investigates workplace safety and health complaints and accidents.

Oregon OSHA Offices



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a
call**

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Portland Field Office
Salem Field Office
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Medford Field Office
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Toll Free number: 1 (888) 292-5247 option 2

Web Site: www.orosha.org



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