

# Roadway/Work Zone Safety

# Objectives

- Why are Work Zones important?
- Understanding Basic Work Zone Setups.
- Discuss how flagger can be utilized to provide for the crew's safety.
- Talk about the basic requirements of PPE in Work Zones.
- Look at some of the equipment used in Work Zones.



# Work Zones are Dangerous Places

- Work zones create an unexpected condition for motorists
- Traffic moving through a work zone is dangerous



# Unexpected Conditions

- Road work creates an unexpected condition for the traveling public
  - *“Construction, maintenance, utility, and incident zones can all benefit from TTC to compensate for the unexpected or unusual situations faced by road users.”*  
MUTCD Section 6B.01







# Why are you here?

Work Zones are dangerous places

- Dangerous to self
- Dangerous to work crew
- Dangerous to traveling public

Workers are struck by

- Passing motorists
- Construction vehicles
- Equipment



# SUMMARY OF MOST RECENT AVAILABLE DATA



**156** PEDESTRIAN FATALITIES IN WORK ZONES

2020



**244** COMMERCIAL MOTOR VEHICLE-INVOLVED CRASH FATALITIES

2020

+

**857** TOTAL WORK ZONE FATALITIES

2020



**44K** ESTIMATED WORK ZONE INJURIES

2020

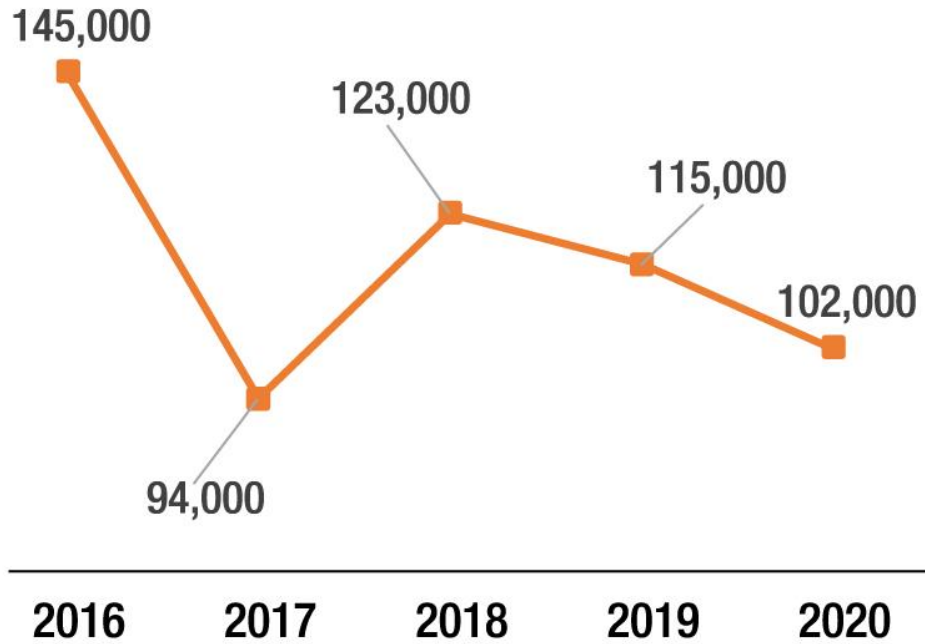


**102K** ESTIMATED TOTAL WORK ZONE CRASHES

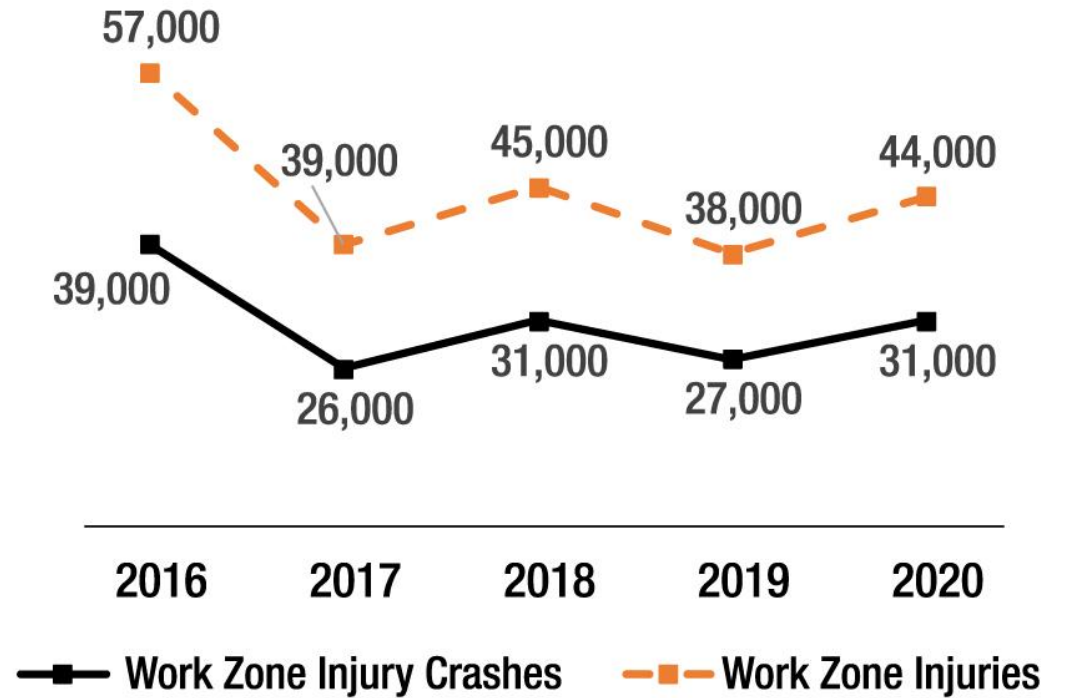
2020



### Estimated Total Work Zone Total Crashes

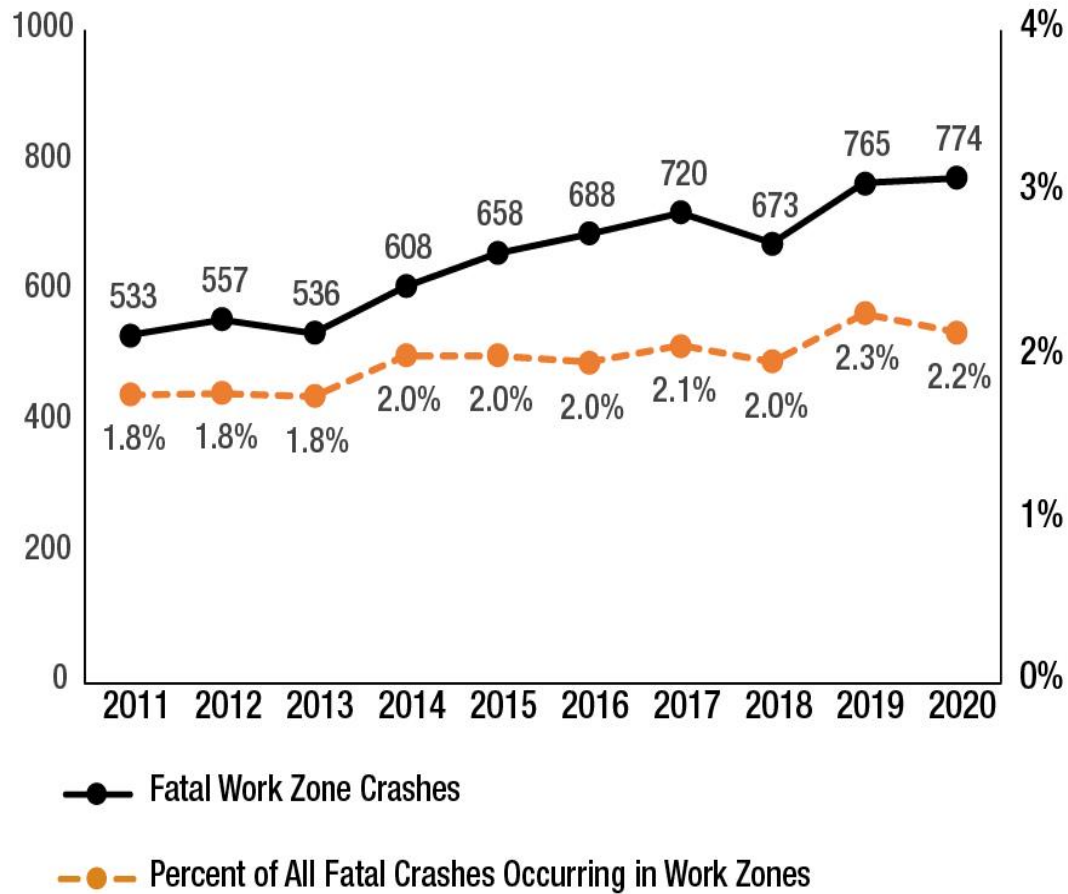


### Estimated Work Zone Injury Crashes and Injuries

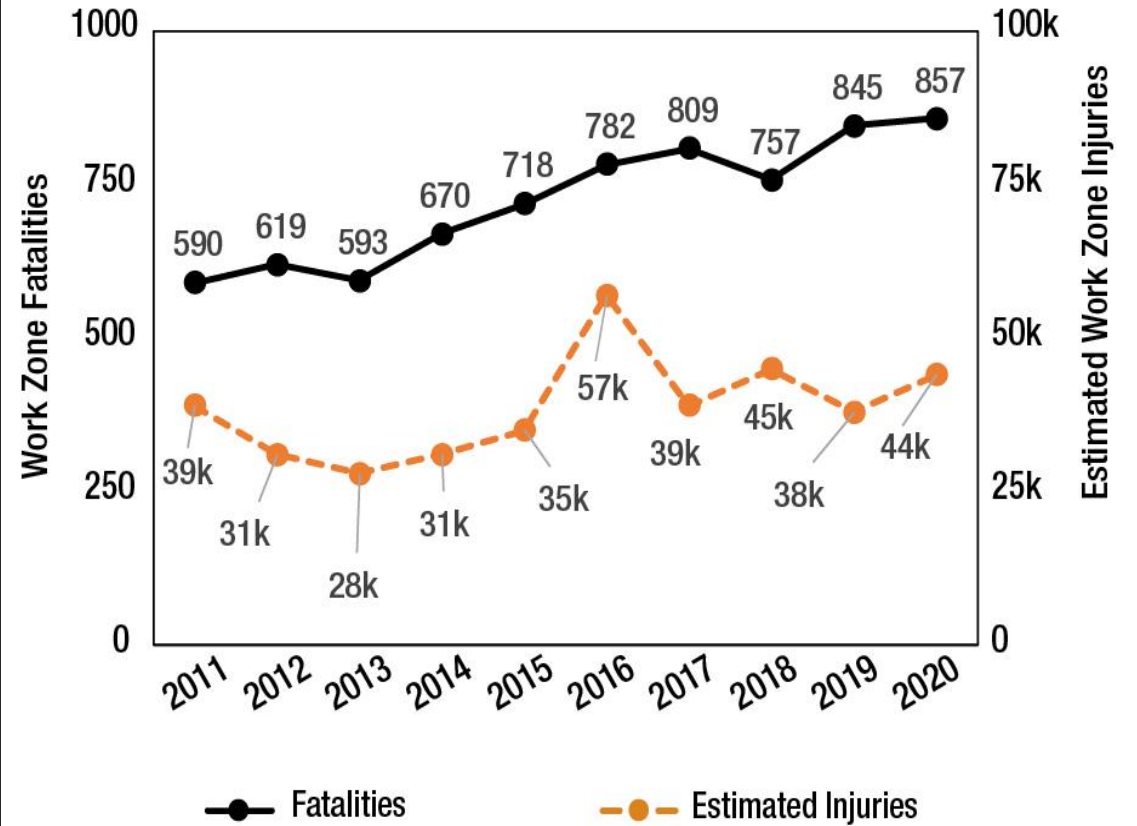




**Work Zone Fatal Crashes and Percent of Fatal Crashes Occurring in Work Zones, 2011-2020**

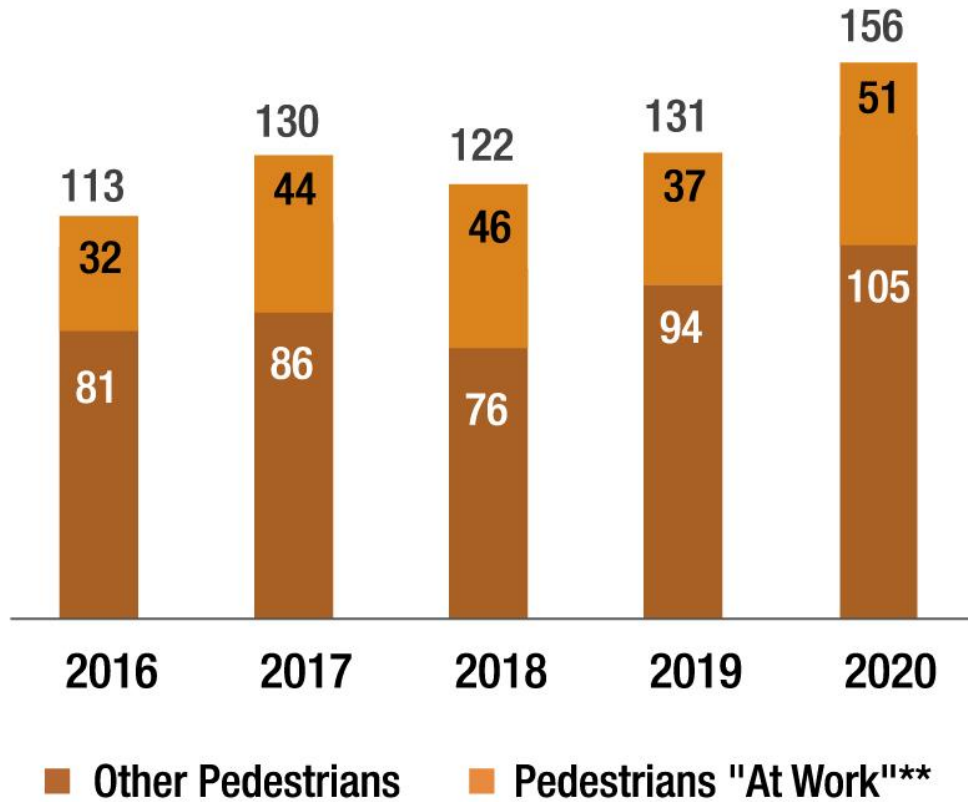


**Fatalities and Estimated Injuries Occurring in Work Zones, 2011-2020**

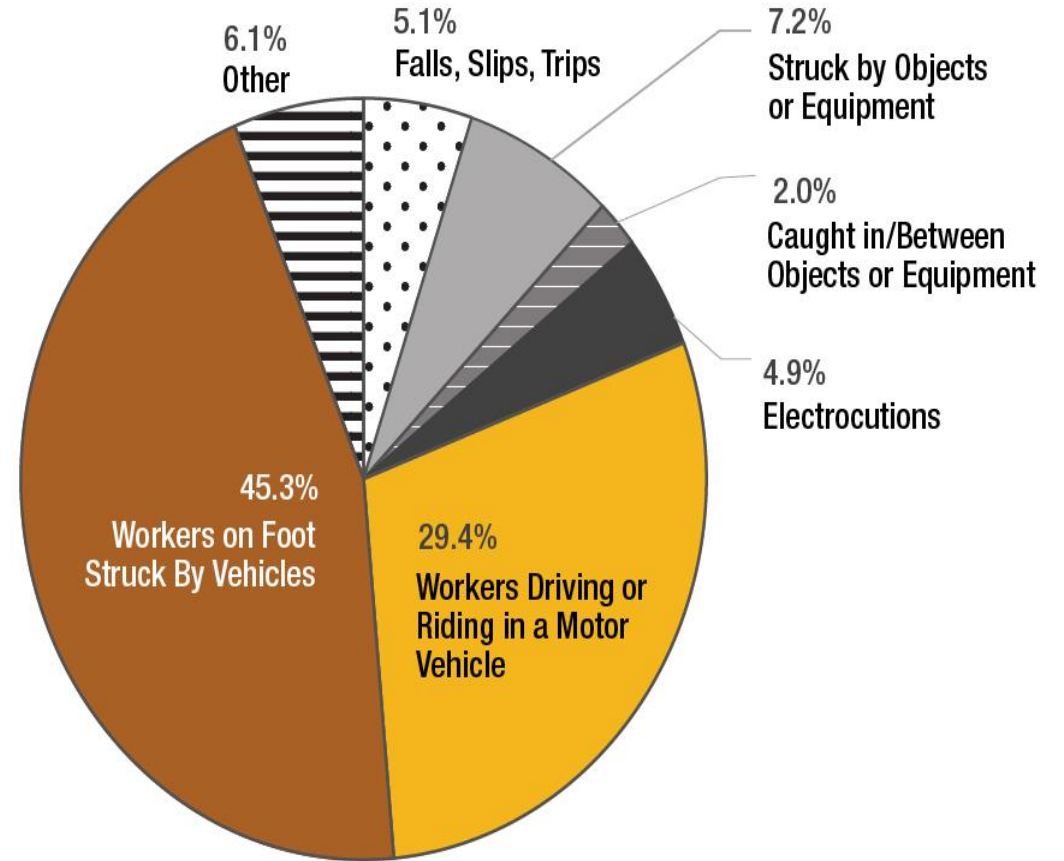




## Pedestrian Fatalities in Work Zones



## Types of Events Resulting in Highway Worker Fatalities at Road Construction Sites, 2017-2019 Average



## Pennsylvania Work Zone Crash Data

<b>Year</b>	<b>Total Fatal Crashes</b>	<b>Total Fatalities</b>	<b>Truck-Involved Fatal Crashes</b>	<b>Truck-Involved Fatalities</b>	<b>Bus-Involved Fatal Crashes</b>	<b>Bus-Involved Fatalities</b>	<b>"At Work" Pedestrian Fatalities</b>	<b>Other Pedestrian-Involved Fatalities</b>
2020	16	16	6	6	0	0	0	1
2019	14	16	6	6	0	0	0	2
2018	20	23	8	10	1	1	1	2
2017	19	20	5	6	0	0	2	1
2016	15	16	4	4	0	0	0	0
2015	22	24	10	10	0	0	2	1



**SAFETY FIRST, IF NOT...**



**YOUR GONNA HAVE A BAD TIME**

quickmeme.com

## SAFETY - a Value!

- Anyone wake up today and say:
  - *“I just can’t wait to go to work and get hurt today!”*
- Everyone has the right to go home the same way they came to work - injury & illness free!

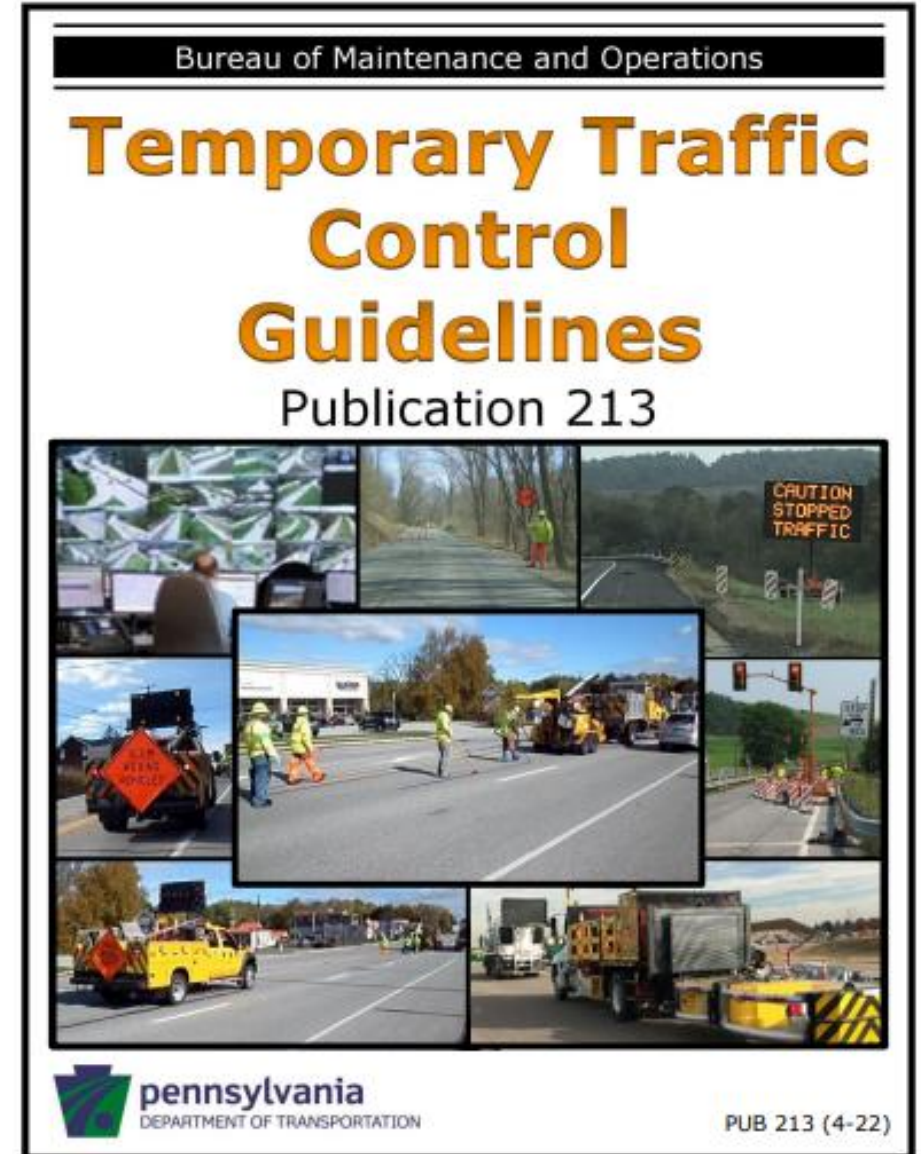
# Laws, Regulations and Guidance

- Flagging and traffic control associated with work zones are governed by law and regulations in Pennsylvania
- PA Vehicle Code
  - (Title 75, Chapter 61, Section 6123):
    - *Any person performing any work on or near the roadway which may create hazards shall erect traffic-control devices in accordance with the rules and regulations of the department (PennDOT) for the maintenance and protection of traffic.*



# Laws, Regulations and Guidance

- The law requires PennDOT guidelines to be followed. These guidelines are in:
  - **Part 6 of the MUTCD (Manual on Uniform Traffic Control Devices)**
  - **PennDOT Publication / Chapter 212, Official Traffic Control Devices (from Title 67)**
  - **PennDOT Publication 213, Temporary Traffic Control Guidelines**





**Federal MUTCD**

**PUB 212**

Adopts MUTCD + State Specifics

**PUB 213**

Takes all of the above and puts it into one place



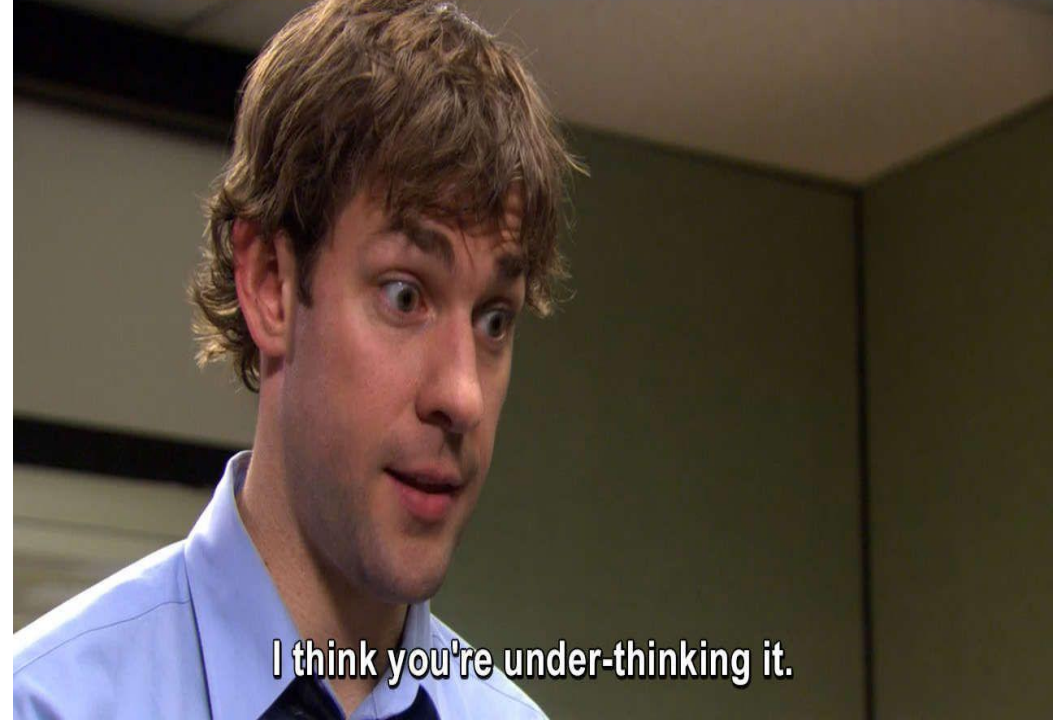
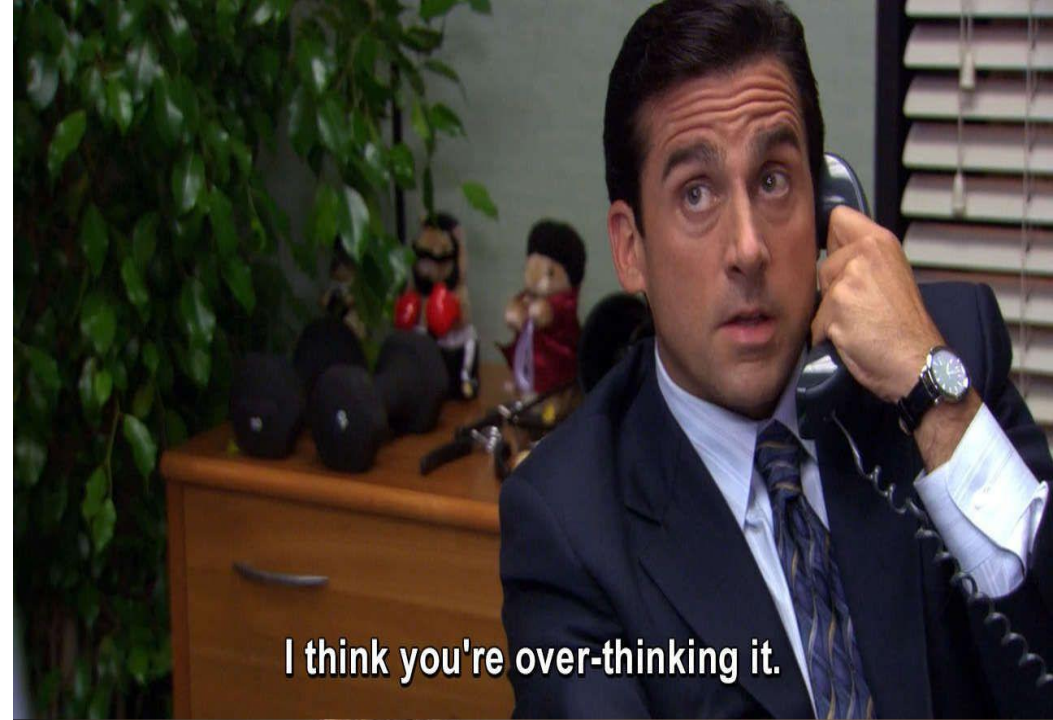
**Most Work Zone Fatalities Due To...**

**POOR POSITIONING!!!!**

## What is a Work Zone?

Carefully organized safety zone designed to ensure protection for:

- Yourself
- Others in the work crew
- Traveling public





# Traffic Control Principles:

- Planning
- Communication
- Knowledge
- Adaptability



# Work Zone Safety Considerations

## Hazard Assessment Control Plan:

- Communication Equipment
  - Public
  - Work Crew
- Duration of the project
- Anticipated effects on road users
- Offer alternative routes of travel
- Lighting
- Visibility
- Inclement weather
- Congested areas
- Constantly changing work conditions
- Special Situations
  - Intersections
  - Emergency Vehicles
  - Nighttime Operations
  - Aggressive, Rude, & Drivers Refusing to Obey



# Work Zone Components

1. Advance warning area
2. Transition area
3. Activity area
  - a) Buffer Area
  - b) Activity Area
4. Termination area



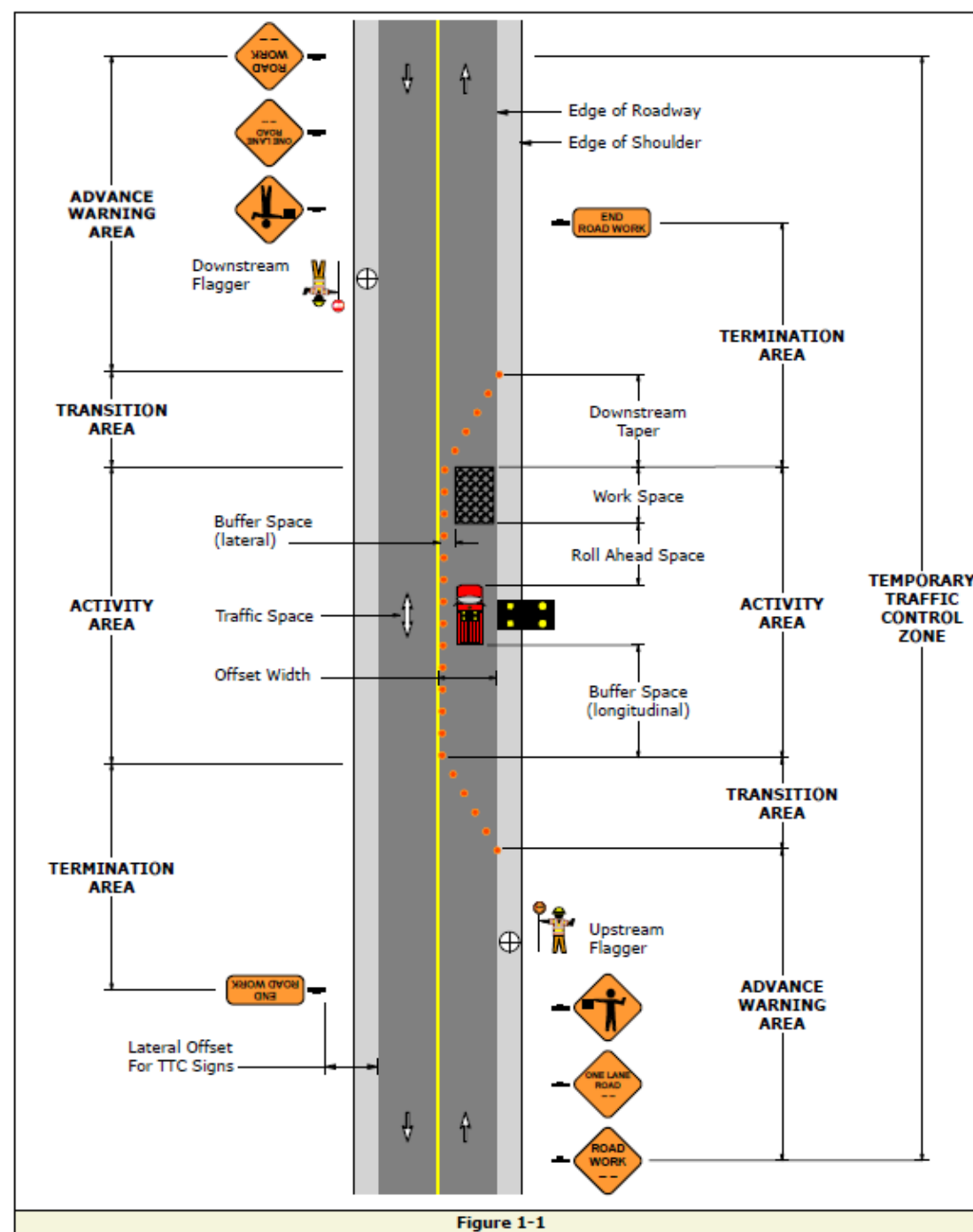


Figure 1-1



# Advance Warning Area

- **ROAD WORK AHEAD** for short-term or moving Work Zones
  - ROAD WORK (with distance) for long-term operations
  
- **ONE LANE ROAD AHEAD**
  
- **FLAGGER SYMBOL** (Rule of Thumb - Flagger *should* be visible from the FLAGGER sign, if possible)



# Advance Warning Area

- BE PREPARED TO STOP (where appropriate)
- ACT 229 Signs Below
  - NOT required when...
  - Mobile Operations
  - Operations 1 hour or less
  - Stationary work < 12 hours + more
  - Speed limit < 45 MPH
  - Emergency response work



Speed	Channelizing Devices Spacing	Sign Spacing						Buffer Space	Roll Ahead Space
		Conventional		Freeways and Expressways					
		Urban	Rural	A (Feet)	B (Feet)	C (Feet)	D (Feet)		
S (MPH)	2S (Feet)	A (Feet)	A (Feet)	A (Feet)	B (Feet)	C (Feet)	D (Feet)	E (Feet)	H (Feet)
25	50	100 - 200	500 - 800	-	-	-	-	155	150
30	60	100 - 200	500 - 800	-	-	-	-	200	150
35	70	100 - 200	500 - 800	-	-	-	-	250	150
40	80	350 - 500	500 - 800	1000	1640	2640	5280	305	150
45	90	350 - 500	500 - 800	1000	1640	2640	5280	360	150
50	100	350 - 500	500 - 800	1000	1640	2640	5280	425	250
55	110	350 - 500	500 - 800	1000	1640	2640	5280	495	250
60	120	-	-	1000	1640	2640	5280	570	250
65	130	-	-	1000	1640	2640	5280	645	250

# Advance Warning Sign Spacing

Pub 213 PATA figures and notes

- Urban area, 35 MPH or less: 100 – 200 feet
- Urban area, greater than 35 MPH: 350 – 500 feet
- Rural areas: 500 – 800 feet for all roadways
- Expressways/freeways different

# Primary Function of Flagging

- The primary function of flagging is to provide safety for:
  - Work crew
  - Motorists
  - Bicyclists
  - Pedestrians

...anyone traveling through the work zone





# Flagger's Duties

- Flaggers are placed at work zones to:
  - Safely stop traffic as needed
  - Maintain safe and continuous traffic flow
    - Reduce speeds
    - Protect work crews
- Provide positive guidance and direction to the traveling public



**I'M MARY  
STOPPINS Y'ALL**

# Flagger's Duties

- First & Last:
  - A flagger must be in position *before* the crew starts working
  - A flagger must be in position *until* the crew stops working and exits the work zone







## What determines location of Flagger Station?

- Location of work zone
  - Visibility
- Escape Routes

# Flagger Station Location

## Flagger station location =

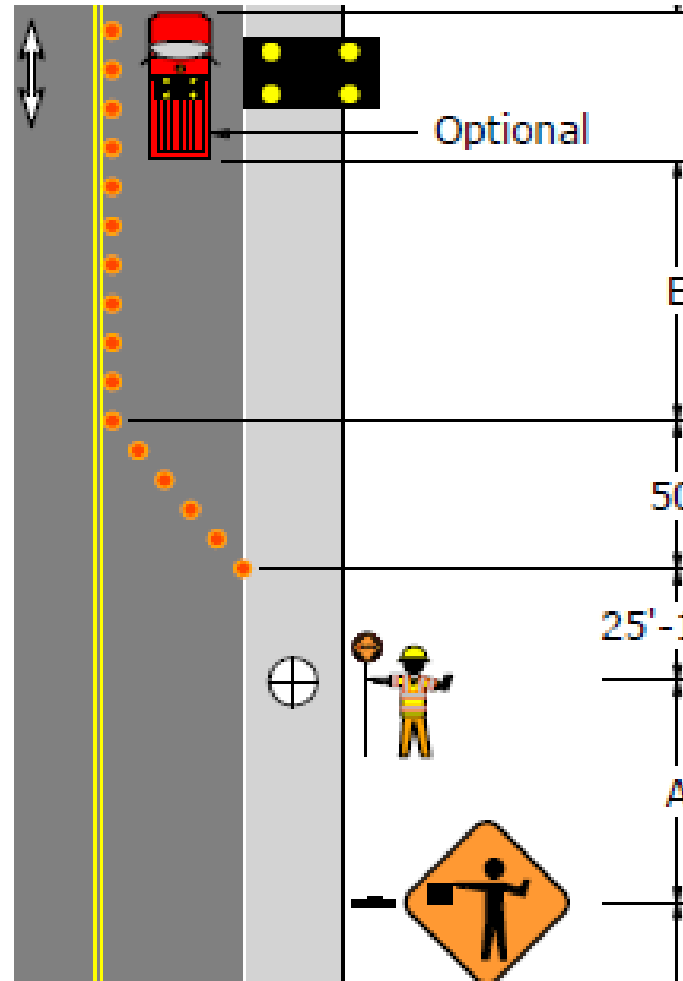
- In advance of WZ to allow traffic safe reaction time

## Far enough ahead of the WZ =

- For approaching traffic to stop before entering the WZ
  - (even if they do enter the buffer space)



# New spacing requirement in Pub 213



Flaggers must  
be positioned  
25' – 100'  
in  
front of taper

# Flagger Stations and Visibility

<b>SPEED (mph)</b>	<b>DISTANCE (ft)</b>
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

- MUTCD 6E.08
- Shall be located such that approaching road users will have sufficient distance to stop at an intended stopping point
- Distance can be adjusted for field conditions

# Visibility

- Flagger station should be visible to motorists a distance specified in Publication 213
- Never allow a group of workers to congregate around flagger station
- Choose position to provide greatest color contrast
- Do not stand in the shade if this restricts visibility
- Take into consideration hill, curves, signs, etc.
- Sun glare may also inhibit visibility



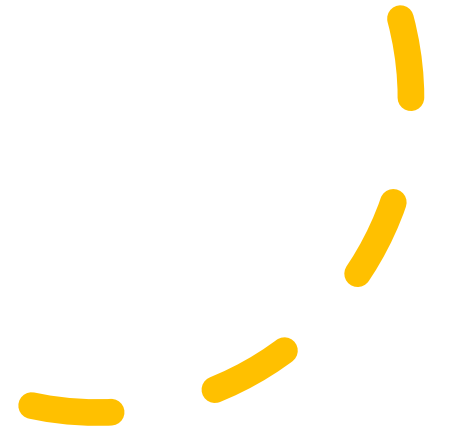


# NO ESCAPE

Never block flagger's  
escape route!

Be aware of:

- Guiderail
- Trees and other vegetation
- Equipment
- Vehicles
- Signs
- Personal items





# Flagger Characteristics

- Sense of responsibility for public and worker safety
- Adequate training
- Good physical condition
- Mentally alert and the ability to react in an emergency
- Courteous and firm manner
- Neat appearance





- Road users are redirected out of the normal path
- Mobile operations— transition area moves
- Tapers are used to transition traffic
- Space taper devices properly





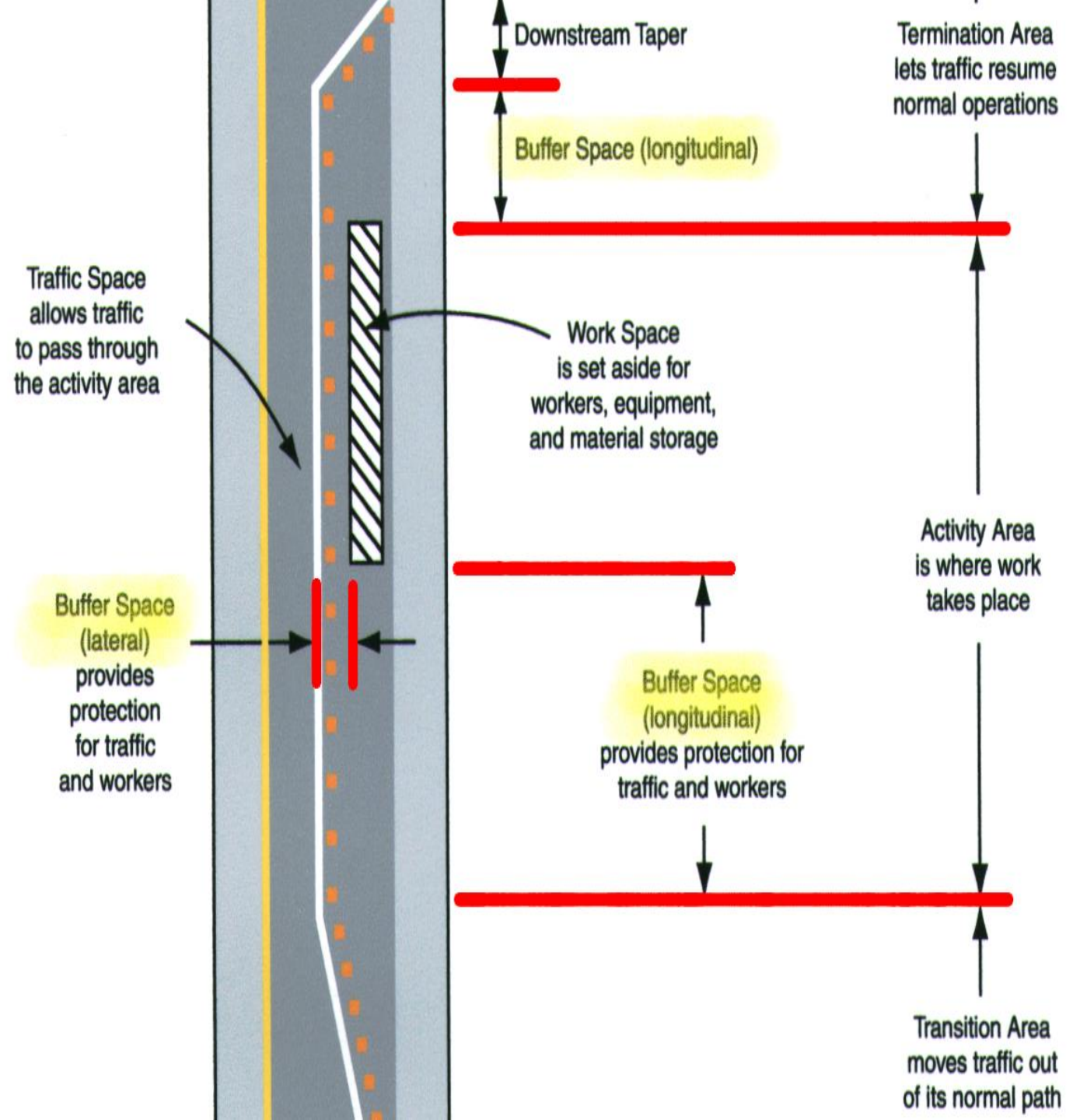


Activity Area



# Buffer Zone

- Allows recovery space for errant vehicles
- Workers and/or equipment should not be in the Buffer Zone



# Work Space

- Channelizing devices delineating work area must all be the same (all cones or all vertical panels, etc.)
  - May be different than taper devices
- Channelizing devices delineating work area should be spaced in feet two times the normal speed limit
  - Example: Normal speed limit is 45 mph, spacing is 90 feet apart)
- Shall be retroreflective for night work



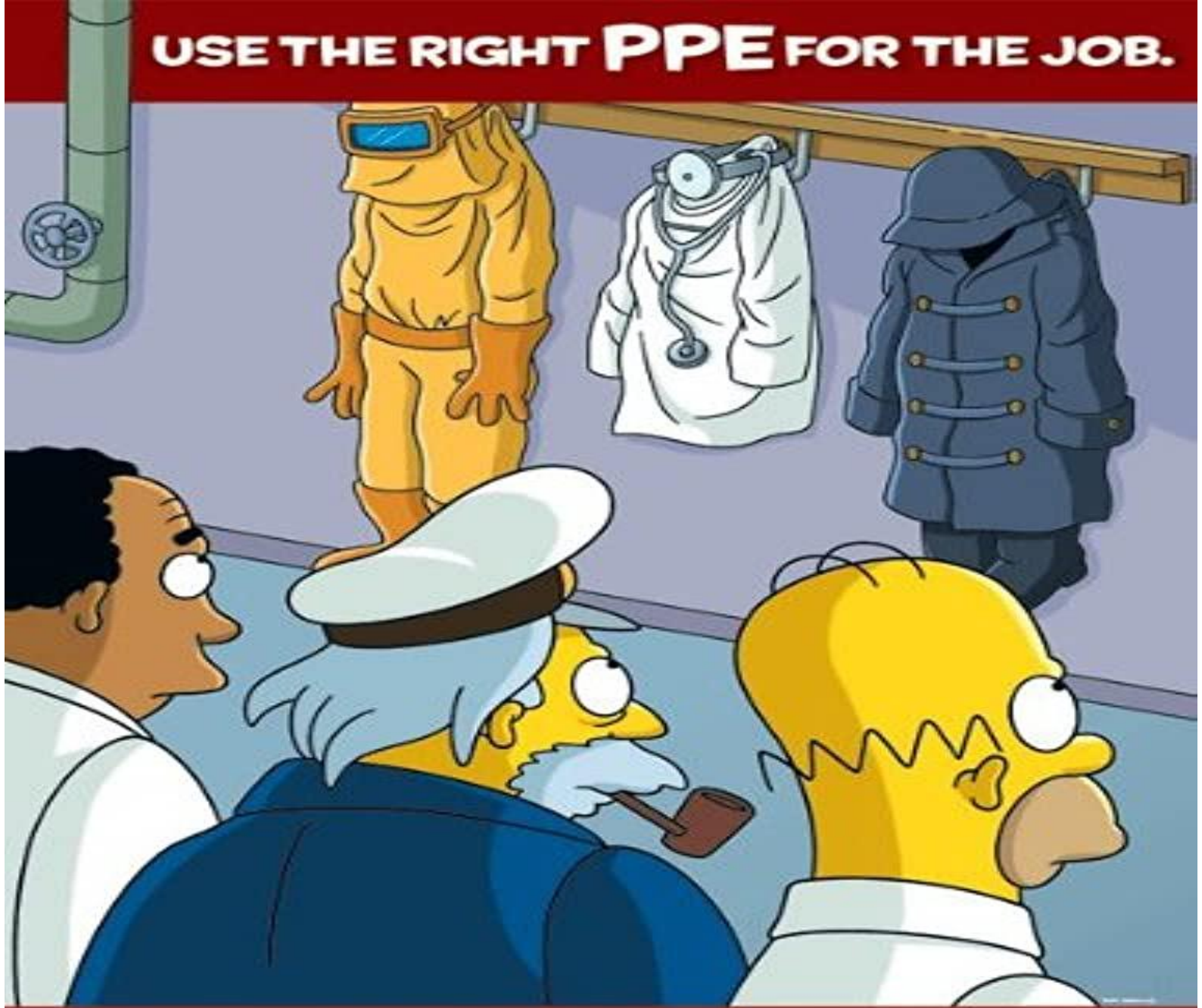
# Termination Area

- Returns road users to normal path
- “END ROAD WORK” sign
- Longitudinal buffer and taper



**END  
ROAD WORK**

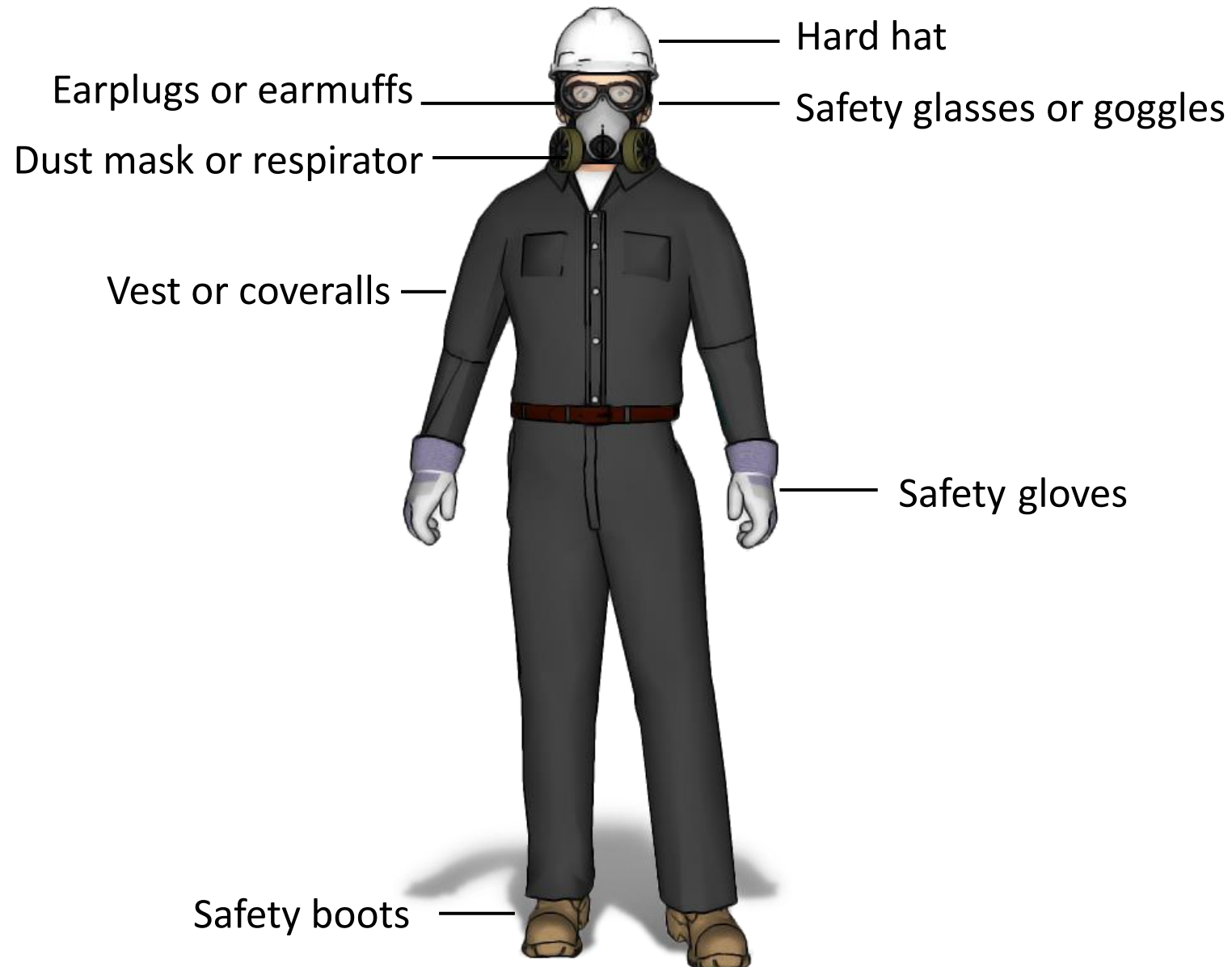




**USE THE RIGHT PPE FOR THE JOB.**

**DO YOU KNOW WHEN AND WHERE TO WEAR PPE?**





# Dressing for Safety

**RETRO-REFLECTIVE IS REQUIRED**

**NOT just plain T-shirts Or Sweatshirts**







## Reflective VS. Retro-Reflectivity



# Flagger Attire

## Non-PennDOT Flaggers \*

- Protective helmet
- ANSI Class 2 Safety Apparel – fluorescent yellow-green, fluorescent orange-red or a combination
- Proper footwear
- ANSI Class 3 garments are recommended at night
- Optional rain gear



\* Unless otherwise written in the contract or permit

Is this Apparel Acceptable?



# Dressing for Safety

- Tags
  - Do NOT remove
- Soiled
  - Clean?
- Loss of Retro-Reflectivity
  - Throw it out







# FLAGGER EQUIPMENT



**STOP/SLOW  
Paddle**

**Red Flag**



## STOP/SLOW Paddle

- Used to control one-lane, two-way traffic
- Used at an intersection with a single flagger controlling traffic from a **SINGLE** direction.
  - **SINGLE** directions only – pay attention - **SINGLE**
- Should be the primary device because it gives more positive guidance than flags.



# Red Flag

- Use at an intersection with a single flagger controlling traffic from MULTIPLE directions.
- Control traffic in *emergencies* when a STOP/SLOW Paddle is not available (See Pub 213 Note B-10)





# FLAGGER EQUIPMENT

## Supplemental Equipment

- Red-Light Wand
- Flares
- Equipment for Communicating



# Equipment for Communicating

- 
- Flaggers must be in communication with each other
  - Hand-held or portable radios – NEVER a vehicle radio
  - Passing flags or batons (rare, but acceptable)
  - Prearranged hand signals or gestures
    - Will not confuse the traveling public
    - Example: tipping the hard hat
  - Voice - short distance segments only





## Red-light Wand & Flares

- Used for operations during hours of darkness
- Only used as a supplement to retroreflective STOP/SLOW Paddle or Red Flag



# Supplemental Equipment

- During hours of darkness, illumination of flagger stations is ***required*** (see ***Pub 213 note B-6***)
  - *Except* in emergencies
  - Street lighting is not adequate
- During emergency situations, when not illuminated, a flagger may use a flashlight with a red glow cone to **supplement** the STOP/SLOW paddle or flag.



# Nighttime Flagger Illumination

- Separate set of floodlights required by Pub 213
- Street lights, vehicle headlights do not meet the requirements
- Position to illuminate the flagger, and not shine into eyes of drivers



# Summary

- Work Zones are Dangerous Places
- Basic Work Zone Setups and Hazard Control Principles
- Flaggers and the Work Zone
- PPE in Work Zones.
- Equipment used in Work Zones.



**WORK**

**ZONE  
FLAGGER**

**AHEAD**

