




Advanced

**Maintenance of
Traffic Training**
Florida Department of Transportation


MOT & TTC
 The FDOT considers the terms
Maintenance of Traffic (MOT) and
Temporary Traffic Control (TTC)
 synonymous. They may be used
 interchangeably in the field and through
 out the course of this presentation.
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Session 1

**Introductions
Course Overview
Policies**
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Introductions

Instructor

Name

Organization


WZ Experience

Participants


Name

Organization

WZ Experience



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Course Goal

Upon completion of this Course, you will be able to:

Analyze


Design

Implement

Maintain Traffic Control Plans (TCP)

All in a clear and concise fashion.

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Course Organization

1

• Policy and Manuals

2

• Fundamental Principles

3

• Temporary Traffic Control Devices

4

• Temporary Traffic Control Zones

5

• Standard Plans

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Course Organization

- 6 • Other Considerations
- 7 • Transportation Management Plans
- 8 • Pay Items
- 9 • Flagging Operations
- 10 • Construction Project Administration

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Testing

- Open Book and Notes
- 2 hours
- Multiple Choice
- 70% score to pass


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National Work Zone Safety Information Clearinghouse

Work Zone Fatalities

Year	US	FL
2007	835	91
2008	716	81
2009	680	82
2010	576	43
2011	587	57
2012	609	51
2013	579	69
2014	670	60
2015	713	79
2016	763	80


On average, approximately two people are killed nationally each day in work zones.



Federal Policy Requirements (23 CFR 630 Subpart J)

- Transportation Management Plans (TMP)
- Responsible DOT and Contractor person to ensure that work zone safety is properly administered
- Pay items for work zone devices
- Training for everyone responsible for the design, implementation, or inspection of traffic control
- Annual process reviews


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State Policy Requirements

Applies to all personnel responsible for the development, design, implementation, operation, enforcement and inspection of work zone related transportation management and temporary traffic control on streets and highways within the State Highway System right-of-way.

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MOT Training Categories

- Flagger
- Intermediate
- Advanced

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Flagger Training

- Minimum areas covered are Flagger Control from the MUTCD, Standard Plans Index 102-600, and general information for traffic control work zones
- Participant must demonstrate knowledge and proficiency in flagging operations
- Field demonstration/dexterity test using hand signaling devices for flagging operations

REQUIRED FOR PERSONNEL WHO:

- Have responsibility for flagging traffic



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Intermediate Training

- 16 Hours long
- Classroom instruction and workshops
- 102-600 Series Index of Florida Standard Plans
- 50 Question qualification test

REQUIRED FOR PERSONNEL WHO:

- Supervise the placement or field maintenance of temporary traffic control devices, excluding temporary barriers.
- Inspect the placement or operational function of temporary traffic control devices, excluding temporary barriers.



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Advanced Training

- 20 Hours long
- Classroom instruction and workshops
- In-depth review of Standard Plans
- Design exercises and problem solving of MOT in TTCP
- 60 Question qualification test

REQUIRED FOR:

- The Professional Engineer responsible for the development of the Temporary Traffic Control Plan.
- The Worksite Traffic Supervisor in accordance with FDOT Standard Specifications, Section 102.
- Personnel responsible for supervising the placement or field maintenance of temporary traffic control devices, including temporary barriers.
- Personnel responsible for inspection of the placement or operational function of temporary traffic control devices, including temporary barriers.



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State Policy Requirements

Refresher Courses:

Training or refresher courses, for all category levels are required every four years for all persons to be qualified to perform their assigned duties.

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Participant Responsibilities

**Maintain a valid
Maintenance of
Traffic
qualification**

**Keep updated on
all changes to
standards and
related
documents**

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National Manuals



**Manual on Uniform Traffic
Control Devices (MUTCD)**



Roadside Design Guide (RDG)



**Policy on Geometric Design of
Highways and Streets (AASHTO
Green Book)**


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State of Florida Manuals


Standard Plans

- Standard Plans Revision




FDOT Design Manual

- Design Bulletins




Standard Specifications

- Special Provisions & Supplements




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State of Florida Manuals


Basis of Estimates (BOE) Handbook



Drainage Manual



Construction Project Administration Manual (CPAM)



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End of Session 1



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Session 2



Fundamental Principles of Temporary Traffic Control Zones

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Principles of Traffic Control Design for Safety

➤

Workers

➤

Motorist

➤

Bicyclist

➤

Pedestrian, including disabled


➤

Enforcement/Emergency Officials

➤

Transit Needs (Bus, Rail, etc.)

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Principles of Traffic Control Selection of Devices

FDOT Device Uniformity

Design of Device

- Specifications
- Approved Products List (APL)

Placement of Device

- Contract Plans
- Standard Plans
- MUTCD






Maintenance of Device

- Spec 102
- ATSSA Guidelines

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**Principles of Traffic Control
Selection of Devices**

-  Fulfill a Need
-  Command Attention
-  Convey a Clear & Simple Meaning
-  Command Respect
-  Provide Adequate Response Time

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**Principles of Traffic Control
Design Considerations**

Guide Traffic and Maintain Work Zone



- Provide adequate warning, delineation, and channelization to assist in guiding road users
- Remove or cover inappropriate devices or markings
- Monitor work zones under varying conditions
- Keep clear zone free of equipment and materials
- Maintain good communication with public and agencies

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Human Factors

- **Driver Experience**
 - sum total of knowledge and experience the driver possesses
- **Expectancy**
 - driver anticipation of occurrence or non-occurrence of events and situations


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Human Factors


- **Decisions**
 - formulation of a driver course of action based on information received
- **Advanced Warning**
 - displaying information to driver about events and situations prior to occurrence and giving adequate time to react
- **Ambiguity**
 - information that creates uncertainty or has more than one meaning


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Human Factors

- **Redundancy**
 - presenting same message in two or more different ways
- **Repetition**
 - displaying important information in several successive locations for emphasis



W4-2


W20-5


R2-1


W6-3

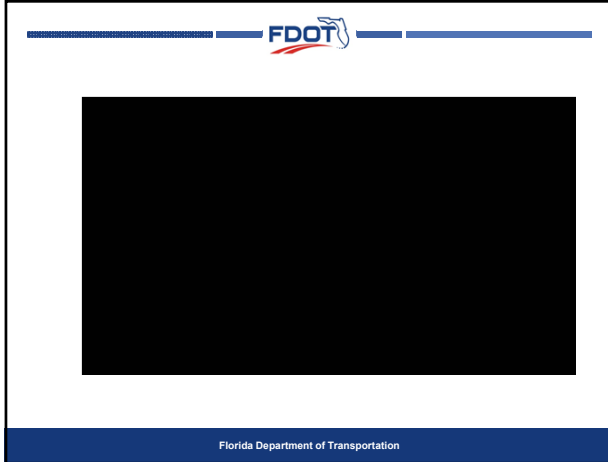
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Introduction and Fundamental Principals Video

Let's review some of the fundamental principals.

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[illegible]





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Work Zone Sign Categories

Warning

Regulatory

Guide








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Warning Signs

- Diamond is basic shape
- Temporary warning signs black legend and border on fluorescent orange background
- Must be at least 48 inches X 48 inches
- Permanent warning signs yellow background with black legend may remain in work zone if still applicable






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Regulatory Signs

- Generally rectangular with longer vertical dimension black legend and border on white background
- Impose legal obligations and/or restrictions on all traffic
- STOP, YIELD, DO NOT ENTER, and WRONG WAY signs have white legend on red background






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Guide Signs

- Rectangular shape with long horizontal dimension
- Basic color white on green
- At work zones may be black on orange to indicate routing changes due to maintenance activity

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Sign Placement

Sign supports must not be located on sidewalks, bicycle facilities, or areas designated for pedestrian or bicycle traffic.



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Work Zone Sign Supports

Temporary Post-Mounted

Work operations exceed 1 day



Temporary Portable

Work operations less than 1 day

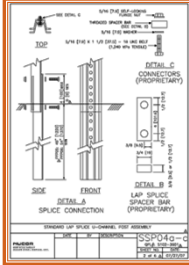


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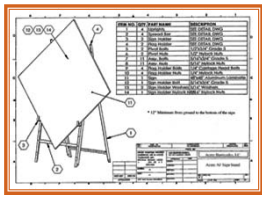
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Work Zone Sign Supports APL Drawings

Temporary Post-Mounted



Temporary Portable



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Channelizing Devices

- Cones, Drums
- Tubular Markers
- Longitudinal Channelizing Devices (LCD's)
- Vertical Panels
- Barricades , Types 1 & 2
- Barricades, Direction Indicator
- Barricades, Type 3


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Function of Channelizing Devices

- Warn road users of conditions created by work activities in or near the roadway.
- Guide and direct drivers, bicyclist and pedestrians safely through the work zone.


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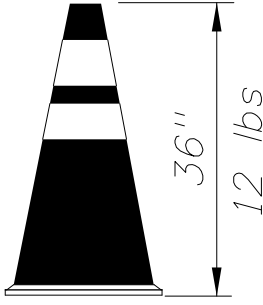
Temporary Warning Lights

- All Temporary Warning Lights have been omitted beginning January 1st 2016

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Cones



CONE SIZE:
 Florida requires
36-inch, 12-lb
cones on state
 roads

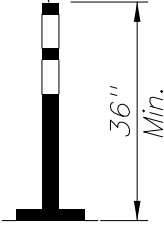
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Tubular Marker

Non-fixed tubular
 markers to be
 used during daylight
 hours only.

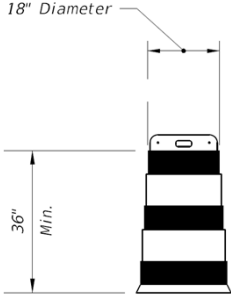
4" Diameter



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Drums



18" Diameter

36" Min.

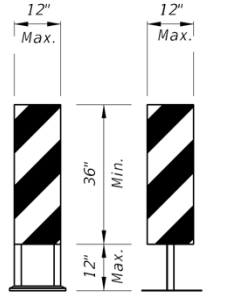
Drums are highly visible devices, have good target value and give the appearance of being formidable obstacles; therefore they command the respect of motorist.

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Vertical Panel

Vertical panels may be used for channelization, and are particularly appropriate for traffic separation or in other locations where lateral space is restricted.



12" Max.

12" Max.

36" Min.

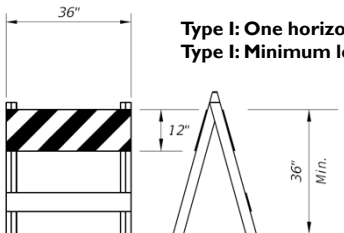
12" Max.

A-FRAME POST MOUNT

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Type I Barricade



36"


12"

36" Min.

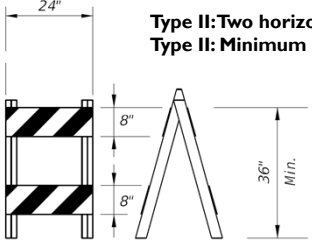
Type I: One horizontal retroreflective rail
Type I: Minimum length of three feet

General: Markings shall slope downward at a 45° angle toward the direction to which traffic is to pass.

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Type II Barricade



Type II: Two horizontal retroreflective rails
Type II: Minimum length of two feet

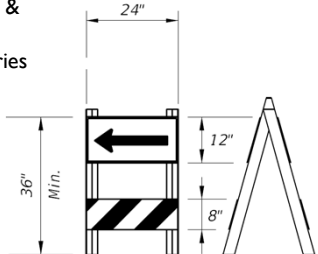
General: Ballast shall not be placed on top rails or any striped rails or higher than 13 inches above the driving surface.

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Direction Indicator Barricade

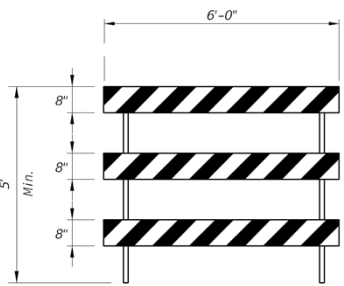
May be used in tapers & transitions
 If used, shall be in a series



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Type III Barricade



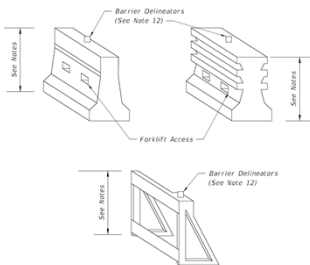
If road closure signs are mounted on a Type III Barricade they shall be installed in accordance with manufacturer's vendor drawing shown on the APL.

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Vehicle & Pedestrian Longitudinal Channelizing Devices (LCD's)

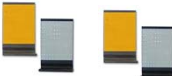
Vehicle & Pedestrian Longitudinal Channelizing Devices (LCD's) are to be used as indicated in Index 102-600.



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Barrier Delineators




Description	<ul style="list-style-type: none"> • Yellow or White • 3 inches wide by 4 inches high Sheeting • Type IV or XI Sheeting
Placement	<ul style="list-style-type: none"> • On top of temporary barrier wall or LCD
Purpose	<ul style="list-style-type: none"> • Placed in a line to delineate the travelway

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Arrow Boards

- Supplement other warning devices
- Provide additional advance warning
- Used for lane closures on multi-lane roadways



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Arrow Boards


Multiple lane closures use multiple arrow boards

Reduce intensity of flashers during darkness

Delineate with temporary traffic control devices



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Portable Changeable Message Signs (PCMS)


Programmable messages that advise the road user of unexpected situations

Provide additional advance warning

Used for night time work within 4' of edge travelway



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Portable Changeable Message Signs (PCMS)

Typical Uses:

- Speed is expected to drop substantially
- Queuing and delays expected
- Changes in alignment or surface condition
- Advance notice of closures (ramp, lane..)
- Changes in road user pattern


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Portable Changeable Message Signs (PCMS)

Message Design

- Message Panel
 - 8 characters per line
 - 3 lines per phase
 - Each message shall consist of either 1 or 2 phases
- Each phase conveys a single thought
- Phase Layout
 - Top line - Present the problem
 - Center Line - Present the location of distance ahead
 - Bottom line - Present recommended driver action



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Radar Speed Display Unit

Used as part of the Motorist Awareness System


Driver Speed Display

Regulatory Speed Limit Sign

"Your Speed" Sign



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Portable Regulatory Sign

Used as part of the Motorist Awareness System


Flashing Lights

Regulatory Speed Limit Sign

When Flashing Sign



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Temporary Barriers

4 Types

- 32" Precast Concrete
- Low Profile Precast Concrete
- Water Filled
- 32" Steel


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Precast Concrete

2 Types of 32" Precast Concrete

- **Type K**
 - F-shape generic barrier developed by FDOT for both roadway and bridge applications
 - Segments are joined with a steel connecting loop and pin
- **Proprietary**
 - Must be listed on the Approved Products List
 - Meet the requirements for "Alternate Designs" in Index 102-100 or meet the requirements of Index 102-110




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Barriers – General Information



Installation	<ul style="list-style-type: none"> Anchored Free Standing
Surface	<ul style="list-style-type: none"> Rigid Pavement (Concrete) Flexible Pavement (Asphalt) Cross Slope of 1 : 10 or flatter
Transitions	<ul style="list-style-type: none"> Required Between Type K Freestanding, Bolted, Staked and Back Filled Required Between Other Types of Barriers
Setback Distance	<ul style="list-style-type: none"> Varies on Type of Installation, Use, Location and Speed Defined in Index 102-110, Sheets 2, 3 and 4 as distance to the edge of flexible or rigid pavement. Defined in Index 102-600 as "Setback Distance"

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Type K Barrier – Index 102-110

Only Type K Barriers and Proprietary Steel Barriers
are approved for use on bridges

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Type K Barrier

Setback Distance


Anchored

• See Index 102-100 – Sheet I

Free Standing

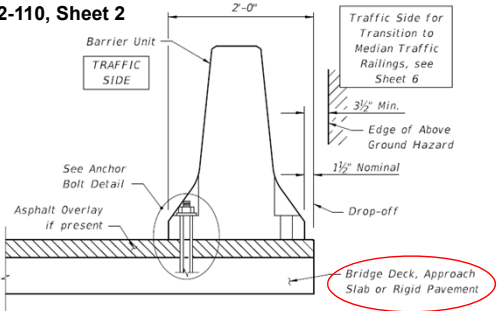
• See Index 102-100 - Sheet I

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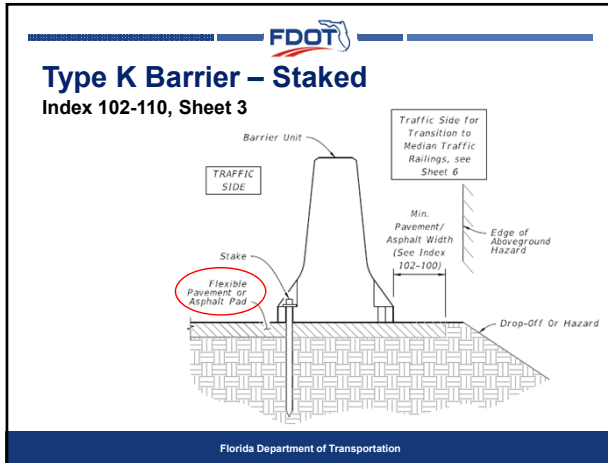


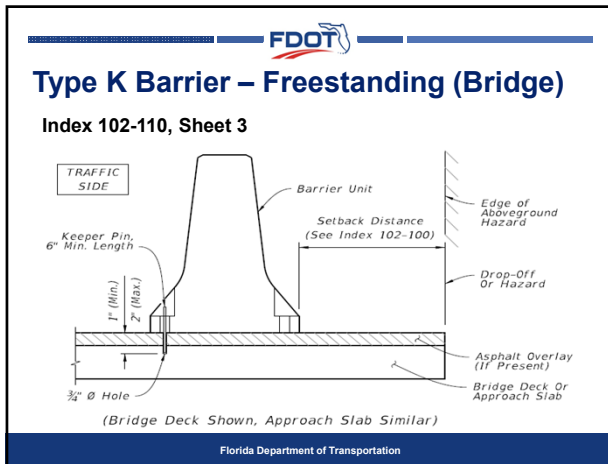
Type K Barrier – Bolted

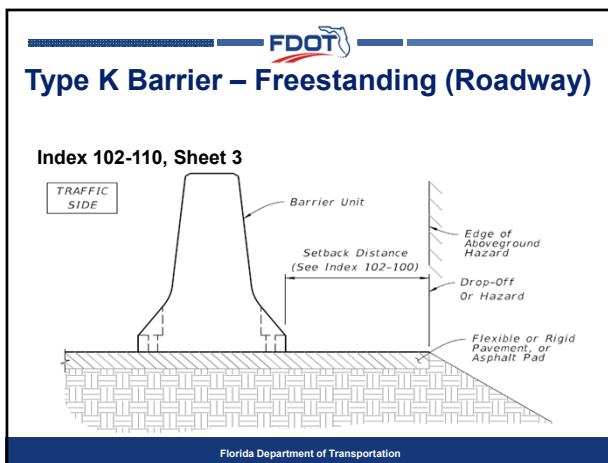
Index 102-110, Sheet 2

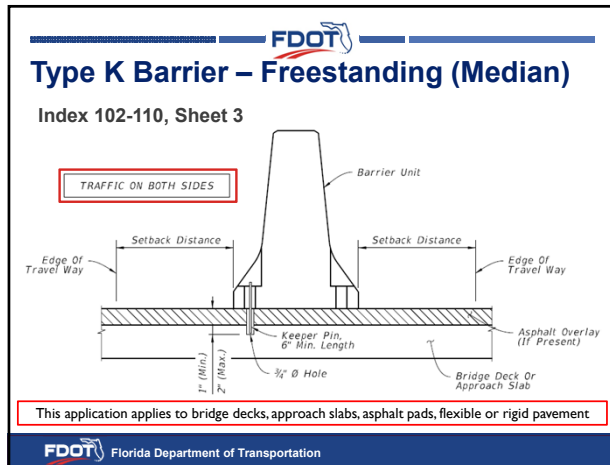


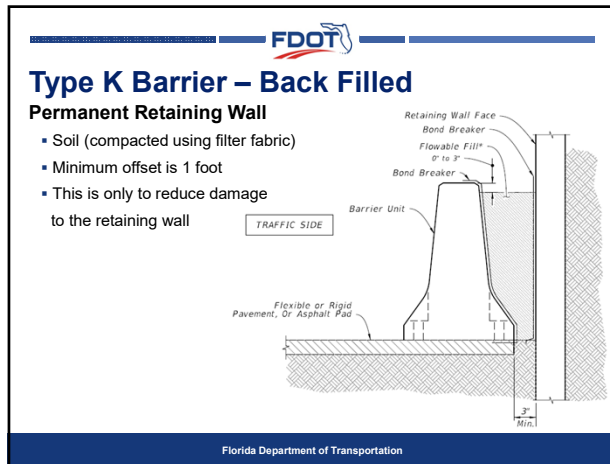
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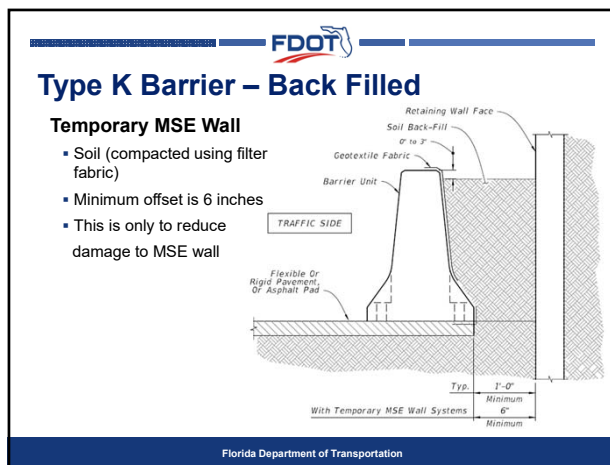












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Type K Barrier – Transitions

Transition Types

- Index 102-110, Sheets 5 and 6
- From Freestanding Type K Barrier to Bridge Median Traffic Railing or Roadway Median Concrete Barrier Wall
- From Freestanding Type K Barrier to Bridge Traffic Railing or Roadway Concrete Barrier Wall
- From Anchored Type K Barrier to Bridge Traffic Railing or Roadway Concrete Barrier Wall
- Overlapping transitions between other types of barriers are governed by Index 102-100

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Type K Barrier – Transitions

- Required Between Semi-Rigid (Freestanding) and Rigid (Bolted, Staked or Back Filled) Conditions
- Required Between Other Types of Barriers
- Most Common Type of Transition is Semi-Rigid to Rigid
 - Bolt or stake pattern for transition units is shown below

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Proprietary Barriers – Index 102-100

2 Types on APL

- JJ Hooks
- Quickchange Moveable

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Proprietary Barriers

Setback Distance

- See Index 102-100, Sheet 1
- Installation required on Asphalt or Concrete Surfaces

INSTALLATION DATA			
CONDITION	LATERAL OFFSET	SETBACK DISTANCE	PAVEMENT / ASPHALT WIDTH
Anchored	2' Min.	2' Min.*	1' Min.
Free-standing	2' Min.	4' Min.	4' Min.

* For Bridge Decks see Index 102-110 or APL

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Proprietary Barriers

Installation

- Freestanding

The diagram illustrates the installation of a freestanding barrier. It shows a cross-section of a road with a barrier unit and barrier delineators. Key dimensions and features labeled include: Edge of Travel Way, Lateral Offset, Flexible or Rigid Pavement or Asphalt Pad, Slope 1:10 or Flatter, Barrier Unit, Barrier Delineators, Setback Distance Above Ground Hazard or Drop Off, Pavement/Asphalt Width, Drop-Off Hazard, and Above Ground Hazard. The diagram is labeled "ROADSIDE INSTALLATION".

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Proprietary Barriers

Surface

- Rigid Pavement (Concrete)
- Flexible Pavement (Asphalt)
- Cross Slope of 1:10 or flatter

The diagram illustrates the installation of a barrier on a surface. It shows a cross-section of a road with a barrier unit and barrier delineators. Key dimensions and features labeled include: Edge of Travel Way, Lateral Offset, Flexible or Rigid Pavement or Asphalt Pad, Slope 1:10 or Flatter, Barrier Unit, Barrier Delineators, Setback Distance Above Ground Hazard or Drop Off, Pavement/Asphalt Width, Drop-Off Hazard, and Above Ground Hazard. The diagram is labeled "ROADSIDE INSTALLATION".

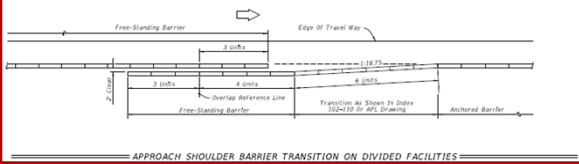
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Proprietary Barriers


Transitions

- Overlapping transitions required between other types of barriers



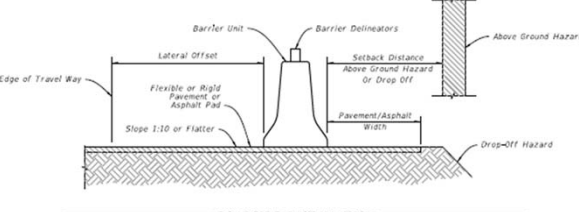
APPROACH SHOULDER BARRIER TRANSITION ON DIVIDED FACILITIES

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Proprietary Barriers

Setback Distance and Offset



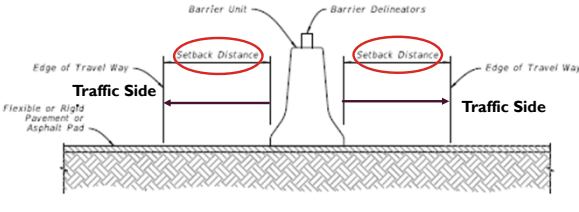
ROADSIDE INSTALLATION

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Proprietary Barriers

Setback Distance and Offset



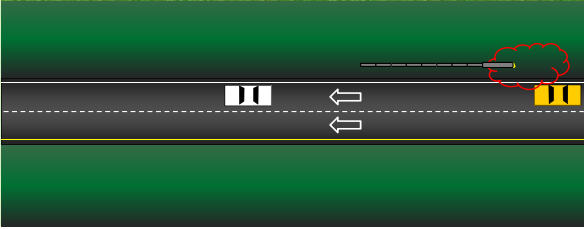
MEDIAN INSTALLATION

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Barrier Terms

Approach End – The portion of a barrier system exposed to approaching traffic.

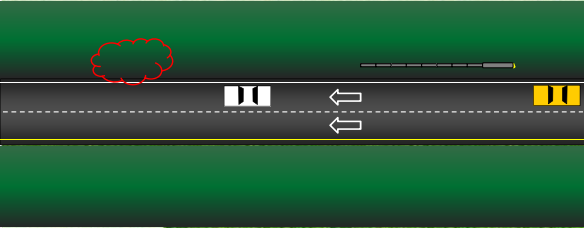


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Barrier Terms

Trailing End – Downstream end of a barrier system, not exposed to approaching Traffic.

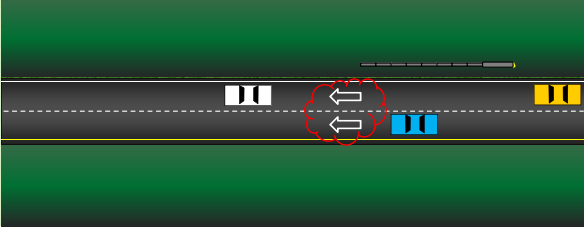


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Barrier Terms

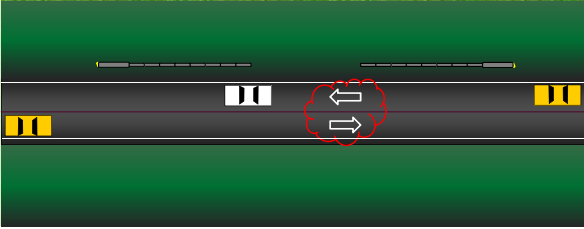
Unidirectional – Exposed to traffic approaching from one direction only.



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Barrier Terms

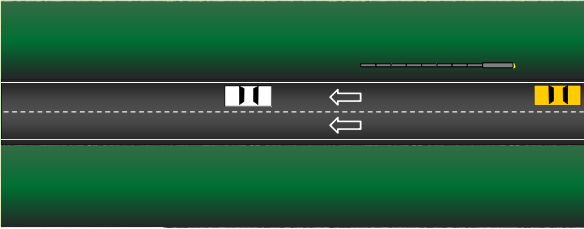
Bidirectional – Exposed to traffic approaching from opposing directions



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Barrier Terms

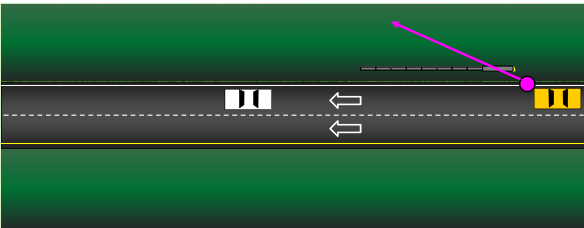
● **Point of Departure** - A point on the edge of a lane at which an errant vehicle leaving the lane will likely impact the leading face of a hazard or area of concern.



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Barrier Terms

Departure Line - A line extending from the Point of Departure to the back of a hazard or Clear Zone



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Barrier Terms

Work Area **INSIDE** Clear Zone Limit use the
Back of Hazard or Back of Work Area Inside Clear Zone

WORK ZONE SPEED MPH	TRAVEL LANES & MULTILANE RAMP (feet)	AUXILIARY LANES & SINGLE LANE RAMP (feet)
60-70	30	18
55	24	14
45-50	18	10
30-40	14	10
ALL SPEEDS CURB & GUTTER	4' BEHIND FACE OF CURB	4' BEHIND FACE OF CURB


Work Area extends **OUTSIDE** Clear Zone Limit
use the Clear Zone Limit Distance

WORK ZONE SPEED MPH	TRAVEL LANES & MULTILANE RAMP (feet)	AUXILIARY LANES & SINGLE LANE RAMP (feet)
60-70	30	18
55	24	14
45-50	18	10
30-40	14	10
ALL SPEEDS CURB & GUTTER	4' BEHIND FACE OF CURB	4' BEHIND FACE OF CURB

Barrier Wall Inspection

- FDOT Temporary Concrete Barrier Evaluation Guide
 - Helps personnel determine when a traffic control device has outlived its usefulness
 - Device condition may be acceptable or unacceptable
 - FDOT does not allow the use of units in "unacceptable" conditions (Specification 102-9.1)
 - May be downloaded at https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/programmanagement/implemented/urlsinspecs/files/docs/default-source/content-docs/programmanagement/implemented/urlsinspecs/files/temporaryconcretebarrierguide.pdf?sfvrsn=343b4c97_10
- The Department no longer uses Quality Guidelines for Temporary Traffic Control Devices and Features
 - ATSSA American Traffic Safety Services Association (ATSSA)


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Barrier Wall Inspection

- **Acceptable**
 - The barrier is completely intact and has only minor blemishes or imperfections, which may include superficial gouges or minor cracks. The barrier has no structural cracks or cracks that exist through the entire cross-section.
 - Minor spalls with a depth of 1.5 inches or less, and no exposed rebar (excluding anchor slots).
 - The unit-to-unit connection assemblies are functional with no damage, are all intact, and fixed in their positions.
 - Temporary Concrete Barrier previously repaired in accordance with Specification 102.


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Barrier Wall Inspection

- **Unacceptable**
 - The barrier has multiple cracks throughout, structural cracks or cracks through the entire cross-section.
 - Spalls with a depth greater than 1.5 inches; any location with exposed rebar or rebar protruding from the barrier (excluding anchor slots); or bolts protruding from the barrier face.
 - Cracked or broken concrete that could easily be dislodged if hit, resulting in either of the two conditions above.
 - Anchored barrier with broken concrete with shear cracks.
 - The unit-to-unit connection assemblies are deformed, bent, broken, or no longer in a fixed position.

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Barrier Wall Inspection


- **Unacceptable wall may be repaired in accordance with Specification 102-9.6.2.4 Temporary Concrete Barrier Repair**
 - Repairs must restore the barrier to original shape and dimensions
 - Repairs are NOT allowed for units that have:
 - Structural cracking
 - Cracks that exist through the entire cross-section
 - Broken unit-to-unit connection assemblies or anchor slots
 - Unit-to-unit connection assemblies or anchor slots no longer in a fixed position

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Low Profile Barrier

Intended for use in Urban Areas where sight distance for side streets and driveways may be a problem.



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Low Profile Barrier

Application	Posted Speeds of 45 mph or less
Surface	Cross Slope of 1 : 10 or flatter
Supplemental Devices	Along the run of barrier: <ul style="list-style-type: none"> • Tubular Markers • 50' cc tangent; 25' cc radii Approach end: <ul style="list-style-type: none"> • Type I Object Marker
Deflection Distance & Offset	Deflection Distance – 9 inch min Approach End Offset – 6 foot min

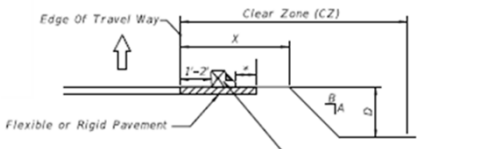
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Low Profile Barrier

■ **Surface**

- Cross Slope of 1:10 or flatter



* Minimum 9' on 1:10 or flatter slopes for 'Portable Temporary Low Profile Barrier For Roadside Safety.' For values A, B, D and X see Index 102-600.


DEFLECTION SPACE AT DROPOFFS

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Low Profile Barrier

- **Supplemental Devices**
 - Allows drivers to clearly see barrier's location
 - Along the run of barrier:
 - Tubular Markers
 - 50' cc Tangent; 25' cc radii
 - Approach end:
 - Type 1 Object Marker



GENERAL NOTES

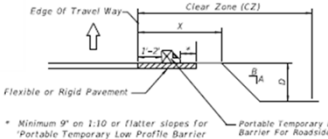
7. Tubular markers shall be orange in color and installed along the run of barrier at the ends and at 50' centers on tangents and 25' centers on radii. The markers shall be fixed to the top of the barrier by an adhesive or other method approved by the engineer. Approach end units shall be marked with a Type 1 object marker. The cost of the tubular markers and Type 1 object marker shall be included in the cost of the low profile barrier.

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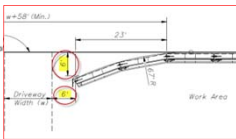
Low Profile Barrier

- **Setback Distance & Offset**
 - Setback Distance – 9 inch min
 - Approach End Offset – 6 foot min



* Minimum 9' on 1:10 or flatter slopes for Portable Temporary Low Profile Barrier For Roadside Safety. For values A, B, D and X see Index 102-400.

DEFLECTION SPACE AT DROPOFFS



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Steel Barriers

- BarrierGuard 800
- Vulcan Barrier
- ZoneGuard
- Check APL for Vendor Drawings

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Steel Barriers




- BarrierGuard 800

FDOT

Water Filled Barriers

- 3 Systems:
 - Triton
 - Guardian
 - Yodock
- Only allowed with prior approval from Roadway Design Office
- See APL for Vendor Drawings




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Crash Cushions

- **Redirective (Non-Gating)**
 - The principle device to shield approach ends of barrier wall



9. A yellow Type I Object Marker shall be centered 3' in front of the crash cushion nose. As an option, the contractor may install Retroreflective Sheeting on the nose of the crash cushion. The sheeting to be used must be solid yellow, Type IV or better and must be a product listed on the Department's Approved Products List (APL). The sheeting to be applied to the nose of the crash cushion shall be a minimum of 360 square inches with a minimum height of 15 inches. Mounting hardware, Object Markers or Retroreflective Sheeting shall be in conformance with Section 993 of the Standard Specifications for Road and Bridge Construction.

--

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Crash Cushion Crash Test Video

**MASH TL-3 Crash Test Results
for the
QuadGuard® Elite M10 System**

© 2011 Energy Absorption Systems, Inc.

Florida Department of Transportation

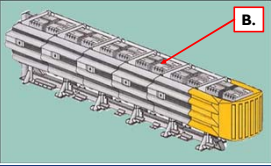



Crash Cushions – Identifying Common Products

Crash Cushions (Impact Attenuators):
 Quadguard (Narrow & Wide) - Proprietary
 Energy Absorption Systems, Inc.


Unique Feature:

- A. Quadruple Corrugated Fender Panels
- B. Rectangular Cartridges
- C. Plastic Nose
- D. Monorail Base






Quadguard



Florida Department of Transportation

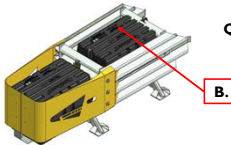


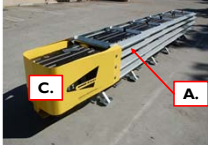
Crash Cushions – Identifying Common Products

Crash Cushions (Impact Attenuators):
 Quadguard II (Narrow & Wide) – Proprietary
(Shorter than the Original Quadguard)
 Energy Absorption Systems, Inc.

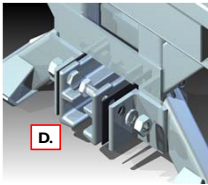
Unique Feature:

- A. Quadruple Corrugated Fender Panels
- B. Rectangular Cartridges
- C. Steel Nose
- D. Monorail Guide Stabilizers






Quadguard II




Florida Department of Transportation

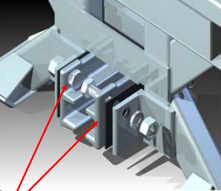


Crash Cushions – Identifying Common Products

Crash Cushions (Impact Attenuators):
 Quadguard II (Narrow & Wide) – Proprietary
(Shorter than the Original Quadguard)
 Energy Absorption Systems, Inc.


D. Monorail Guide Stabilizers






Quadguard II

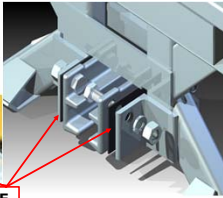
Florida Department of Transportation



Crash Cushions – Identifying Common Products


Crash Cushions (Impact Attenuators):
 Quadguard II (Narrow & Wide) – Proprietary
(Shorter than the Original Quadguard)
 Energy Absorption Systems, Inc.
 E. Shims





Quadguard II

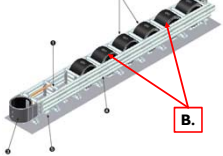
Florida Department of Transportation

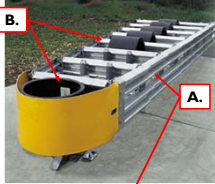


Crash Cushions – Identifying Common Products

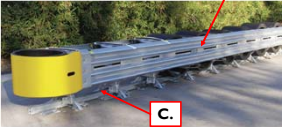
Crash Cushions (Impact Attenuators):
 Quadguard Elite (Narrow & Wide) – Proprietary
(Reusable Cylinders)
 Energy Absorption Systems, Inc.
 Unique Feature:

- A. Quadruple Corrugated Fender Panels
- B. HDPE Cylinders
- C. Monorail Base






Quadguard Elite



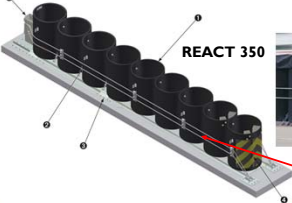
Florida Department of Transportation





Crash Cushions – Identifying Common Products

Crash Cushions (Impact Attenuators):
 REACT 350 – Proprietary
 Energy Absorption Systems, Inc.
 Unique Feature:

- A. Large Diameter HDPE Cylinders
- B. Redirective Cables







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Crash Cushions – Identifying Common Products

Crash Cushions (Impact Attenuators):
 TRACC – Proprietary
 Trinity Attenuating Crash Cushion (TRACC)
 Trinity Highway Products, LLC.
 Unique Feature:
 A. Plastic Nose
 B. No Cartridges
 C. Stacked Modified W-Beam Fender Panels

TRACC

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Crash Cushions – Identifying Common Products

Crash Cushions (Impact Attenuators):
 TAU II – Proprietary
 Lindsay Transportation Solutions/Barrier Systems
 Unique Feature:
 A. Plastic Nose
 B. Conical Shaped Cartridges
 C. Modified Thrie-Beam Fender Panels

TAU-II

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Crash Cushions – Identifying Common Products

Crash Cushions (Impact Attenuators):
 TAU II – Proprietary

TAU II

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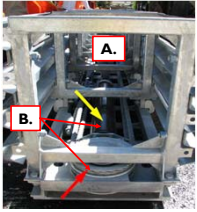


Crash Cushions – Identifying Common Products


Crash Cushions (Impact Attenuators):
 SCI Smart Cushion – Proprietary Work Area Protection, Inc.

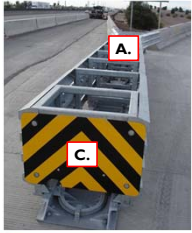
Unique Feature:

- A. No Cartridges
- B. Hydraulic Cylinder w/Cable
- C. Blunt/Square Nose




SCI Smart Cushion





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Crash Cushions – Identifying Common Products


Crash Cushions (Impact Attenuators) :
 X-MAS – Proprietary
(Double Faced Version of the X-Tension Terminal)
 Lindsay Transportation Solutions/Barrier Systems

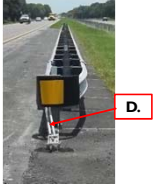
Unique Feature:

- A. W-Beam Panels w/Slider Bracket
- B. Standard Driven Posts
- C. Forward Anchorage
- D. Dual Tension Cables




X-MAS






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Truck/Trailer Mounted Attenuators (TMA'S)




- Truck or Trailer Mounted
 - Listed on APL
- Indexes 102-607 & 102-619
- Mounted by Manufacturer's Recommendations


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Temporary Lane Separator



**Tubular
Marker**



**Vertical
Panel**



**Opposing
Traffic**

← **3 Approved Fixed Channelizing Devices** →

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Painted Pavement Markings



Centerlines, lane lines, edge lines, stop bars and turn arrows will be required in work zones prior to opening the road to traffic.

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Raised Pavement Markers



RPM's shall be installed as a supplement to:

- a) All lane lines.
- b) Edge lines in transition & approach areas.
- c) Edge lines of gore areas.

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Pavement Markings - Conflicting Markings

Remove all pavement markings (paint, tape, thermoplastic, raised pavement markers, etc.) that conflict with the adjusted vehicle or pedestrian paths.

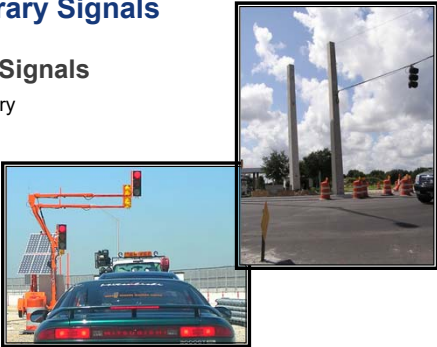


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Temporary Signals

- **Traffic Signals**
 - Temporary
 - Existing



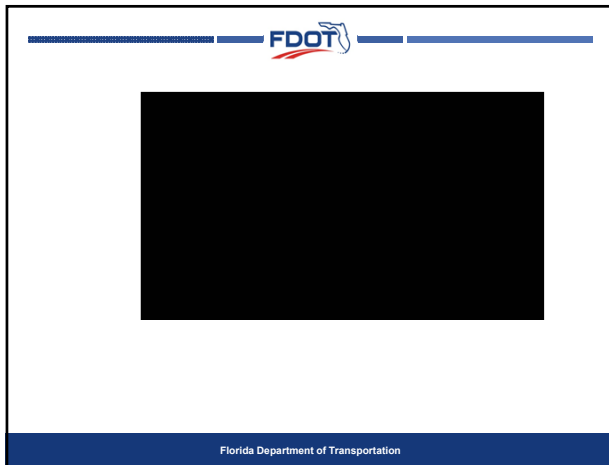
Florida Department of Transportation

FDOT

Traffic Control Devices Video

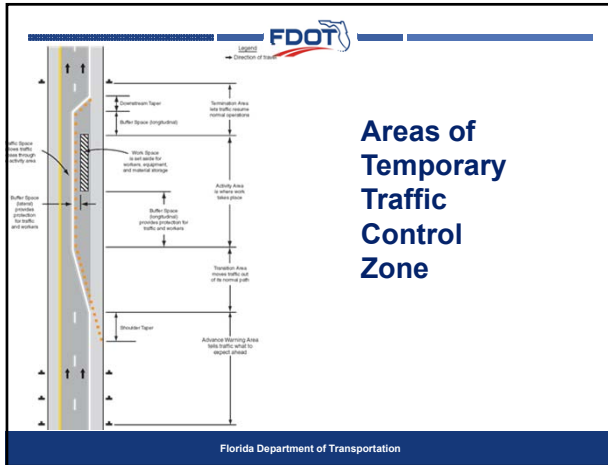
Let's look at some of these devices.

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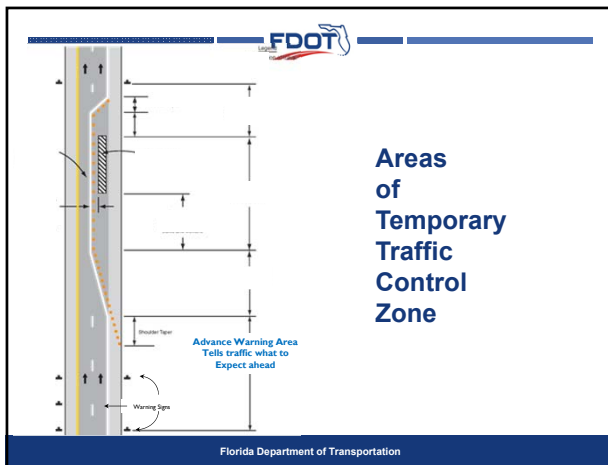


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Advance Warning Area

- First indication to motorists of unusual situation; alerts them work operations will occur short distance ahead.
- Signs properly positioned and spaced to give motorists adequate time to respond.

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Transition Area

Direct motorist from one lane to another in a smooth and gradual transition with channelizing device

Taper Length=L
See Table II

Buffer Space
See Table II

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FDOT

Advance Warning Area
Tells traffic what to
Expect ahead

Transition Area

Warning Signs

Areas of Temporary Traffic Control Zone

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FDOT

Taper

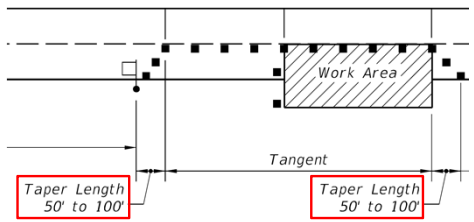
- Series of channelizing devices and/or pavement markings placed on angle to move traffic out of or into normal path

- Formula to calculate taper length found in taper table section of various Indexes in the Standard Plans, 102-600 Series.

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Two-Lane Two-Way / Down Stream Taper



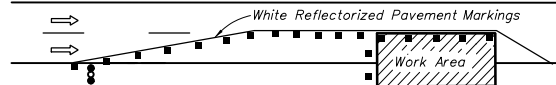
Two-Lane Two-way Taper - Used for flagging operations

Down Stream Taper – used at the downstream end of work area to direct drivers to move back into lane that was closed

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Merging Taper



A merging taper is used to close a lane on a multilane roadway and to direct traffic in the closed lane to merge into the adjacent lane.


40 mph or less

$$L = \frac{WS^2}{60}$$

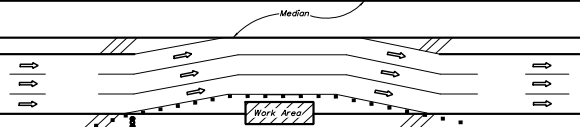
45 mph or greater

$$L = WS$$

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Shifting Taper

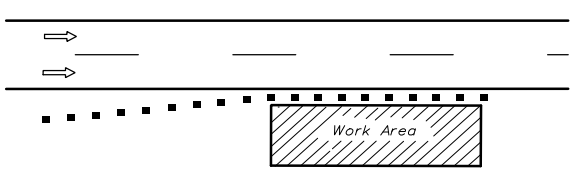


A shifting taper is used to move traffic into a different travel path when a merge is not required.

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Shoulder Closure Taper



A shoulder taper is used to close a shoulder.

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General 102-600 Series Indexes

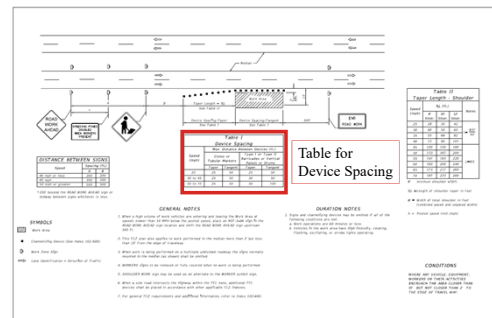



Table 1
Device Spacing

Speed (mph)	Cone or Tubular Marker	Type I or Type II Barricade or Vertical Panel or Drum
25	25	50
30 to 45	25	50
50 to 70	25	100

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General 102-600 Series Indexes

Device Spacing is determined by:

Speed

Type of Device (Cone or Tubular Marker) (Barricade, Vertical Panel or Drum)

Location of Device Taper or Tangent

Speed (mph)	Cone or Tubular Marker		Type I or Type II Barricade or Vertical Panel or Drum	
	Taper	Tangent	Taper	Tangent
25	25	50	25	50
30 to 45	25	50	30	50
50 to 70	25	50	50	100

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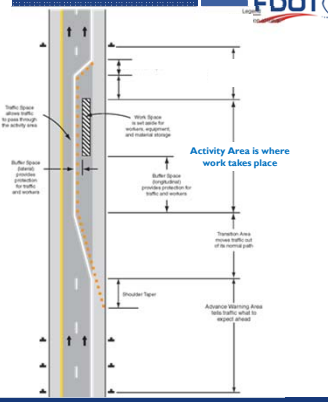
Activity Area

Section of highway where work activity takes place consists of:

- **Buffer Space**
 - Longitudinal
 - Lateral
- **Work Space**
- **Traffic Space**



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Areas of Temporary Traffic Control Zone

Activity Area is where work takes place

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Buffer Space

- **Longitudinal Buffer Space**
 - Allow motorists extra space to regain control if they missed warning signs
 - Provides room for motorist to stop before reaching work area
- **Lateral Buffer Space**
 - Used to separate traffic space from the work space and provides protection for traffic and workers
- **Keep buffer space free of equipment, workers, materials, and workers' vehicles**


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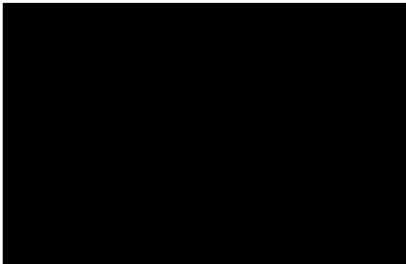


Elements of Temporary Traffic Control Video

Let's look at some of these elements.

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End of Session 4



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Session 5


Standard Plans



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**INSTRUCTOR - Click Book to Launch
Standard Plans Index 102-600
PowerPoint Presentation**



Students - Open your copy of the
Standard Plans to Index 102-600


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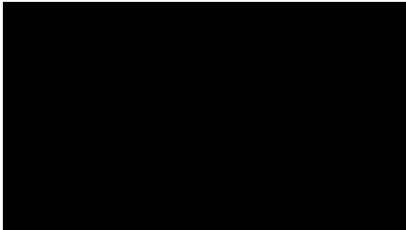


Temporary Traffic Control Plans (Standard Plans Index) Video


Lets look at some of Standard Index traffic control plans.


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Other Considerations – Open Traffic Lanes

Existing number of lanes shall remain open to traffic when construction is not active.


Limited Access Facilities -Widening and Major Reconstruction

Existing number of lanes shall remain open to traffic at all times throughout the duration on the construction project.

ALL Projects Under Reconstruction



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Other Considerations – Lane Closures

Lane Closure Analysis


- Used to determine when lane closures should be allowed without excessive delay.
- Required whenever lane closure is considered

Interstate and Limited Access Facilities


- Some Districts do not allow daytime lane closures unless approved in writing by upper management. Check with the District early in the design process.

Interstate and Limited Access Facilities

- No lane closures in excess of 1 work day shall be permitted where only 2 travel lanes exist in 1 direction unless approved by the District Secretary.



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Other Considerations

Intersecting road signs and signals

Sight distance


Lane Widths


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Other Considerations - Pedestrians and Bicycles


Tools to Minimize Impacts:

- Phasing of Construction
- Staging of Work at Location
- Alternate Routes
- Public Information
 - Contact Facility Managers, Public Service Providers
 - Web Sites for Trails, Long Distance Routes
 - Mapping Detours
- Seasonal Scheduling of Work
 - Schools, Parks
- Alternate Maintenance Techniques

A photograph showing two cyclists riding on a paved road. They are wearing helmets and casual clothing. In the foreground, there are several orange traffic cones arranged in a line, likely marking a construction zone or a detour. In the background, there are trees, a building with a red roof, and a dark-colored car parked on the side of the road. The sky is clear and blue.[illegible]




Other Considerations




Detours

Temporary rerouting onto another roadway




Diversions & Lane Shifts


Maintain traffic using existing or temp. pavement



Other Considerations


Narrow Bridges






Regulatory Speeds



Highway Lighting





Other Considerations

Motorist Awareness System



Work Area Access

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End of Session 6



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Session 7

Transportation Management Plans



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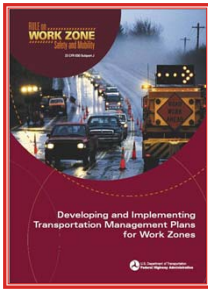


Transportation Management Plan (TMP)


(FDOT Design Manual, Part 2)

Method to:

- Minimize Traffic Delay
- Minimize Crashes
- Innovative Public Information
- Innovative Demand Management
- Innovative Construction Strategies
- Alternate Routes




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Significant Projects

- **Project or Projects**
 - that are anticipated to cause sustained work zone impacts.
- **All Interstate Projects**
 - Within a Transportation Management Area (TMA)
 - that occupy a location for more than 3 days
 - with lane closures.



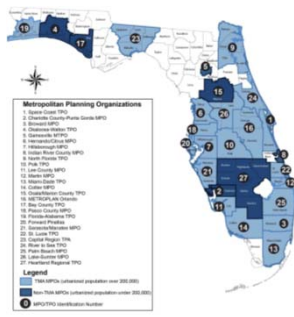
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Transportation Management Area

MPO/TMA (Over 200,000)

Non TMA MPO's (Under 200,000)



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TMP Team Members

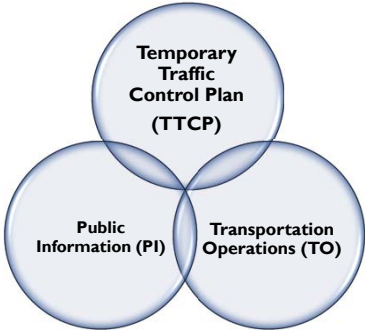
- PD&E
- Design
- Traffic Operations
- Construction
- Transit
- FHWA
- Local Government Officials
- Public Information
- Others, as necessary (Police, hospitals, etc.)



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TMP Components



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Transportation Operations (TO) Component

Strategies to Mitigate Work Zone Impacts

- Demand Management
- Corridor/Network Management
- Safety Management and Enforcement
- Work Zone Traffic Management



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TO Strategy Demand Management

- Transit Services Improvements and Transit Incentives
- Shuttle Services
- Ridesharing/Carpooling Incentives
- Park-n-Ride Promotions
- HOV Lanes
- Variable Work Hours And Telecommuting

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TO Strategy Corridor/Network Management

- Signal Timing/Coordination Improvements
- Temporary Traffic Signals
- Intersection Improvements
- Bus Turnouts
- Turn Restrictions
- Truck Restrictions
- Dynamic Lane Closure Systems
- Ramp Closures
- Railroad Crossing Controls

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TO Strategy Safety Management & Enforcement

- Motorist Awareness System
- Temporary Barriers
- Temporary Crash Cushions
- Automated Flagger Assistance Devices
- On-site Safety Training
- TMP Inspection Team Meetings

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TO Strategy

Work Zone Traffic Management

Intelligent Transportation System (ITS) for Monitoring and Management

Transportation Management Center (TMC)

Aerial Surveillance

Call Boxes

Mile Post Markers

Service Patrol

Local Detour Routes

Incident Response Plan

Law Enforcement

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Public Information (PI) Component

Communication Strategies About the Expected Work Zone Impacts to Inform:

- Road Users
- General Public
- Residences
- Businesses
- Public Entities

May be included in the Districts Community Awareness Plan (CAP)

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Public Information (PI) Key Steps

- Determine the appropriate size and nature of the public information and outreach campaign.
- Identify Resources
- Identify Partners
- Identify Target Audiences
- Develop the message(s)
- Determine communication strategies
- Determine communication timing

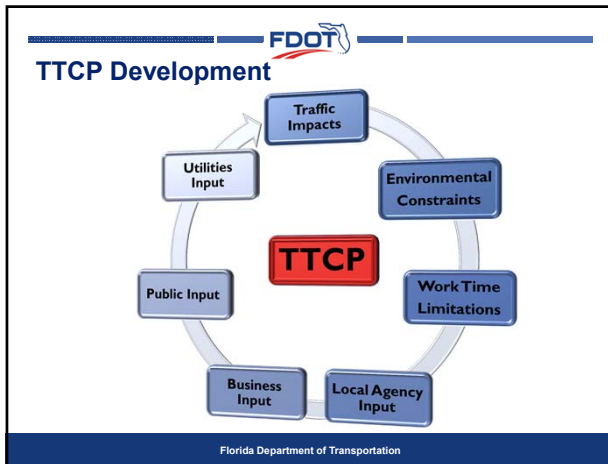
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Temporary Traffic Control Plan (TTCP) Component

Reference to Specific
Standard Plans Index
Drawing(s)

Designed Specifically
for the Project

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TTCP Development

■ **PHASE I**

- rough concept should be outlined, including typical sections for each phase

■ **PHASE II**

- many details should be provided including most major components

■ **PHASE III**


- traffic control plans should be complete with pay items prepared to complete

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TTCP Development

- I. Understand project
- II. Develop project specific objectives
- III. Brainstorm TTCP alternatives

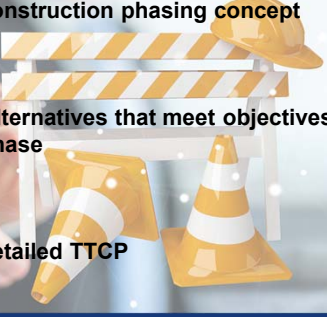


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TTCP Development

- IV. Develop construction phasing concept
- V. Examine alternatives that meet objectives for each phase
- VI. Develop detailed TTCP



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TTCP Sheet Details

- Project Complexity
- Use of appropriate Indexes
- Modifications to Indexes
- Project specific details
- Signing schemes


Standard Plan Index	Revision (None)	Index Title	Design Number	Standard Plan Index	Change Index	Control
Support Detail						
SP-001		Standard Plans for Road Construction - Complete eBook				
SP-002		SP-2018-01 Control Shield				
SP-003		Table of Contents - Road Construction				
SP-004		Consistency of Change Standards Index to Standard Plans				
SP-005		Revision History Log				
Miscellaneous						
SP-006		Miscellaneous (Earthwork) Details	400			
SP-007		Superintendence - High Speed Roadways	410			
SP-008		Superintendence - Low Speed Roadways	411			
SP-009		Earthwork and Compaction	412			
SP-010		Earthwork - Roadway Projects	413			
SP-011		Earthwork - Other Projects	414			
General Construction Operations						
Performance of Traffic						
SP-012		Temporary Barrier	415			
SP-013		Table M. Temporary Concrete Barrier System	416			
SP-014		Low Profile Barrier	417			
SP-015		General Information for Traffic Control Through Work Zones	418			
SP-016		Two-Lane, Two-Way Work Outside Shoulder	419			
SP-017		Two-Lane, Two-Way Work on Shoulder	420			
SP-018		Two-Lane, Two-Way Work Within the Travel Way	421			
SP-019		Two-Lane, Two-Way Work at Intersection	422			
SP-020		Two-Lane, Two-Way Work Near Intersection	423			

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TTCP Sheet Details

- Typical Sections
- Locations of advance warning signs and lighting units
- Temporary Pavement Markings
- Locations of temporary barriers and crash cushions

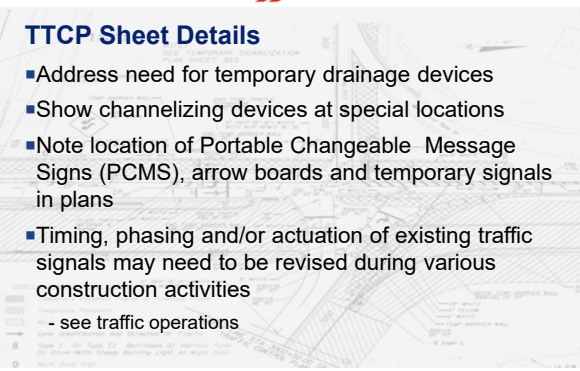


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TTCP Sheet Details

- Address need for temporary drainage devices
- Show channelizing devices at special locations
- Note location of Portable Changeable Message Signs (PCMS), arrow boards and temporary signals in plans
- Timing, phasing and/or actuation of existing traffic signals may need to be revised during various construction activities
 - see traffic operations

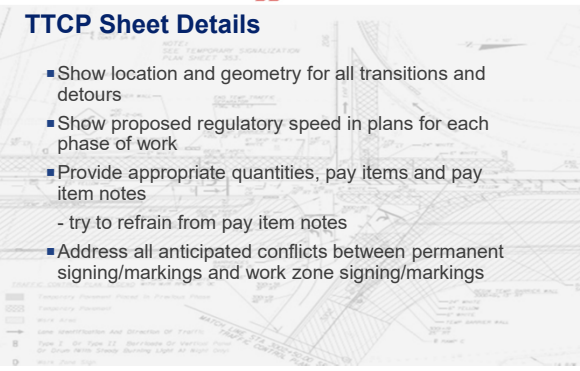


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TTCP Sheet Details

- Show location and geometry for all transitions and detours
- Show proposed regulatory speed in plans for each phase of work
- Provide appropriate quantities, pay items and pay item notes
 - try to refrain from pay item notes
- Address all anticipated conflicts between permanent signing/markings and work zone signing/markings





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TTCP Sheet Details

- Address key strategies such as use of Traffic Control Officers, Service Patrol, highway advisory radio, 511 and Speed and Law Enforcement Officers
- Include plan notes to clearly define work
- Show extent to which contractor will be required to maintain existing highway lighting


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End of Session 7




Florida Department of Transportation




Session 8

Traffic Control Pay Items




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MOT Pay Items

No.	Description
I02- I	Maintenance of Traffic (MOT), LS/DA
I02- 2- AA	Special Detour, LS/LS
I02- 3	Commercial Materials for Driveway Maintenance, CY
I02- 14	Traffic Control Officer, HR
999-I02- A	Speed and Law Enforcement Officer, by contract with FDOT
I02- 60	Work Zone Signs, ED
I02- 61	Business Signs, EA
I02- 71- AB	Barrier Wall (Temporary), LF


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MOT Pay Items

No.	Description
I02- 73	Guardrail (Temporary), LF
I02- 74- A1	Channelizing Device (Type I, II, VP, DI, Drum or LCD), ED
I02- 74- A2	Channelizing Device (Type III), ED
I02- 74- A7	Channelizing Device (Pedestrian LCD), LF
I02- 76	Advance Warning Arrow boards, ED
I02- 78	Temporary Retroreflective Pavement Marker, EA
I02- 81- 2	Temporary Crash Cushion-Gating, LO
I02- 89- A7	Temporary Crash Cushion (Redirective), LO


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MOT Pay Items

No.	Description
I02- 94- AB	Glare Screen, LF
I02- 98- A	Barricade Type III (to remain), EA
I02- 99	Portable Changeable Message Sign, ED
I02-I04- A	Temporary Signalization and Maintenance of Intersection, ED
I02-I07	Temporary Traffic Detection, Intersection, ED
I02-I50- 1	Portable Regulatory Sign, ED
I02-I50- 2	Radar Speed Display Unit, ED

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MOT Pay Items

No.	Description
102-911-A	Removable Pavement Markings (white/black), LF; SF
102-912-A	Removable Pavement Markings (yellow), LF; SF
710- 1A-BCD	Painted Pavement Markings, MIXED

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End of Session 8



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The Fun Begins



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Session 9

FLAGGER OPERATIONS

(Flagger Training)



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Objectives

- 1

Perform as Flagger
- 2


Implement Emergency Procedures
- 3

Plan Flagging Operations
- 4

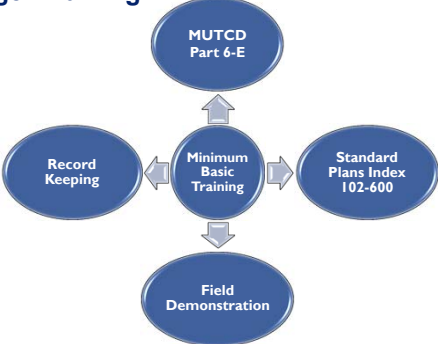
Select potential Flaggers
- 5

Train Flaggers

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Flagger Training



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FDOT

Flagger Responsibilities

Public Safety

Communication

Traffic Control

Maneuver

Guidance

Recognize/
Warn

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FDOT

Flagger Priorities

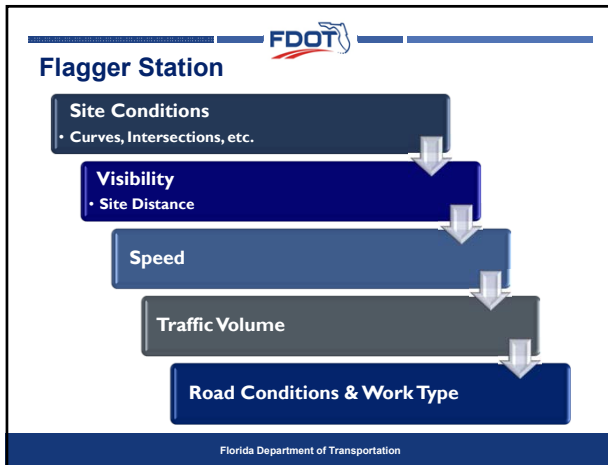
7/27/2015 Florida Department of Transportation

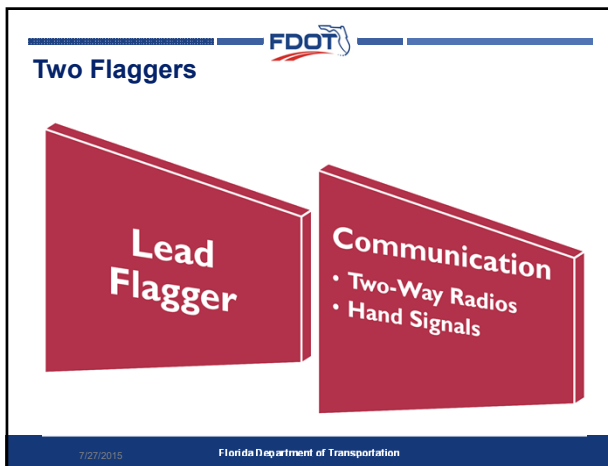
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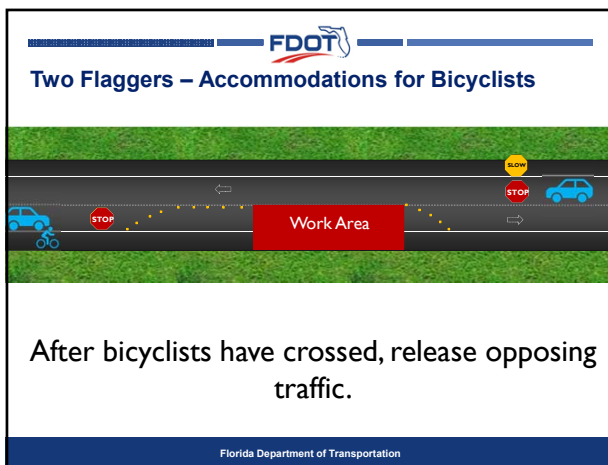
Emergency Procedures

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[illegible]







Flagger Clothing


- ANSI/ISEA 107-2004/107-2010 High-Visibility Safety Apparel:
 - Standard Class 2 for Day
 - Standard Class 3 for Night
- Required within Right-of Way
- Hard hat (recommended)






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Flagger Equipment



**24" Stop
Slow Paddle**




**Night
Well-Lit**




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Stop/Slow Paddle




Stop



Proceed



Slow Down



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Right Equipment for Right Time

- The Stop/Slow paddle is the primary traffic control device.
- Flag use is limited to immediate emergencies, intersections, and when working on the centerline or shared left turn lanes where two (2) flaggers are required and there is opposing traffic in the adjacent lanes.
- Flashlight, lantern or other lighted signal that will display a red warning light shall be used at night.

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Using Flags

STOP

**SLOW
DOWN**

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Flagging Administration

Administration file includes:

- Qualification of instructor
- Copy of course material
- Keep record of:
 - Date of training
 - Individuals trained


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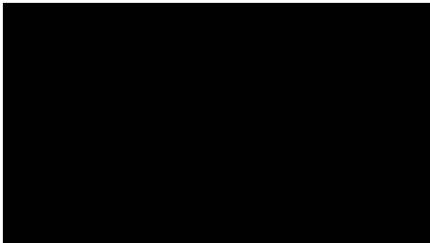


Flagging Video

Let's look at some typical flagging operations.

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End of Session 9



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FDOT

Session 10

Construction Project Administration



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FDOT

Selection of Traffic Control Plan (TCP)

Contractor provides letter stating if they plan to use an alternate TCP or TCP in contract

Alternate TCP	TCP in Contract
Signed & Sealed	11" x 17" Plans

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FDOT

Worksite Traffic Supervisor (WTS) Duties

On site during all set up and take down

↓

Performs drive thru inspections immediately after set up

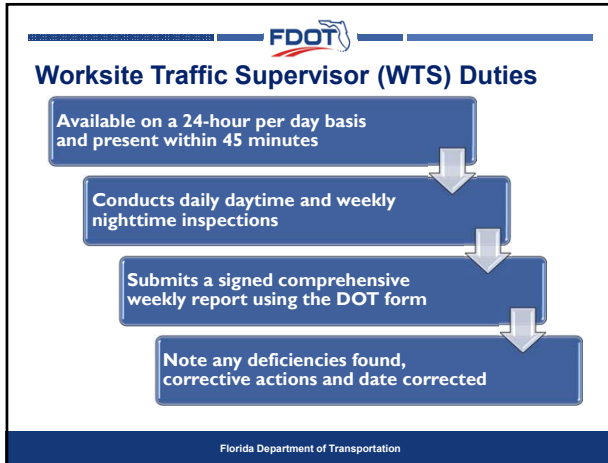
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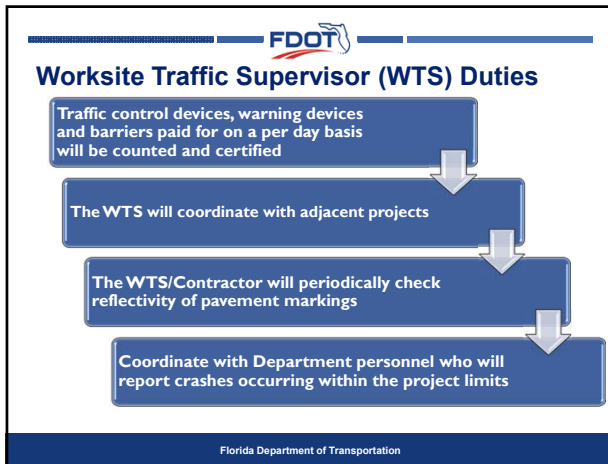
On site during all nighttime operations

↓

Immediately corrects all safety deficiencies

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End of Session 10




Florida Department of Transportation




Session 11

Questions, Review and Qualification Exam



Florida Department of Transportation



Referenced Webpage Links

Description	Web page link
MUTCD	http://www MUTCD fdot.gov
Florida Department of Transportation	http://www fdot.gov
Standard Plans	http://www fdot.gov/design/standard/Plans/SPs.shtml
MOT Training Course Providers	http://www.motestm.com/first-4-training-provider.aspx
FDOT Design Manual	http://www fdot.gov/highway/DM14/
Specification Book	http://www.fdot.gov/transportation/specs/Specs.shtml
APL (Approved Products List)	http://www fdot.gov/transportation/ApprovedProducts/Specifications
Survey Safety Handbook	http://www.fdot.gov/transportation/documentcenter/survey-safety-handbook.pdf
Maintenance of Traffic Training Procedure	http://www fdot.gov/transportation/Training/FormsAndProcedures/MOT-DocumentTopicName425-010-010
MOT Administration Website	http://www.motestm.com/home.aspx

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