PROCEDURE

SIGNS

SIGNALS

MARKINGS

SPECIAL OPERATIONAL TOPICS

Section 4.1

Crosswalks in Areas with Heavy Pedestrian Traffic

4.1.1 PURPOSE

This section provides guidelines on the application of pavement markings and signing in the vicinity of marked crosswalks.

Near destinations along the State Highway System that draw a lot of pedestrians, such as beaches or hotels, engineers may consider adding crosswalks at locations other than intersections to encourage a defined path for pedestrian crossings. Consider the vicinity of sidewalks, paths, guardrails, retaining walls, or shrubbery for marked crosswalks.

4.1.2 MARKINGS

Design crosswalks as two parallel 1-foot-wide white lines. Place these lines no less than 6 feet apart at intersections and no less than 10 feet at midblock locations. Locate the crosswalk where it provides the shortest crossing distance whenever practical. Use special emphasis markings to make the crosswalk more visible to pedestrians and motorists. See the ***Standard Plans, Indexes 522-002 and 711-001*** for more information.

4.1.3 SIGNING

Install a *PEDESTRIAN CROSSING* sign (***W11-2***) with a downward diagonal arrow plaque (***W16-7p***) immediately adjacent to each marked pedestrian crossing. This installation can be ground-mounted or mounted overhead on a mast arm or span wire.

Install a *PEDESTRIAN CROSSING* sign (***W11-2***) with an *AHEAD* plaque (***W16-9P***) before a marked crosswalk. Engineers may install these in advance of each crosswalk in areas with heavy pedestrian activity. Use engineering judgment to determine if advance crossing sign assemblies are needed. Consider the relative spacing of crosswalks, roadside development, and other factors. Consult the ***FDOT Design Manual (FDM) Exhibit 230-9*** for the suggested sign placement distance based on approach speeds.

Engineers may install an *END PEDESTRIAN CROSSING* sign to notify motorists that the pedestrian zone has ended. Use 8-inch letters on an 8 x 4 feet sign panel for overhead mounted signs. Use 4-inch letters on a 2 x 2.5 feet sign panel for ground-mounted signs. This will resemble the *END SCHOOL ZONE* sign (***FTP-32-06*** or ***FTP-34-06***) shown in the ***Standard Plans, Index 700-102***. Install the sign approximately 200 to 300 feet downstream of the last marked crosswalk.

Section 4.2

Pavement Word, Symbol, and Arrow Markings

4.2.1 PURPOSE

This section provides guidelines on the application of roadway pavement word, symbol, and arrow markings to supplement existing highway signing and provide additional emphasis for regulatory, warning, or guidance messages (***Figure 4.2-1*** and ***Figure 4.2-2***).

Figure 4.2-1. Pavement Word Markings

Review ***MUTCD Section 3B.20*** for the minimum requirements for roadway pavement word, symbol, and arrow markings. For additional requirements, consult the ***Manual on Speed Zoning for Highways, Roads, and Streets in Florida*** and ***Standard Plans, Indexes 711-001 and 711-002***.

Design route shields in accordance with ***Standard Plans, Index 711-001***.

Only use roadway pavement word, symbol, and arrow markings as a substitute for vertical signs when overhead signing is impractical or impossible to install, such as when it would impose on navigable airspace.

To recommend non-standard word or symbol pavement markings, complete the following:

1. Conduct an engineering study documenting how these markings would improve safety or operations efficiency and submit it to the ***District Traffic Operations Engineer (DTOE)*** for concurrence.
2. Once the DTOE has concurred, the ***District Traffic Operations Office*** will submit the study to the ***State Traffic Operations Engineer (STOE)*** for concurrence.
3. Once the STOE has concurred, the ***State Traffic Engineering and Operations Office*** will submit an FHWA Request to Experiment (RTE) for approval.
4. If the RTE is approved by FHWA, the ***District Traffic Operations Office*** recommending the design will be responsible for submitting the required interim and final reports to the ***State Traffic Engineering and Operations Office*** for review and submission to FHWA.

Figure 4.2-2. Pavement Symbol and Arrow Markings

4.2.2 LANE USE ARROW AND 'ONLY' PAVEMENT MARKINGS ON INTERSECTION APPROACHES

Use lane-use arrow symbols only in through lanes at intersections with overhead lane-use control signs or where unusual geometrics or through lane alignment may confuse drivers. In the latter case, use a straight arrow symbol in through lanes as additional driver guidance.

The roadway pavement word *ONLY* is not required for an exclusive turn lane if the arrow symbol is used under the following conditions:

- Lane is developed at a midblock location
- Lane is clearly delineated by appropriate channelization
- Lane requires lateral vehicle movement from an established lane for proper positioning to execute the turn

Use the roadway pavement word *ONLY* with the roadway pavement arrow symbol where unusual geometrics or exclusive turn lane alignment may confuse drivers.

Where an established through lane becomes an exclusive turn lane, use the roadway pavement word *ONLY* with the roadway pavement arrow symbol indicating the allowed turning movement.

When using the roadway pavement word *ONLY* with an arrow symbol, pair the pavement markings with the appropriate signs specified in ***MUTCD*** ***Section 2B-18***, ***Section 2B-19***, ***Section 2B-20***, and ***Section 3B-20***.

Review the ***Standard Plans, Index 711-001*** for design and placement details for roadway pavement arrows and the *ONLY* message.

4.2.3 ROUTE SHIELD PAVEMENT MARKINGS

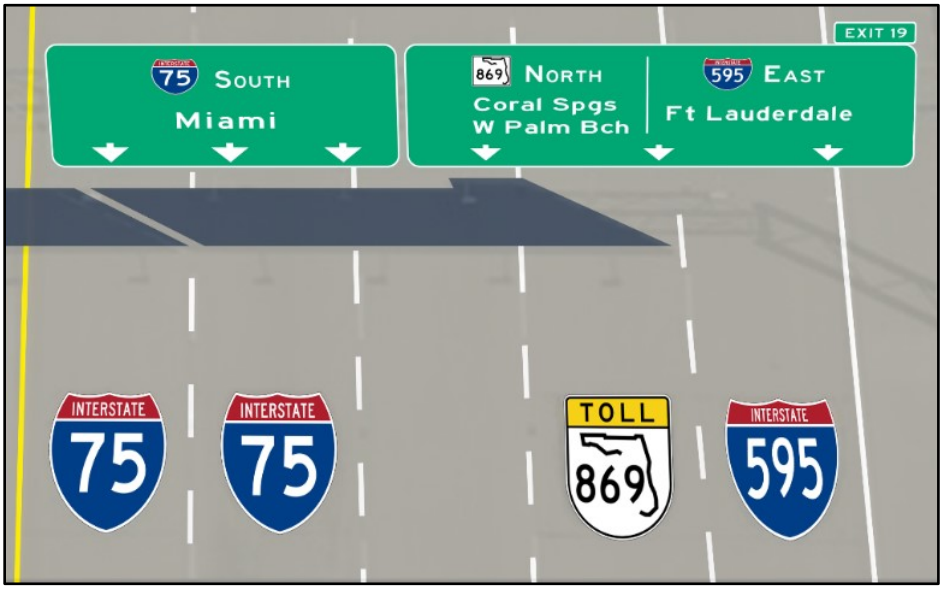
Route shield pavement markings are costly (***Figure 4.2-3***) and engineers need to coordinate with the ***District Maintenance Office*** before the DTOE approves their use. Consider public feedback about the intended location.

Route shield pavement markings are justified under any of the following conditions:

- Crashes have increased because traffic volumes have worsened the effects of complex lane assignments such as lane drops, double lane exits with optional lanes, gores where crash cushions are frequently hit, or unusual geometries.
- The optional or excess lane is underutilized and weaving maneuvers may cause unexpected congestion identified by volume/capacity analyses.

- Lane assignments are complex or alignment shifts are present.
- An overhead sign structure is not practical and the turn lane from an arterial to a limited access on-ramp may appear to provide access to other destinations.

Figure 4.2-3. Route Shield Pavement Markings



Consider the following when deciding where to install route shield pavement markings:

- Install route shield pavement markings where they will be most visible to drivers.
- Place the markings after at least one interchange overhead guide sign.
- Place the markings far enough upstream of the decision point to allow drivers to safely change lanes.
- Install the markings 1 mile in advance of the decision point, taking into consideration existing signs and other traffic control devices.
- Limit installations to two sets of markings (shield with arrow or message) before the gore or decision point.
- Avoid placing the markings under or immediately adjacent to overpasses, as they can cast shadows on the shields. Placing markings on downhill slopes may reduce their effectiveness.

Install route shield pavement markings as follows:

- Use pre-formed thermoplastic.
- Use 20-foot-long shields for limited access roadways and 15-foot-long shields for arterials and collectors.

- Align a route shield in the center of the lane.
- Install the route shields horizontally across the roadway; do not stagger them.
- If including arrows or messages to supplement the route shields (*TO*, *LEFT*, *RIGHT*, *NORTH*, *SOUTH*), place them after the route shield. See ***Figure 4.2-4***.
- Leave an 80-foot gap between markings except for cardinal directions, which may be 40 feet from a route shield marking.

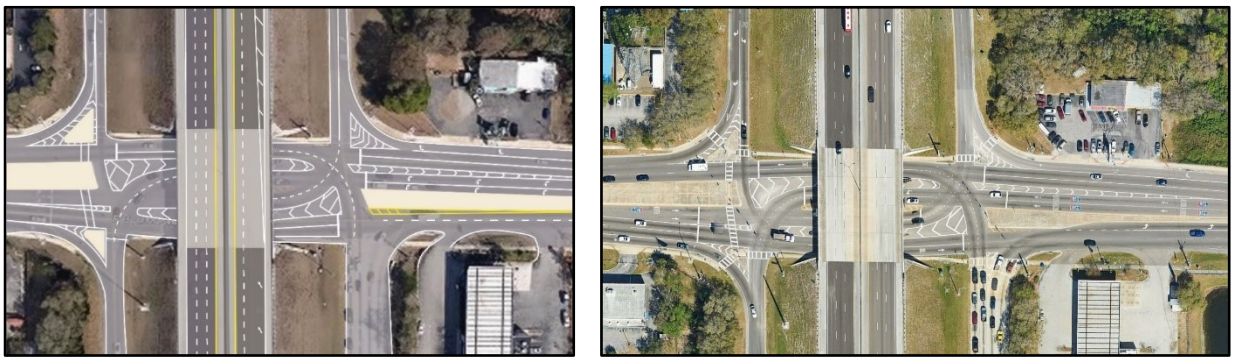
Figure 4.2-4. Cardinal Direction Markings

4.2.4 ROUTE SHIELDS FOR INTERCHANGE ACCESS

Route shield pavement markings can help prevent wrong-way driving as drivers navigate arterials connected to limited access facilities. A common example of their application is diamond interchanges or where turn lane(s) are developed at signals where the actual turning movement is to be made at a downstream signal. Engineers should apply these treatments in conjunction with appropriate geometric design (e.g., supplemental channelization, signing, lighting) to prevent potential wrong-way driving.

Figure 4.2-5 shows before and after plan views at the E Bearss Avenue and I-275 interchange. The image to the left shows the before conditions with dual westbound left-turn arrow markings east of the northbound off-ramp. The image to the right shows the after conditions with interstate shield, cardinal direction, and straight arrow pavement markings on the eastbound and westbound left-turn lanes. These pavement marking improvements inform drivers that the limited access on-ramp entrance is available at the downstream signal.

Figure 4.2-5. Before and After Plan View of E Bearss Avenue and I-275 Interchange



Include the interstate shield, cardinal direction, and straight arrow pavement markings that fall before a break in the arterial left-turn lane(s) serving a ramp at an interchange. An example is shown in ***Figure 4.2-6***.

Figure 4.2-6. Pavement Markings for Interchange Access

At new interchanges, install one set of markings, including the interstate shield, cardinal direction, and straight arrow per lane preceding the break in the turn lane that serves the on-ramp.

Section 4.3

Use of Blue Raised Pavement Markers to Identify Fire Hydrants

Section rescinded. Requirements can now be found in ***Standard Plans, Index 706-001***.

Section 4.4

Roundabout Markings

The Department's standards for this section are shown in ***MUTCD Chapter 3C*** and ***FDM 213***.

Section 4.5

Express Lanes Markings

4.5.1 PURPOSE

This section provides guidance on pavement markings for express or managed lanes. It supplements the standards defined in the ***FDM 211***, ***FDOT Managed Lanes Handbook***, and ***MUTCD***.

4.5.2 DEFINITIONS

Buffer Area or Buffer Space: The space between the managed lane(s) and the general purpose lanes. This space is delineated by a pattern of standard longitudinal pavement markings that are wider than usual or wide lane line markings.

Buffer Width: The lateral gap between the managed lane(s) and the general purpose lanes as measured from the centerline of an 8-inch longitudinal pavement marking.

Slip Ramp: An exclusive lane that connects managed lane(s) and general purpose lanes by using breaks in the separation type.

Toll Gantry: Truss structure supporting toll equipment over the roadway.

Tolling Area: Section of roadway underneath the toll gantry.

Weave Lane: A lane accommodating weaving movements and speed changes as vehicles merge between managed lane(s) and general purpose lanes.

Weave Zone: Provides simultaneous ingress and egress access between managed lane(s) and general purpose lanes using a break in the separation type.

4.5.3 '*EXPRESS*' AND '*ONLY*' WORD PAVEMENT MARKINGS IN EXPRESS LANES

Install the *EXPRESS* and *ONLY* roadway pavement words before express lane access points and co-locate them with overhead advance guide signs under the following conditions:

- When a general purpose lane transitions directly into an express lane(s).
- When a general purpose lane directly connects from a surface street (see ***MUTCD Figure 2G-26***).

Install the *EXPRESS* roadway pavement word at the immediate point of entry under the following conditions:

- When the slip ramp transitions directly into an express lane(s).
- When the slip ramp from a general purpose lane merges directly into an express lane(s).

Do NOT install the *ONLY* roadway pavement word under the following conditions:

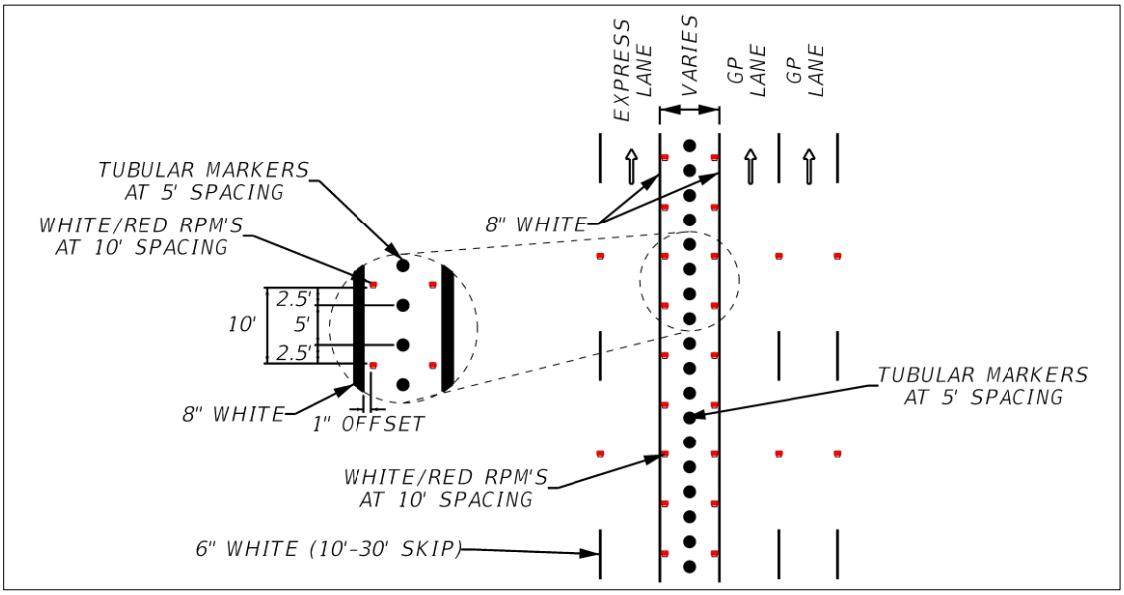
- When the express lane is accessed by a weave zone.
- When the express lane is accessed by a weave lane.
- At any point beyond the entry gore where there is no legal option to exit or enter an express lane(s).

4.5.4 CHEVRONS AND MARKERS IN THE BUFFER AREA

Follow the buffer width requirements in ***FDM 211*** for chevrons and pavement markers in the buffer area. Install chevron crosshatch markings in buffer areas with tubular markers (***Figure 4.5-1***) as follows:

- Do not use chevrons in buffers narrower than 2 feet.
- Place chevrons as follows in buffers 2 to 12 feet wide:
  - **Slip Ramps:** Add 18-inch white chevrons spaced 100 feet apart within the slip ramp transition.
  - **Weave Lanes:** Add 18-inch white chevrons spaced 100 feet apart within the weave lane transition.
  - **Weave Zones:** Add 18-inch white chevrons spaced 100 feet apart for 1,000 feet on both sides of the weave area.
- For buffer widths greater than 12 feet, add 18-inch white chevrons spaced 100 feet apart.

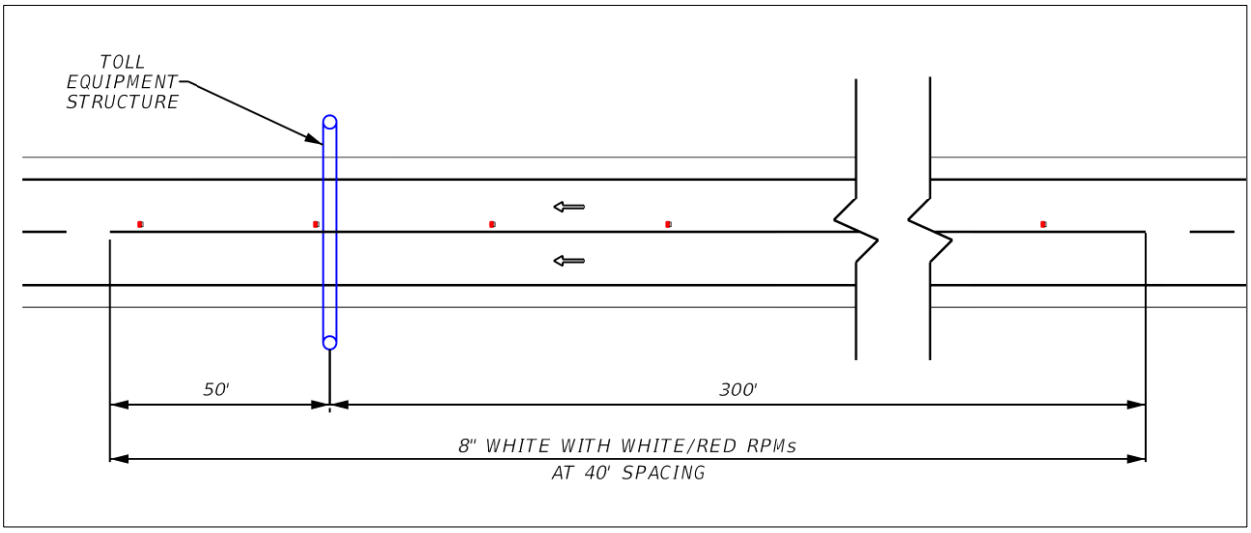
Figure 4.5-1. Buffer Area Detail



4.5.5 SPECIAL PAVEMENT MARKINGS WITHIN THE TOLLING AREA

Where there is more than one express lane, separate the lanes with a solid 8-inch white stripe 300 feet ahead of the toll gantry and 50 feet past it, as shown in ***Figure 4.5-2***.

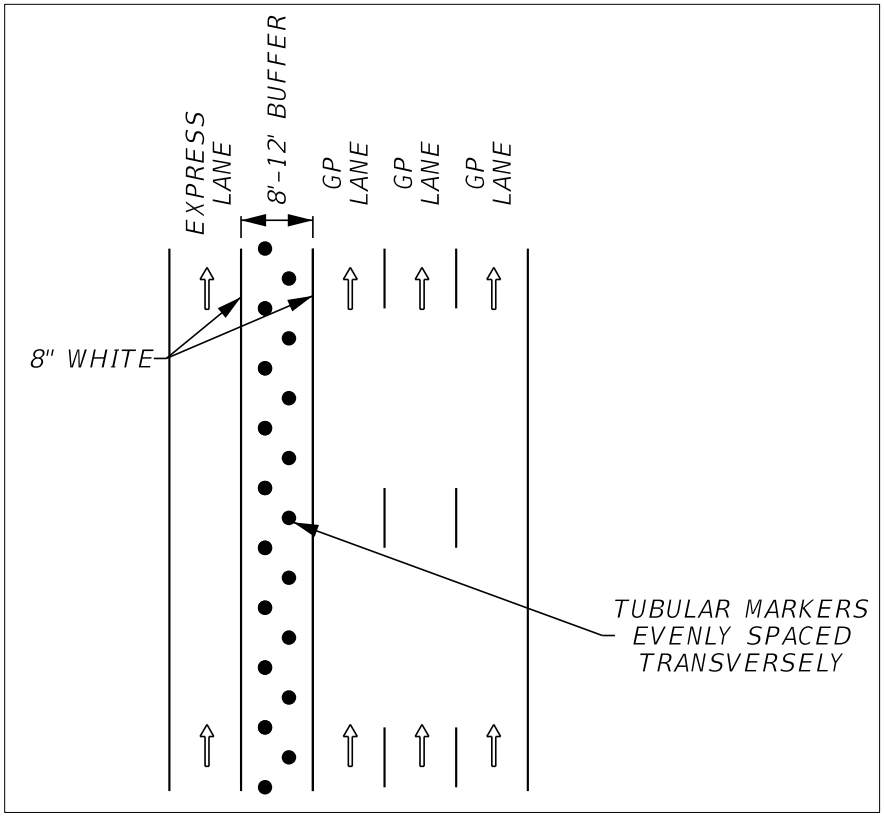
Figure 4.5-2. Striping Under the Toll Gantry



Place tubular markers within the tolling area according to the ***FDM 211*** buffer width requirements:

- **Less than 8 feet:** Place one tubular marker, as shown in ***Figure 4.5-1***.
- **Between 8 and 12 feet:** Evenly space two tubular markers transversely, as shown in ***Figure 4.5-3***.
- **12 feet and greater:** Evenly space three tubular markers transversely.
- Do not install tubular markers or raised pavement markers on top of the loop or lead-in saw cut or sealant.

Figure 4.5-3. Tubular Marker Placement within the Tolling Area for Buffer Widths between 8 and 12 feet



Section 4.6

Use of Internally Illuminated Raised Pavement Markers

4.6.1 PURPOSE

This section provides guidance for the uniform application of internally-illuminated raised pavement markers (IIRPMs) on the State Highway System.

4.6.2 DEFINITIONS

Raised Pavement Marker (RPM): A roadway safety treatment used to enhance nighttime and wet weather visibility of roadway striping. RPMs are typically made of plastic, ceramic, or thermoplastic paint.

Retroreflective Raised Pavement Marker (RRPM): An RPM that retroreflects automotive headlights.

Internally-Illuminated Raised Pavement Marker (IIRPM): A steady-burn internally-illuminated RPM. IIRPMs are permitted for use by ***MUTCD Chapter 3B*** as an equivalent alternative to RRPMs. The IIRPMs mentioned in this section are also known as Class F RPMs in ***Standard Specifications, Section 706***.

4.6.3 APPLICATION

RRPMs are the Department's standard type of raised pavement marker. The use of IIRPMs should be limited to mitigation strategies for curves with any of the following:

- Substandard horizontal alignment or superelevation.
- Substandard lane widths.
- Substandard shoulder widths.

4.6.4 PROCEDURE

Space IIRPMs that supplement or substitute for longitudinal line markings as described in ***MUTCD Sections 3B.12 through 3B.14***. IIRPM installation on roadways within the State Highway System requires a signed and sealed traffic engineering and safety study. Submit the study to the District Traffic Operations Office for approval. ***DTOEs*** will coordinate with the District Maintenance Engineer regarding the location of these installations.