230 Signing and Pavement Marking

230.1 General

Traffic control devices are necessary to help ensure highway safety. Traffic control devices provide for an orderly and predictable movement of motorized and non-motorized traffic throughout the highway transportation system. They also provide guidance and warnings to ensure the safe and informed operation of individual elements of the traffic stream. The design and layout of signs and pavement markings should complement the basic highway design.

FHWA's ***Manual on Uniform Traffic Control Devices (MUTCD)*** contains detailed information of all standard highway signs and pavement marking messages. Each sign is identified by a unique designation. Signs and pavement markings not included in the ***MUTCD*** or in the ***Standard Plans*** are to be detailed in the plans. Sign and pavement marking design must comply with the ***Standard Specifications***, ***Standard Plans***, ***Traffic Engineering Manual (TEM)***, ***Manual on Uniform Traffic Studies (MUTS)***, and the ***MUTCD.***

Examples of typical signing and pavement marking configurations are included in ***FDM 230.6***.

230.1.1 Structural Supports

AASHTO's ***LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*** and ***FDOT Modifications to LRFDLTS-1*** provide structural design criteria.

Refer to ***FDM 261*** for information regarding structural support requirements. Refer to ***FDM 940*** for information regarding plan requirements.

230.1.2 School Zones

The Department's ***Manual on Speed Zoning for Highways, Roads and Streets in Florida*** (a.k.a., ***Speed Zoning Manual***)***, Chapter 15,*** provides school zone signing and pavement marking requirements.

Public or private elementary, middle schools (Junior High), and federally funded facilities providing a full-time educational program are to comply with the pavement markings,

signs, and other traffic control devices referenced in the ***Speed Zoning Manual***. The use of these devices at high schools must be justified by an engineering study.

Standard Plans, ***Index 700-120*** provides details relating to enhanced highway signing assemblies.

230.1.3 Vertical Clearance

See ***FDM 210.10.3*** for vertical clearance requirements for sign structures.

230.2 Signing

230.2.1 Sign Placement

Refer to the ***MUTCD***, ***Standard Plans***, and ***FDM 215*** for acceptable sign locations. Provide a four-foot clear width, not including the width of curb, when a sign is located within a sidewalk.

230.2.1.1 Advance Guide Signs for Limited Access Facilities

Use physical gore as the point of reference to measure distance for advance guide sign messages when the physical gore and theoretical gore are separated by no more than 500 feet.

230.2.2 Overhead Signs on Limited Access Facilities

MUTCD Section 2A lists thirteen optional conditions where overhead signs have value on limited access facilities. Signs are to be ground mounted except at locations required by the ***MUTCD*** or noted below:

Use overhead exit direction signs when any of the following conditions exists:

(1) Interchange Spacing ≤ 3 Miles

(2) Left Exit

(3) Three or More Through Lanes

Use overhead advance guide signs when any of the following conditions exists:

(1) Interchange Spacing ≤ 3 Miles

(2) Left Exit

(3) Limited access facility to limited access facility Interchange (1/2 mile and 2 mile, 1 mile required by the ***MUTCD***)

This criteria is not intended to restrict the use of overhead signs where there is insufficient space for post mounted signs or where there is restricted sight distance.

Place overhead advance guide signs over the shoulder with the edge of the sign aligned with the edge of the traveled way unless otherwise shown in the ***MUTCD***. Place overhead exit signs over the ramp traffic lane(s). If a barrier is present to shield another hazard, place the upright behind the barrier with proper setback for barrier performance.

230.2.3 Local Street Names on Guide Signs

Standard practice is to use route numbers on guide signs to designate roadways. When the local name for a roadway is more familiar than the route number, the local street name may be used as supplemental information to route numbers. The decision to use a local name should be coordinated with the District Traffic Operations Engineer.

230.2.4 External Lighting of Overhead Signs

Provide external lighting of overhead signs only for the following conditions:

(1) Horizontal curves with radii of 880 feet or less on roadways and ramps, in or connected to context classifications C1, C2, & C2T.

(2) Horizontal curves with radii of 2,500 feet or less on roadways and ramps, in or connected to context classifications C3 through C6.

(3) In sag vertical curves with a K value of 60 or less for all locations.

Show sign lighting requirements on the Guide Sign Worksheet when sign lighting is required. Include sign lighting calculations in the Lighting Design Analysis Report.

To eliminate the use of lighting on existing overhead sign structures, confirm all panels on the structure utilize Type XI sheeting. All panels not utilizing Type XI sheeting must be overlaid with Type XI sheeting or replaced with new panels utilizing Type XI sheeting prior to elimination of the lighting.

See ***FDM 231.2*** for sign lighting criteria.

230.2.5 Signs on Barriers and Traffic Railings

For information regarding attachments to bridge traffic railings, concrete median barrier walls, or concrete shoulder barrier walls, refer to ***FDM 215.5***.

Utilize ***Standard Plans, Index 700-013*** when attaching the following permanent sign supports to a median traffic railing:

(1) No U-Turns (R3-4) w/ Official Use Only

(2) Left Lane Ends (W9-1)

(3) Merge Symbol (W4-2)

(4) Warning, Regulatory, or Advisory Speed signs used as a countermeasure or mitigation for safety conditions

(5) Shoulder Use Signs

No other permanent signs are to be attached to median traffic railings. ***Standard Plans, Index 700-013*** may be used for temporary or work zone signs when ***Standard Plans, Index 102-600*** cannot accommodate post mounted signs within existing conditions.

230.2.6 Signing for Temporary Bridges with Steel Decks

Place “Slippery When Wet” signs (W8-5) in advance of temporary bridges with steel decks. Refer to ***TEM***, ***Section 2.1***

230.2.7 Object Markers and Delineators

An object marker is used to mark obstructions within or adjacent to the roadway. The ***MUTCD*** describes four object markers and how they are to be used. A Type 1 (style OM1-3 only) or Type 3 (all styles) object marker is used to mark obstructions within the roadway. A Type 2 (style OM2-2V only) or Type 3 (all styles) object marker is used to mark obstructions adjacent to the roadway. A Type 4 (style OM4-3 only) object marker (end-of-roadway marker) is used to alert users of the end of the road.

A delineator is a guidance device rather than a warning device. The ***MUTCD*** and ***Standard Plans, Index 711-003*** illustrate the use of delineators along the edge of limited access traffic lanes and interchange ramps. A delineator may be a flexible or a non-flexible type. District maintenance offices generally have a preference on which should be specified.

Modification for Non-Conventional Projects:
Delete the last sentence of the above paragraph and see RFP for requirements.

230.2.8 Tubular Markers

Tubular markers are the Department's standard device for the purpose of channelization. The color of tubular markers must be the same color as the pavement marking that they emphasize. They are typically used for channelization at the following locations unless signing (e.g., R4-7 or R4-8) is otherwise required:

(1) Multilane intersections where additional visibility is required for the marking of an island,

(2) Marking median openings,

(3) Nose of traffic separators,

(4) Where the island is obstructed due to crest vertical curves,

(5) Intersections where the alignment thru the intersection is not straight,

(6) Hardened center lines,

(7) To preclude lane changing where it is not practicable to provide a barrier (e.g. managed lanes, separated bicycle lanes, acceleration lanes), and

(8) To restrict vehicle movements and control turning speeds.

230.2.9 Enhanced Highway Signing Assemblies

Flashing beacons, highlighted signs, and electronic speed feedback signs may be used to increase the conspicuity of warning and regulatory signs.

For school signing requirements, see ***Chapter 15*** of the ***Speed Zoning Manual***.

Typical applications with these enhancements are shown in ***Standard Plans, Index 700-120***.

230.2.10 Internally Illuminated Street Name Signs

Do not exceed nine feet in width for an internally illuminated street name sign. For span wire systems, the sign is to be mounted to the strain poles. On mast arm supports, the

sign may be mounted to the support or to the arm. When mounted to the arm, the distance between the upright and the near side edge of the sign is not to exceed ten feet.

Design the street name sign in accordance with the ***TEM, Section 2.2***. Utilize the following text attributes in order of preference:

(1) 10-inch upper case with 8-inch lower case, Type EM font

(2) 10-inch upper case with 8-inch lower case, Type E font

(3) 8-inch upper case with 6-inch lower case, Type EM font

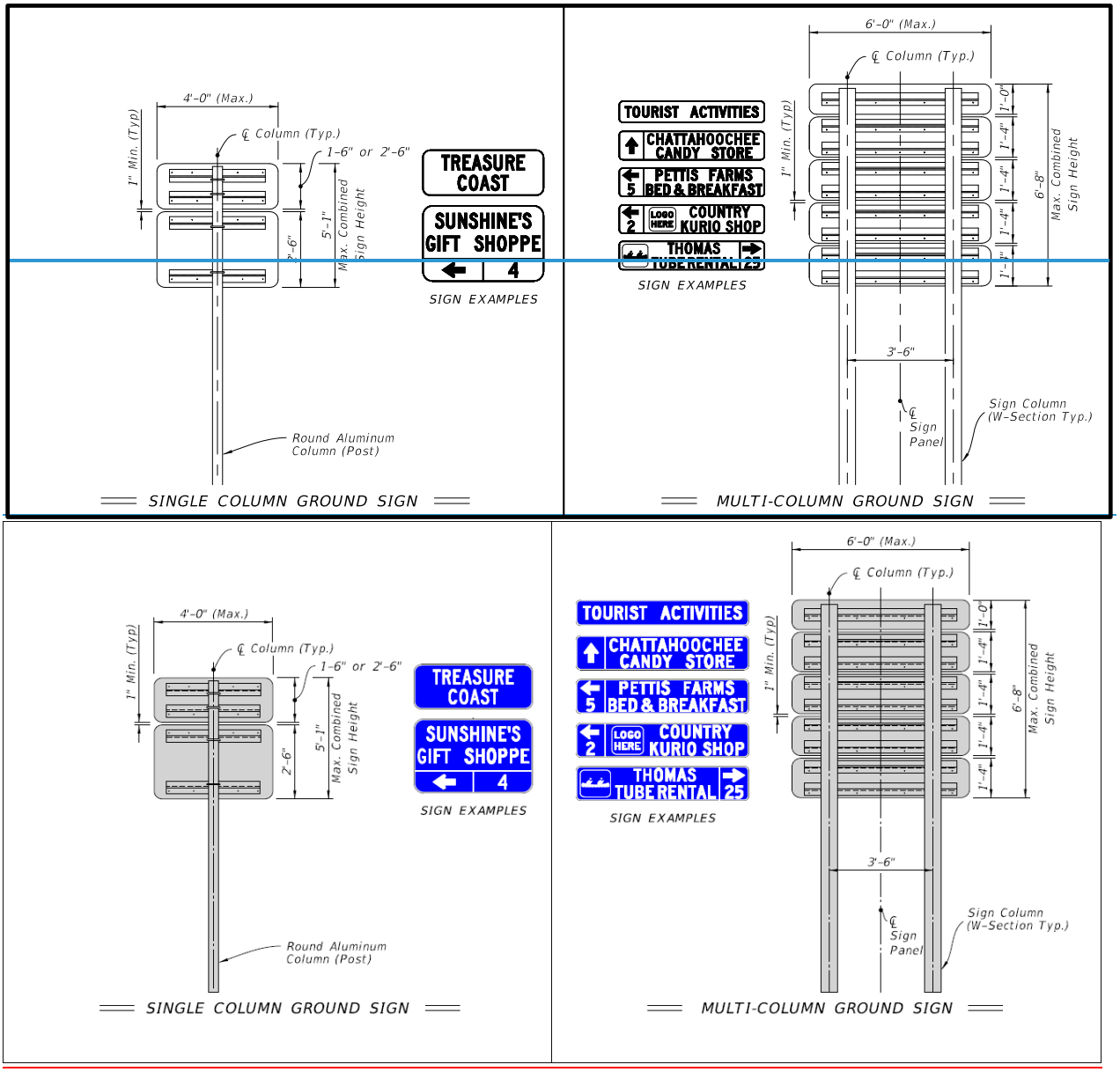
(4) 8-inch upper case with 6-inch lower case, Type E font

230.2.11 Tourist-Oriented Directional Signs

Tourist-Oriented Directional Signs are guide sign assemblies with individual panels displaying the identity and directional information for a business, service, or activity facilities. These panels are unique in size, content, and have specific criteria for that must comply with ***Rule 14-51, Florida Administrative Code*** and ***MUTCD Chapter 2K***.

Maximum sign panel dimensions for single and multi-column ground-mounted signs are shown in ***Figure 230.2.1***. Place Tourist-Oriented Directional Signs in accordance with ***Standard Plans, Index 700-101***.

Figure 230.2.1 Tourist-Oriented Directional Sign Panel Dimensions



230.2.12 Florida National Scenic Trail Signs

Provide signage and pavement markings as shown in ***Exhibit 230-b*** at all locations where the Florida National Scenic Trail crosses along the SHS.

Use RS-034 signs to guide the public to designated trailhead parking when available and adjacent to the crossing.

230.3 Pavement Markings

The ***MUTCD*** was adopted by the Department as the uniform system of traffic control for use on the streets and highways of the State. This action was in compliance with ***Chapter 316.0745*** of the ***Florida Statutes***. The ***MUTCD*** is the national standard, and its requirements must be met, as a minimum, on all roads in the State. Where Department manuals indicate criteria which is more stringent than the ***MUTCD***, Department criteria is to be followed. See ***FDM 220*** for signing and pavement marking requirements for at-grade railroad crossings.

230.3.1 Selection of Pavement Marking Material

For new pavement markings, use ***Table 230.3.1*** as a guide to assist in selecting the appropriate pavement marking material. For any given pavement marking application, the table indicates allowable materials for three different substrates as follows: asphalt pavement (A), concrete pavement (C), and concrete bridge deck (B). The table also indicates when black contrast is required on new pavement surfaces. For existing asphalt surfaces, contact the District Maintenance Engineer to determine if black contrast is required.

Once the pavement marking material is selected from ***Table 230.3.1***, verify the project meets the criteria discussed in ***FDM 230.3.1.1*** through ***230.3.1.5***.

For maintaining existing pavement markings, consider the existing pavement condition and coordinate with the District Maintenance Engineer. Possible options for consideration include:

- Refurbishment Thermoplastic
- Hot Spray Thermoplastic
- Durable Paint

Remove existing pavement markings and apply new pavement marking in accordance with ***Table 230.3.1.***

Table 230.3.1 Pavement Marking Material Selection

Pavement Marking Category	Pavement Marking Application	Color	Material Options					Black Contrast**
			Hot-Applied Standard Thermoplastic	Permanent Tape	Preformed Thermoplastic	Two Reactive Components*	Durable Paint	
Longitudinal Solid Lines	**Solid Lines**	White	A C	c B		a c		a C B***
		Yellow	A C	c B		a c		
Longitudinal Skip and Dotted Lines	**Skip Lines (10-30 Skip)**	White	A	C B		a		a C B
		Yellow	A	C B		a		
	Dotted Extension Lines (6-10)	White	A	C B		a		a C B
		Yellow	A	C B		a		
	Dotted Lines (3-9)	White	A	C B		a		a C B
		Yellow	A	C B		a		
	Dotted Guidelines (2-4)	White	A		C B	a		a C B
		Yellow	A		C B	a		
Markings Other Than Longitudinal Lines	**Diagonal Cross Hatch**	White	A C B		a c b			
		Yellow	A C B		a c b			
	Chevrons	White	A C B		a c b			
	Stop Lines		A		a C B			a C B
	Yield Lines (Shark's Teeth)		A		a C B			a C B
	Standard and Special Emphasis Crosswalk Transverse Lines-12"		A		a C B			a C B
	Special Emphasis Crosswalk Longitudinal Bars- 24"				A C B			a C B
	Railroad Dynamic Envelope				A C B			a C B
	Messages and Symbols		A		a C B			a C B
	Lane Use Arrows		A		a C B			a C B
	Ramp Exit Numbers				A C B			A C B
	Bicycle Markings (arrows, symbols, messages)				A C B			a C B
	Shared Use Path Markings (arrows, symbols, messages)				A C B			a C B
	Wrong Way Arrows		A		a C B			a C B
	Route Shields	Multi-color			A C B			a C B
Curb Delineation	**Island Nose**	Yellow					A C B	
Legend:	**Options:** **Preferred (in caps): A = Asphalt Pavement C = Concrete Pavement B = Concrete Bridge Deck** **Allowed (lowercase): a = Asphalt Pavement c = Concrete Pavement b = Concrete Bridge Deck**							

* Two Reactive Components require approval by District Maintenance Engineer and District Construction Engineer.
** For existing asphalt surfaces, contact the District Maintenance Engineer to determine if contrast is required.
*** Use black contrast for longitudinal solid white lane lines. Do not use contrast on solid edge lines.

230.3.1.1 Longitudinal Solid Lines

The following applies to Longitudinal Solid Line material selection:

- For Asphalt Surfaces:
  - Hot-Applied Standard Thermoplastic is the preferred option.
  - Two Reactive Components may be used if approved by the District Maintenance Engineer and District Construction Engineer.
  - For existing asphalt surfaces, contact the District Maintenance Engineer to determine if black contrast is required.
- For Concrete Surfaces:
  - Hot-Applied Standard Thermoplastic is the preferred option.
  - Permanent Tape may be used with the understanding that the cost is significantly higher.
  - Two Reactive Components may be used if approved by the District Maintenance Engineer and District Construction Engineer.
  - Use black contrast consistent with ***Standard Plans Index 711-001*** for longitudinal solid white lane lines. Do not use contrast on solid edge lines.
- For Concrete Bridge Deck Surfaces:
  - Use Permanent Tape.
  - Use black contrast consistent with ***Standard Plans Index 711-001*** for longitudinal solid white lane lines. Do not use contrast on solid edge lines.

230.3.1.2 Longitudinal Skip and Dotted Lines

The following applies to Longitudinal Skip Line (10-30), Dotted Extension Line (6-10), and Dotted Line (3-9) material selection:

- For Asphalt Surfaces:
  - Hot-Applied Standard Thermoplastic is the preferred option.
  - Two Reactive Components may be used if approved by the District Maintenance Engineer and District Construction Engineer.
  - For existing asphalt surfaces, contact the District Maintenance Engineer to determine if black contrast is required.
- For Concrete and Concrete Bridge Deck Surfaces:
  - Use Permanent Tape

- Use black contrast consistent with ***Standard Plans Index 711-001*** for longitudinal skip and dotted lines.

The following applies to Dotted Guide Line (2-4) material selection:

- For Asphalt Surfaces:
  - Use Hot-Applied Standard Thermoplastic if black contrast is not required.
  - Use Preformed Thermoplastic if black contrast is required. Use black contrast consistent with ***Standard Plans Index 711-001*** for longitudinal dotted lines.
  - Two Reactive Components may be used if approved by the District Maintenance Engineer and District Construction Engineer.
- For Concrete and Concrete Bridge Deck Surfaces:
  - Use Preformed Thermoplastic with black contrast consistent with ***Standard Plans Index 711-001*** for longitudinal dotted lines.

230.3.1.3 Markings Other Than Longitudinal Lines

The following applies to Diagonal Cross Hatch and Chevron material selection:

- For Asphalt, Concrete, and Concrete Bridge Deck Surfaces:
  - Hot-Applied Standard Thermoplastic is the preferred option.
  - Preformed Thermoplastic may be used with the understanding that the cost is significantly higher.

The following applies to Stop Line, Yield Line, 12-inch Transverse Line at standard and special emphasis crosswalks, Message, Lane Use Arrow, and Wrong Way Arrow material selection:

- For Asphalt Surfaces:
  - Hot-Applied Standard Thermoplastic is the preferred option if black contrast is not required.
  - For existing asphalt surfaces, contact the District Maintenance Engineer to determine if black contrast is required. Use Preformed Thermoplastic with black contrast if black contrast is required.
- For Concrete and Concrete Bridge Deck Surfaces:
  - Use Preformed Thermoplastic with black contrast.

The following applies to 24-inch Longitudinal Bars at special emphasis crosswalks material selection:

- For Asphalt Surfaces
  - Preformed Thermoplastic is the preferred option.

  - For existing asphalt surfaces, contact the District Maintenance Engineer to determine if black contrast is required. Use Preformed Thermoplastic with black contrast if black contrast is required.

- For Concrete and Concrete Bridge Deck Surfaces:
  - Use Preformed Thermoplastic with black contrast.

The following applies to Railroad Dynamic Envelope, Bicycle Markings (includes arrows, symbols, and messages), Shared Use Path Markings (includes arrows, symbols, and messages), and Route shields material selection:

- For Asphalt Surfaces:
  - Use Preformed Thermoplastic.
  - For existing asphalt surfaces, contact the District Maintenance Engineer to determine if black contrast is required. Use Preformed Thermoplastic with black contrast if black contrast is required.
- For Concrete and Concrete Bridge Deck Surfaces
  - Use Preformed Thermoplastic with black contrast.

The following applies to Ramp Exit Number material selection:

- For Asphalt, Concrete, and Bridge Deck Surfaces
  - Use Preformed Thermoplastic with black contrast.

Provide the following black contrast for Markings Other Than Longitudinal Lines and include details in the plans:

- Special Emphasis Crosswalk 24-inch Longitudinal Bars: Provide 4-inch-wide black contrast border on both sides of longitudinal bars.
- Yield Lines (Shark's Teeth): Provide black contrast block with a minimum of 1.5 inches from the yield line perimeter to the edges of the block.
- Stop Lines: Provide 4-inch-wide black contrast border on both sides of stop line.
- Railroad Dynamic Envelope: Provide 4-inch-wide black contrast border on both sides of each 12-inch-wide line.
- Lane Use Arrows, Wrong Way Arrows, Messages, Symbols, and Bicycle Markings (includes arrows, symbols, and messages) with design speed of 45 MPH and less:

Provide 1.5-inch minimum black contrast border adjacent to the perimeter of the pavement marking.

- Lane Use Arrows, Wrong Way Arrows, Messages, Symbols, and Bicycle Markings (includes arrows, symbols, and messages) with design speed greater than 45 MPH: Provide black contrast block with a minimum of 1.5 inches from the pavement marking perimeter to the edges of the block.
- Intricate Symbols - For intricate symbols such as the Helmeted Bicyclist Symbol, use black contrast block for all design speeds.

230.3.1.4 Curb Delineation

Use Durable Paint for curb delineation at island noses.

230.3.2 Pavement Marking Maintenance

Two standard methods to extend the life of existing pavement markings are the application of Refurbishment Thermoplastic and Hot Spray Thermoplastic. These applications are often used when existing pavement markings no longer meet specification requirements, and the anticipated service life of the pavement is approximately 3 years or greater. Refurbishment Thermoplastic and Hot Spray Thermoplastic are discussed in the following sub-sections.

Use of Durable Paint is an option for asphalt pavement where the longer service life of Refurbishment Thermoplastic is not required. Durable Paint should not be used in areas opened to traffic due to the prolonged cure time of approximately 20 minutes. Prior to use, contact the District Maintenance Engineer to determine if the use of Durable Paint is recommended.

230.3.2.1 Refurbishment Thermoplastic

Refurbishment Thermoplastic is the placement of new hot-applied thermoplastic material on top of existing pavement markings at a minimum thickness of 0.06 inches (60 mils). On concrete riding surfaces (i.e., concrete pavement and bridge deck surfaces) with existing Permanent Tape pavement markings, remove and replace in accordance with ***Table 230.3.1***.

Consider the following when contemplating the use of refurbishment markings:

- Remaining service life of the pavement
- Thickness and conditions of existing markings
- Traffic volumes
- Cost of markings

- Other special requirements such as contrast needs or ground-in rumble strip installation

Coordinate with the District Maintenance Engineer to determine if Refurbishment Thermoplastic is appropriate. If Refurbishment Thermoplastic cannot be applied without exceeding the maximum thickness of 0.150 inches (150 mils), use Hot Spray Thermoplastic, or remove the existing markings before placing Hot-Applied Standard Thermoplastic markings. When contemplating the use of Refurbishment Thermoplastic, consider an anticipated service life of 3-5 years. Refer to ***Standard Specification 711*** for additional information on Standard and Refurbishment Thermoplastic.

230.3.2.2 Hot Spray Thermoplastic

Hot Spray Thermoplastic is the application of a minimum 0.04-inch (40 mil) application of Hot Spray Thermoplastic material on existing longitudinal pavement markings.

Use of Hot Spray Thermoplastic may be conducive in the following circumstances:

- Existing audible or vibratory pavement markings need to have retroreflectivity restored.
- Resurfacing is scheduled within 2-4 years.
- Refurbishment Thermoplastic would result in excessive pavement marking thickness and the removal and replacement with Standard Thermoplastic is cost prohibitive.
- Condition of the existing pavement has deteriorated such that removal and replacement is not an option as it would cause greater damage to the existing pavement.

230.3.3 No-Passing Zones

Follow the procedures contained in the ***MUTS*** for determining the limits of no-passing zones.

Limits of pavement markings for no-passing zones will be established by one of the following methods:

(1) On projects where existing roadway conditions (vertical and horizontal alignments) are to remain unaltered by construction, the no-passing zones study will be accomplished as part of the design phase. The limits of the no-passing zones will be shown on the plans.

(2) On projects with new or altered vertical and horizontal alignments, limits for no-passing zones will be established during construction. The required traffic study and field determination of limits will be performed by the designer during post

design. Sufficient time must be included to accomplish the required field operations without delaying or interfering with the construction process.

For two-lane, two-way roadways, conduct a no-passing zone study ~~should be conducted~~ if any of the following conditions apply subsequent to the last roadway resurfacing project:

(1) Newly constructed intersections

(2) ~~Multiple new~~ New residential or commercial driveway connections

(3) New sight distance obstructions due to vegetation, tree growth, or buildings

(4) History of wrong way/head-on crashes or observations/complaints of near misses

230.3.4 Work Zone Pavement Markings

Use Standard Paint for work zone markings on asphalt and concrete pavement. The performance of Standard Paint has been evaluated by the Department for a period of 6 months.

Consider using Durable Paint or Refurbishment Thermoplastic when a work zone phase is expected to last for more than a year under heavy traffic volumes. The performance of Durable Paint has been evaluated by the Department for a period of 18 months.

Use Removable Tape for transitions on the final structural course or dense-graded friction course. Removable Tape may be used for other markings to avoid the removal of paint and scaring of final surface. Do not use Removable Tape for application durations of more than 6 months. Do not use Removable Tape on open-graded friction course.

Use contrast consistent with ***Standard Plans Index 711-001*** for solid white lane lines. Do not use contrast on solid edge lines.

230.3.5 Raised Pavement Markers (RPMs)

Retroreflective RPMs, Class B, are the standard type of RPM.

Internally illuminated RPMs are similar to retroreflective RPMs but are internally illuminated with LEDs. Internally illuminated RPMs may be used in lieu of retroreflective RPMs to enhance delineation and driver awareness as a mitigation strategy for substandard conditions as defined in the ***TEM, Section 4.6***.

Place all RPMs in accordance with the ***Standard Plans, Index 706-001*** and the ***MUTCD***.

230.4 Wrong-Way Signs and Pavement Markings

Deploy the enhanced signing and pavement markings in this section to improve positive guidance, to minimize driver confusion, and to reduce wrong-way movements. The height of WRONG WAY (R5-1a) signs must be in accordance with ***Standard Plans, Index 700-101***. Include red retroreflective strips for enhanced conspicuity on DO NOT ENTER (R5-1) and static WRONG WAY (R5-1a) sign columns in accordance with ***MUTCD Section 2A.~~18~~***. Include white retroreflective strips for enhanced conspicuity on ONE WAY (R6-1) sign columns in ***Exhibits 230-5, 230-6, and 230-7*** in accordance with ***MUTCD Section 2A.~~18~~***. Orient wrong-way signs in the direction they are intended to regulate. Avoid placement of wrong-way sign in locations that are visible to drivers traveling in the appropriate direction. These wrong-way prohibitive signs and pavement markings are used to enhance driver awareness. They are in addition to other required signs and pavement markings that are not shown in exhibits.

230.4.1 Exit Ramp Intersections

The standard for signing and pavement marking and advanced countermeasure installation at exit ramp intersections are illustrated in ***Exhibits 230-1a*** and ***230-1b***. The description of the layouts are as follows:

(1) Include ***MUTCD*** "optional" signs; second DO NOT ENTER (R5-1), second WRONG WAY (R5-1a), and ONE WAY (R6-1) signs.

(2) Include NO RIGHT TURN (R3-1) and COMBINATION U-TURN & LEFT TURN PROHIBITION (R3-18) signs.

(3) Use 42 inches by 30 inches WRONG WAY (R5-1a) signs.

(4) Modify distances between signs and detectors as appropriate for multi-lane ramps.

(5) Include yellow 2'-4' dotted guideline striping on left edge line and white dotted guideline striping on right edge or lane line for left turns between ramps entrances/exits and cross-streets.

(6) Include retroreflective yellow paint on ramp median nose where applicable. Include RPMs on ramp median nose in accordance with ***Standard Plans, Index 706-001***.

(7) Include a straight arrow and route interstate shield pavement marking in left-turn lanes extending from the far-side ramp intersection through the near-side ramp intersection to prevent premature left turns. Refer to ***TEM***, ***Section 4.2.4*** "Route Shields for Wrong-Way Treatment" for additional information.

(8) Include a straight arrow and ONLY pavement message in outside lane approaching the ramp exit.

(9) Coordinate with the District Traffic Operations Engineer (DTOE) to determine if a wrong-way vehicle detection system and a pair Light-emitting Diode (LED) Highlighted WRONG WAY (R5-1a) signs are required. If the DTOE determines they are required, install as illustrated in ***Exhibits 230-1a and 230-1b***. The Highlighted Sign assembly may be solar powered or AC powered. If powered by AC, provide a power service assembly, conduits, and power conductors from the Highlighted Sign to the local cabinet. The Highlighted Sign must be integrated back to the District's Traffic Management Center (TMC). Connectivity between the Highlighted Sign and the TMC may be provided by either fiber optic or wireless communications. If fiber optic communications are used, include the fiber optic cable, conduit, and transmission equipment. If wireless communications are used, include the antenna and communication devices.

Modification for Non-Conventional Projects:
Delete item (9) above and see the RFP.

230.4.2 Diverging Diamond Intersections

Signing of Diverging Diamond Intersections is an evolving practice. Typical signing and pavement markings at diverging diamond crossovers and exit ramp intersections are illustrated in ***Exhibit 230-2*** and described as follows:

(1) Include DO NOT ENTER (R5-1), WRONG WAY (R5-1a), and ONE WAY (R6-1) signs.

(2) Include NO RIGHT TURN (R3-1), NO LEFT TURN (R3-2), and COMBINATION U-TURN & LEFT TURN PROHIBITION (R3-18) signs.

(3) Include KEEP RIGHT (R4-7), KEEP LEFT (R4-8), and OBJECT MARKER (OM3) signs.

(4) Use 42 inches by 30 inches WRONG WAY (R5-1a) signs.

(5) Include white 2'-4' dotted guideline striping for through movements at the crossover location turns as well as at ramp entrances/exits.

(6) Include retroreflective yellow paint on crossover and ramp median nose where applicable. Include RPMs on ramp median nose in accordance with ***Standard Plans, Index 706-001***.

(7) Include a straight arrow pavement marking in all through lanes for the crossover maneuver in both directions on the downstream side of the crossover intersections.

(8) Include Wrong-Way Arrow pavement markings in all through lanes for the crossover maneuver in both directions on the upstream side of crossover intersections.

(9) Include route interstate shield pavement marking in the left turn lane(s) prior to and after the crossover intersection. Refer to ***TEM***, Section 4.2.4 "Route Shields for Wrong-Way Treatment" for additional information.

(10) Include a left turn arrow and ONLY pavement message in exclusive left turn lanes approaching ramp entrances.

See ***FDM D217*** for more information on Diverging Diamond Interchanges.

230.4.3 Divided Arterials and Collectors

This section is intended for unsignalized, stop-controlled connections (i.e., a two-way or one-way sided street, commercial driveway, or driveway_ along divided arterials or collectors with a full median opening. For connections without a median opening, see ***FDM 230.4.4***.~~Provide Wrong-Way Arrow pavement markings at unsignalized intersections with median widths of 20 feet or greater.~~

Provide DO~~N~~ NOT ENTER (R5-1) signs and WRONG WAY (R5-1a) signs on the outside shoulder at all unsignalized intersections. Provide DO NOT ENTER (R5-1) signs and WRONG WAY (R5-1a) signs on the median at unsignalized intersections with median nose widths of 30 feet or greater (See ***Exhibits 230-3*** and ***230-4***). Orient each median sign face at 45 degrees toward the connection it is intended to regulate. For median nose widths less than 30 feet, the median DO NOT ENTER (R5-1) and WRONG WAY (R5-1a) signs are optional. Place each sign as close to the wrong-way roadway as possible while meeting the placement criteria of ***Standard Plans, Index 700-101***.

~~See ***Exhibits 230-3*** and ***230-4*** for recommended configurations of Wrong-Way Arrow pavement markings, DO NOT ENTER (R5-1) signs, and WRONG WAY (R5-1a) signs.~~

Commentary: For median nose widths less than 30 feet, median DO NOT ENTER (R5-1) and WRONG WAY (R5-1a) signs should only be considered in high-risk locations (as described below). If placed in these narrower medians, ensure details in the plans clearly specify 45-degree rotation of each sign toward the wrong way movements to reduce visibility to those making proper turning movements.

At intersections with positive offset left-turns, use DO NOT ENTER (R5-1) signs with dimensions of 48 inches by 48 inches in the median. The outside shoulder DO NOT ENTER is to meet the minimum size that corresponds to the mainline roadway classification per Table 2B-1 of the MUTCD. See ***FDM 212.14.4*** for further information on offset left turn lanes.

For Context Classifications C1, C2, C3C, and C4 place Wrong-Way Arrow pavement markings in all lanes prior to unsignalized, stop-controlled connection (i.e., side streets, commercial driveways, or driveways) with median widths of 20 feet or greater. For roadways with multiple, closely spaced connections, use engineering judgement to place~~.~~ ~~Space~~ Wrong-Way Arrow pavement markings. ~~no closer than 300 feet.~~ The placement of Wrong-Way Arrow pavement markings must be spaced at 450 feet or greater, except in high-risk locations where the minimum spacing can be reduced to 300 feet. For all other Context Classifications, consider placing Wrong-Way Arrow pavement markings as described above where high-risk locations are present.

High-risk ~~Coordinate with the District Traffic Operations Engineer (DTOE) to evaluate high-risk~~ locations are typically identified in Safety Studies using factors such as land-use, presence of lighting, history of impaired driving, crash history, and an over-represented population of licensed drivers 25 or younger and 65 or older. Determination of high-risk locations is at the discretion of the District Traffic Operations Engineer (DTOE).~~.~~

See ***Exhibits 230-3*** and ***230-4*** for recommended configurations of Wrong-Way Arrow pavement markings, DO NOT ENTER (R5-1) signs, and WRONG WAY (R5-1a) signs.

At ~~intermediate~~ ends of medians, consider the use of KEEP RIGHT assemblies (R4-7 and OM1-3) ~~sign~~ for ~~median~~ nose widths less than 30 feet.

230.4.4 One-Way Pairs and Divided Arterials/Collectors with One-Way Egress

One-Way Egress is a condition where a two-way or one-way side street, commercial driveway, or driveway connects to a one-way arterial/collector or divided arterial/collector without a median opening.

See ***Exhibit 230-5*** for recommended configurations.

Place a ONE WAY (R6-1) sign at signalized and unsignalized, stop-controlled connection (i.e., side streets, commercial driveways, or driveways) with one-way egress. ONE WAY (R6-1) sign shall be placed on far side median or shoulder depending on facility type.

At driveways controlled by a non-signalized traffic control device with one-way egress, place a Right Turn Lane-Use Arrow in the approach lane, and a RIGHT TURN ARROW (FTP-039~~55~~R-~~06~~025) sign or a LEFT TURN ARROW (FTP-~~55L~~039L-~~06~~025) sign below the STOP (R1-1) sign. Verify this sign has not already been installed by District driveway permit. At side street connections, place a Mandatory Lane Control (R3-5) sign below the STOP (R1-1) sign.

For Context Classifications C1, C2, C3C, and C4 place Wrong-Way Arrow pavement markings in all lanes prior to signalized and unsignalized, stop-controlled connection (i.e., side streets, commercial driveways, or driveways) with one-way egress. For roadways with multiple, closely spaced connections, space Wrong-Way Arrow pavement markings based on engineering judgement. Space Wrong-Way Arrow pavement markings at 450 feet or greater, except in high-risk locations where the minimum spacing can be reduced to ~~no closer than~~ 300 feet. For all other Context Classifications, consider placing Wrong-Way Arrow pavement markings as described above where high-risk locations are present. High-risk locations are typically identified in Safety Studies using factors such as land-use, presence of lighting, history of impaired driving, crash history, and an over-represented population of licensed drivers 65 and older. Determination of high-risk locations is at the discretion of the District Traffic Operations Engineer (DTOE). ~~Coordinate with the District Traffic Operations Engineer (DTOE) to evaluate high-risk locations using factors such as land-use, presence of lighting, history of impaired driving, crash history, and an over-represented population of licensed drivers 65 and older. Determination of high-risk locations is at the discretion of the DTOE~~.

230.4.5 Undivided One-Way Streets

For two-way street approaches, place the following signs and pavement markings as illustrated in ***Exhibit 230-6***:

(1) Place the corresponding turn prohibition (R3 Series) symbolic sign on the right-hand side of the approach street.

(2) Place DO NOT ENTER (R5-1) signs on both sides of the one-way street.

(3) Place Wrong-Way Arrow pavement markings in all lanes upstream of side street. Space Wrong-Way Arrow pavement markings no closer than 450 feet apart.

(4) Add turn and through lane-use arrow on approaches to the one-way street.

(5) For one-way approaches, place the following signs and pavement markings as illustrated in ***Exhibit 230-7***:

(6) Place the corresponding turn prohibition (R3 Series) symbolic sign. Where overhead structures exist, consider placement of a secondary turn prohibition sign over the lane or closest to the direction it is prohibiting.

(7) Place DO NOT ENTER (R5-1) signs on both sides of the one-way street.

(8) Place Wrong-Way Arrow pavement markings in all lanes prior to the side street. Space Wrong-Way Arrow pavement markings no closer than 450 feet apart.

230.4.6 Two-Way Signalized Intersections

Provide the following signing and pavement markings as illustrated in ***Exhibit 230-8*** for intersections serving two-way traffic where the distance from the side street stop bar to the arterial receiving lane meets or exceeds 60 feet:

(1) Place yellow 2'-4' dotted guide center line for left turn movement onto a two-way state route.

(2) Where design or conditions deem it appropriate to provide enhanced positive guidance for the driver, include yellow 2'-4' dotted guide center line for left turn movement off the state route.

(3) For multiple left turn lanes, place white 2'-4' dotted guideline for right edge or lane line. For single left turn lane, white 2'-4' dotted guideline may be provided on right edge line.

If a two-way street crosses a one-way street at a signalized intersection, the criteria of ***FDM 230.4.5*** applies.

Exhibit 230-1a: Typical Layout forStandard Signing and Pavement Marking at Exit Ramp Intersections

Exhibit 230-1b: Typical Layout for Partial Cloverleaf/Trumpet Exit Ramp Intersections

Exhibit 230-2: Typical Layout for Diverging Diamond Interchange Exit Ramp and Crossover

Exhibit 230-3: Typical Layout for Wrong-Way Signing and Pavement Marking at 4-Leg Intersections Along Divided Arterials/Collectors

Exhibit 230-4: Typical Layout for Wrong-Way Signing and Pavement Marking at 3-Leg Intersections Along Divided Arterials/Collectors

Exhibit 230-5: Typical One-Way Pairs and Divided Arterials/Collectors with One-Way Egress

Exhibit 230-6: Typical Two-Way Approach to Undivided One-Way Street

Exhibit 230-7: Typical One-Way Approach to Undivided One-Way Street

Exhibit 230-8: Typical Dotted Line Markings to Extend Center Line and Lane Line Markings into Signalized Intersection

230.5 Signing and Pavement Marking Coordination

Coordination with other offices and agencies is a very important aspect of signing and pavement marking design. The offices discussed in this section are those that are typically involved in developing signing and marking plans; however, there may be other offices or agencies involved.

The District Utilities Engineer provides the coordination between the designer and the various utilities. The Utilities Section may assist in identifying or verifying conflicts with overhead and underground utilities. The District Utilities Engineer should be contacted as early in the design phase as possible.

The Structures EOR provides the design of the sign structure and foundation for overhead cantilever and overhead truss sign assemblies. The Structures EOR should be contacted early in the design phase to allow adequate time for coordination with the Geotechnical Engineer in obtaining the necessary soils information.

Contact the State Outdoor Advertising and Logo Manager on any project affecting business logo structures. Refer to ***FDM 110.5.5*** for requirements and additional information.

230.6 Typical Signing and Pavement Marking Configurations

The following sub-sections describe standard signing and pavement marking applications for midblock crosswalks, Florida scenic trails, median openings along divided arterials/collectors, roadway transitions, stop controlled intersections along divided arterials/collectors, and residential and minor street terminations.

230.6.1 Midblock Crosswalks

Typical signing and pavement markings for stop controlled and signal controlled midblock crosswalks are illustrated in ***Exhibit 230-9*** and described as follows:

(1) Include PEDESTRIAN TRAFFIC (W11-2), DIAGONAL ARROW (W16-7p), AHEAD (W16-9p), and STOP HERE FOR PEDESTRIANS (R1-~~5p~~5b) signs

(2) Include 24” white stop line placed 40 feet plus or minus 10 feet in advance of the marked crosswalk.

(3) Include 6” solid white lane lines 100 feet in length upstream of each approach and terminating at the stop line.

(4) Include special emphasis crosswalk markings consistent with ***Standard Plans, Index 711-001***.

230.6.2 Florida Scenic Trails

Typical signing and pavement markings for Florida Scenic Trails are illustrated in ***Exhibit 230-10*** and described as follows:

(1) Include FLORIDA NATIONAL SCENIC TRAIL 1000 FEET, PEDESTRIAN CROSSING (W11-2), DIAGONAL ARROW (W16-7p), and AHEAD (W16-9p) signs.

(2) Include FLORIDA NATIONAL SCENIC TRAIL, TRAIL MARKER, and HIKING TRAIL (RS-068) signs.

(3) Include special emphasis crosswalk markings consistent with ***Standard Plans, Index 711-001***.

230.6.3 4-Leg Stop Controlled Intersections Along Divided Arterials/Collectors

Typical signing and pavement markings for stop controlled median openings along divided highways are illustrated in ***Exhibit 230-11*** and described as follows:

(1) Include DIVIDED HIGHWAY CROSSING (R6-3), STOP (R1-1), and ONE WAY (R6-1) signs.

(2) Include YIELD (R1-2) and ONE WAY (R6-1) signs in the median when the median nose width is 30 feet or greater.

(3) Divided highway signs (R6-3) may be on the same structure with the STOP and ONE WAY signs or on a separate structure.

(4) See the ***MUTCD*** and ***Standard Plans, Index 711-001*** for additional pavement marking details.

(5) See ***FDM 230.4*** for Wrong-Way signs and pavement markings.

230.6.4 3-Leg Stop Controlled Intersections Along Divided Arterials/Collectors

Typical signing and pavement markings for 3-leg stop controlled intersections along divided arterials/collectors are illustrated in ***Exhibit 230-12*** and described as follows:

(1) Include DIVIDED HIGHWAY CROSSING (R6-3a), STOP (R1-1), and ONE WAY (R6-1) signs.

(2) Include YIELD (R1-2) and ONE WAY (R6-1) signs in the median when the median nose width is 30 feet or greater.

(3) Include OBJECT MARKER (OM1-3) as shown and in accordance with ***Specification 705*** and ***Standard Plans, Index 700-010***.

(4) See the ***MUTCD*** and ***Standard Plans, Index 711-001*** for additional pavement marking details.

(5) Provide sheeting on signs and object markers in accordance with ***Specification 993***.

(6) See ***FDM 230.4*** for Wrong-Way signs and pavement markings.

230.6.5 Residential and Minor Street Terminations

Typical signing and pavement markings for residential and minor street terminations are illustrated in ***Exhibit 230-13*** and described as follows:

(1) For minor street terminations, include STOP (R1-1), LARGE ARROW (W1-6), and TWO DIRECTIONAL LARGE ARROW (W1-7), signs. Include OBJECT MARKER (OM1-3) as shown and in accordance with ***Specification 705*** and ***Standard Plans, Index 700-010***.

(2) For residential street terminations, include DEAD END (W14-1) sign. Include OBJECT MARKER (OM4-3) as shown and in accordance with ***Specification 705*** and ***Standard Plans, Index 700-010***.

230.6.6 Roadway Transitions (2-Lane Undivided to 4-Lane Divided)

Typical signing and pavement markings for roadway transitions from 2-lane undivided to 4-lane divided are illustrated in ***Exhibit 230-14*** and described as follows:

(1) Include DIVIDED HIGHWAY (W6-1), DIVIDED HIGHWAY ENDS (W6-2), TWO WAY TRAFFIC (W6-3), DO NOT ENTER (R5-1), KEEP RIGHT (R4-7), and LANE ENDS (W4-2) signs.

(2) For left roadway centered on the existing roadway scheme, include a RIGHT LANE ENDS (W9-1) sign.

(3) For right roadway centered on the existing roadway scheme, include a LEFT LANE ENDS (W9-1L) sign.

230.6.7 Channelized Turn Lanes

Typical signing and pavement markings for channelized turn lanes are illustrated in ***Exhibit 230-15*** and described as follows:

(1) Include STOP (R1-1) sign.

(2) For yielding right turn lanes include YIELD (R1-2) sign.

(3) Include right or left turn lane arrows as applicable.

230.6.8 Toll Route Markers

Typical signing and pavement markings for toll routes are illustrated in ***Exhibit 230-16a*** to ***16c*** and described as follows:

(4) Use toll route marker sign panel on the toll mainline.

(5) Use the Toll Auxiliary Sign in combination with the toll route marker on side streets leading to the toll mainline.

(6) On numbered routes, use the Toll Route Shield without the additional Toll Auxiliary Sign.

The width of cardinal direction sign, directional arrow auxiliary sign, or other auxiliary sign in the route marker assembly must match the width of the parent route marker sign.

The signs and markers can be found in the ***Department's Sign Library***.

230.6.9 Bicycle and Pedestrian Facilities at Interchanges

Typical signing and pavement markings for bicycle and pedestrian facilities through interchange areas are illustrated in ***Exhibits 230-17a*** and ***230-17b.*** Use the signs below to alert and direct motorists, pedestrians, and bicycles through the interchange area:

(1) Place COMBINED BICYCLE/PEDESTRIAN WARNING (W11-15) sign and AHEAD (W16-9P) plaque to alert motorists of the upcoming pedestrian crossing.

(2) Place STOP HERE FOR PEDESTRIANS (R1-5b) sign at the stop line to indicate where motorists must stop for pedestrians.

(3) Place PEDESTRIAN WARNING (W11-15) sign and DOWN ARROW (W16-7P) plaque to indicate the pedestrian and bicycle crosswalk location.

(4) Place NO TURN ON RED (R10-11a) sign if a traffic signal controls the intersection.

Use other signs and pavement markings per the ***TEM*** and ***MUTCD*** if needed, based on the design of the interchange. Criteria for the design of bicycle and pedestrian facilities through interchanges is found in FDM 211.

The signs and pavement markings can be found in the ***Department's Sign Library***.

Exhibit 230-9: Typical Signing and Pavement Markings for Midblock Crosswalks

Exhibit 230-10: Typical Signing and Pavement Markings for Florida Scenic Trails

Exhibit 230-11: Typical Signing and Pavement Markings at 4-Leg Stop-Controlled Intersections Along Divided Arterials/Collectors

Exhibit 230-12: Typical Signing and Pavement Markings at 3-Leg Stop-Controlled Intersections Along Divided Highways

Exhibit 230-13: Typical Signing and Pavement Markings for Residential and Minor Street Terminations

Exhibit 230-14: Typical Signing and Pavement Markings for Roadway Transitions (2-Lane Undivided to 4-Lane Divided)

Exhibit 230-15: Typical Pavement Markings for Channelized Turn Lanes

Exhibit 230-16a: All Electric Tolling Connecting Roadways Typical Signing Layout

Exhibit 230-16b: All Electric Tolling Entrance / Exit Ramp Typical Signing Layout

Exhibit 230-16c: All Electric Tolling Mainline Toll Typical Signing Layout

Exhibit 230-17a: Bicycle and Pedestrian Facilities through Interchange Typical Signing and Pavement Marking Layout

Exhibit 230-17b: Bicycle and Pedestrian Facilities at Low-Angle Interchange Ramp Signing and Pavement Marking Layout