ORIGINATION FORM

Proposed Revisions to a Standard Plans Index
(Please provide all information — Incomplete forms will be returned)

**Contact Information:**
Date: June 5, 2021
Originator: Eric Griffin and Malcolm Tomatani
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**Summary of the changes:**
All Sheets: Renumbered
Sheets 1 through 7: Due to introduction of two new sheets, updated the total sheet number from 7 to 9.
Sheets 1, 2, 3, 4: Updated the name of the office from "Transportation Statistics" to "Transportation Data and Analytics".
Sheet 1: Added 12 Port Patch Panel, Managed Field Ethernet Switch, and Note 6 for installation.
Sheet 2: Added 12 Port Patch Panel, Managed Field Ethernet Switch, and Note 6 for installation.
Sheet 4: Change color scheme to vendor provided color scheme
Sheet 6: NEW SHEET describing the quartz piezoelectric weigh-in-motion installation for Type I Configuration.
Sheet 7: NEW SHEET describing the quartz piezoelectric weigh-in-motion installation for two distinct Type III Configurations. Added a note to contact the Transportation Data and Analytics office for correct layout based on vehicle classification unit.

**Commentary / Background:**
See additional sheet for background

**Other Affected Offices / Documents:** (Provide name of person contacted)
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**Origination Package Includes:**
(Email or hand deliver package to Rick Jenkins)
<table>
<thead>
<tr>
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**Implementation:**
| ✔️  | Design Bulletin (Interim) |
|     | DCE Memo |
|     | Program Mgmt. Bulletin |
| ✔️  | FY-Standard Plans (Next Release) |

Contact the Roadway Design Office for assistance in completing this form
**Contact Information:**
Date: June 5, 2021
Originator: Eric Griffin and Malcolm Tomatani
Phone: (850) 414-4709
Email: eric.griffin@dot.state.fl.us

**Additional Information, as needed:**

These revisions were submitted by Malcolm Tomatani and Eric Griffin.

The interstate traffic monitoring sites are being connected to the FDOT statewide fiber optic network via a 12 strand drop cable, patch panel, and switch. Quartz piezoelectric weigh-in-motion sensors are being installed in two different ASTM configurations (Type I and Type III). The Type III configuration is further described based on the vehicle classification unit.

Weight sensor language was added to Specs 695 and 995 according to all volume, classification and Weigh-In-Motion Traffic Monitoring Stations. All current revisions are necessary based on current updates to specification language and industry standards.

**Standard Plans:**
Index Number: 695-001
Sheet Number(s): 1 through 7
Index Title: Traffic Monitoring Sites
Contact Information:
Date: June 6, 2021
Originator: Derwood Sheppard
Phone: (850) 414-4334
Email: derwood.sheppard@dot.state.fl.us

Standard Plans:
Index Number: 695-001
Sheet Number (s): 6-7
Index Title: Traffic Monitoring Site

Summary of the changes:
Sheet 6 (New Sheet 8) - Update Elevation View to match foundation details on Sheet 7 (New Sheet 9); Change "4" Nominal Aluminum Pole" to "4.5" OD Aluminum Pole; Added Solar Panel callout.
Sheet 7 (New sheet 9) - Update Foundation Details to show bars and stirrups; Update note 2 to reference Spec 646; Update Note 6; Change all references "4" Nominal Aluminum Pole" to "4.5" OD Aluminum Pole.

Commentary / Background:
The foundations within Indexes 646-001, 654-001, 695-001, and 700-120 are being updated to be more consistent between applications. A structural analysis was completed to determine if the foundations could be revised to provide a more consistent design between the various applications.

Other Affected Offices / Documents: (Provide name of person contacted)
Yes  No
☑  ☐ Other Standard Plans – Derwood Sheppard
☐  ☑ FDOT Design Manual –
☐  ☑ Basis of Estimates Manual –
☐  ☑ Standard Specifications –
☐  ☑ Approved Product List –
☑  ☐ Construction –
☐  ☑ Maintenance –

Origination Package Includes:
(Email or hand deliver package to Rick Jenkins)
Yes  N/A
☑  ☐ Redline Mark-ups
☐  ☐ Proposed Standard Plan Instruction (SPI)
☐  ☐ Revised SPI
☐  ☐ Other Support Documents

Implementation:
☐ Design Bulletin (Interim)
☐ DCE Memo
☐ Program Mgmt. Bulletin
☑ FY-Standard Plans (Next Release)

Contact the Roadway Design Office for assistance in completing this form
Email to: Rick Jenkins rick.jenkins@dot.state.fl.us and Darren Martin darren.martin@dot.state.fl.us
I 5 ft. Long Equipment Classification Unit (See Note 5)

Cable, (See Note 5) ———:

Bracket

" ———:

Modem

(See Note 4)

1/2" 0 Hole Bracket

Adjustable Shelf

12 Port Patch Panel

(See Note 6)

Managed Field Ethernet Switch

(See Note 6)

Vehicle Speed/Classification Unit

(See Note 4)

Battery Terminal

Solar Power Surge Suppression

Solar Terminal

12 Volt Storage Battery

Backplane For Lanes 3 To 4

(See Note 3)

Surge Suppressors

(Furnished Separately)

J1 Recept. With Alum. Wp. Bracket For Lanes 2 To 4 (See Note 3)

Cabinet Cable

NOTE:

Fabricate bracket out of 1/2" - 1/4" inch thick aluminum. Dimensions may vary depending on the manufacturer of the J1 receptacle being furnished. The cabinet manufacturer will construct the mounting bracket to fit the receptacle.

J1 MOUNTING BRACKET

NOTES:

1. Traffic monitoring site cabinet includes:
   A. One adjustable Shelf; (equipped as shown)
   B. One basic assembly; (equipped as shown)
   C. One J1 receptacle with mounting bracket;
   D. One J1 equipment cable 5 ft. long (Reference Sheet 4);
   E. All Associated wiring and wiring harnesses.

2. Basic backplane assembly consists of:
   A. Two inductive loop terminal strips;
   B. One piezo sensor terminal strip;
   C. One battery terminal strip;
   D. One solar panel terminal strip.

3. The contractor is responsible for contacting the TMS Manager at the Transportation Statistics Office for lane number information and verification.

4. Speed/Classification Unit and Modem furnished separately.

5. Cable ends must be fabricated to fit the vehicle speed/classification unit. (Reference Sheet 4)

6. 12 Fiber Single Mode Cable, 12 Port Patch Panel, Managed Field Ethernet Switch furnished separately.

CHANGED TO: Data and Analytics

ADDED: Note 6

CABINET LAYOUT DETAILS (Four Lanes or Less)
ADDED:

- 2 Port Patch Panel (See Note 6)
- Managed Field Ethernet Switch (See Note 6)

Vehicle Speed/Classification Unit (See Note 4)

J1 Receptacle With Alum. Mtg. Bracket For Lanes 1 To 4 (See Note 3)

12 Volt Storage Battery

Adjustable Shelf

Surge Suppressors (Furnished Separately)

Cabinet Cable

5 ft. Long Equipment Cable, (See Note 5)

J1 Recept. With Alum. Mtg. Bracket For Lanes 1 To 4 (See Note 3)

Backplane For Lanes 1 To 4 (See Note 3)

Backplane For Lanes 5 To 8 (See Note 3)

Wiring To Backplane

Equipment Cables (See Note 5)

Aluminum Bracket For J1 receptacle (Reference Detail, Sheet 1) (Attach To Shelf Mounting Rail In Cabinet)

Cable Arrangement For More Than Four Lanes Monitored By a Single Vehicle Speed/Classification Unit

OPTION A

(Shown)

Vehicle Speed/Classification Unit (See Note 4)

J1 Receptacle

P1 Equipment Cable Plug (Lanes 1 Through 4)

J1 Receptacle

P1 Equipment Cable Plug (Lanes 5 Through 8)

Wiring To Backplane

Equipment Cables (See Note 5)

Backplane For Lanes 1 To 8 (See Note 3)

CABINET LAYOUT DETAILS (Five to Eight Lanes)

INDEX SHEET

ADDED: Note 6

CHANGED TO: Data and Analytics

EQUIPMENT CABLE ASSEMBLY

NOTES:

1. Traffic monitoring site cabinet includes:
A. One adjustable shelf; equipped as shown
B. Two backplane assembly; equipped as shown
C. Two J1 receptacle with mounting bracket
D. One J1 equipment cable 5 ft. long (Reference Sheet 4)
E. All associated wiring and wiring harnesses

2. Basic backplane assembly consists of:
A. Two inductive loop terminal strips
B. One piezo sensor terminal strip
C. One battery terminal strip
D. One solar panel terminal strip

3. The contractor is responsible for contacting the TMS Manager in the Transportation Statistics Office for lane number information and verification.

4. Speed/Classification Unit and Modem furnished separately

5. Cable ends must be fabricated to fit the vehicle speed/ classification unit. (Reference Sheet 4 for Pinout Charts, receptacle and plug details.

6. 12 Fiber Single Mode Cable, 12 Port Patch Panel, Managed Field Ethernet Switch furnished separately.
CHANGED TO: Data and Analytics

NOTES:
1. Reference Sheet 1 or 2, Note 2 for items to be included with backplane.
2. All terminal strip contacts are on 6" centers (Clinch 142 Series or equal)
   Use insulated fork wire terminations.
3. The contractor is responsible for contacting the TMS Manager in the Transportation
   Statics Office for lane number information and verification.

8 in. x 24 in. x ½ in. Thick Aluminum Backplane

Battery Terminal

Solar Power Voltage Regulator

Solar Terminal

Ground to Backplane

Ground

Inductive Loop Lead-In And Piezo Sensor Leads From Roadway
CHANGED TO: Data and Analytics

NOTES:
1. The contractor is responsible for contacting the TMS Manager in the Transportation Statistics Office for lane number information and verification.

2. The equipment cable can accommodate up to four lanes of inductive loop and piezo sensor inputs. (Reference Sheet 1 for cabinet layout)

3. For more than four lanes and up to eight lanes of inputs, the following options are available:
   A. Second Vehicle Speed/Class. Unit and separate equipment cable connecting to a second J1 receptacle; or
   B. Single Vehicle Speed/Class. Unit capable of up to eight lanes of inputs and a single equipment cable with split ends to fit two J1 receptacles. (Reference Sheet 2 detail)

4. Numbers in parenthesis in the pinout chart identify lane numbers when a second backplane for lanes 5 through 8 is required.

5. Cable Ends must be fabricated to fit the vehicle Speed/Classification Unit.
1. Install axle sensors and loops associated with axle sensors after placement of the friction course.

2. Cut a 3½' deep slot for the Inductive loops. Loop slots will be cut wide enough to allow unforced placement of leads in the bottom of the slot.

3. Twist loop leads at the rate of 8 to 16 twists per foot. Loops that are within 150' of the cabinet, extend the twisted pair loop wire directly to the cabinet. For distances over 150', twist loop wire to the lead loop in the lane. The trailing loop must be spliced to the loop wire twisted pair at the first pull box to which the loop wire is pulled.

4. Marking will consist of two rounds of contrasting colored tape, one color for the lane number and the second color for the lead loop location in the lane. The first band closest to the cabinet will represent the lane number, one round of tape and a second round of a contrasting colored tape for the lead loop in the lane. The trailing loop does not have a second contrasting colored band of tape.

5. See Index 635-001 for pull box and apron details.

6. All splices will be performed using splice kits designed for direct burial. Splice kits will include screw on wire connectors and a housing with sufficient sealant to fully encapsulate the spliced connections. Taped splices are not permitted.

7. Use a chalk line or string and paint to layout the position of the sensor and lead-in cable slots. Ensure saw cuts do not deviate more than 0.5 inches from the chalk line. Use a single blade or ganged blade saw wide enough to cut the axle sensor slot at full width in a single pass. Cutting two slots and chipping out roadway material between them is not allowed.

8. All sensor slots and any cuts in the roadway will be thoroughly blown out to ensure there is no dust or debris prior to installation of sensors or leads.

9. Install Exit Windows at least 2' apart.
Inductive Loops Are 6' x 6', Centered In Lane And Between Quartz Axle Sensors (Typ.)

NOTES: Type I configuration used in vehicle classification systems.
Note: Configuration A and Configuration B are based on the vehicle speed/classification unit. Contact the TMS Manager in the Transportation Data and Analytics Office for correct layout.
Non-Intrusive Vehicle Sensor Mounting Height Must Be Adjusted To Optimize The Unit's Coverage Area.

Coverage Area

Roadway

Median

4" Nominal Aluminum Pole (See Std. Spec. 646)

Mounting height and offset from the roadway must be determined on a site-by-site basis, in accordance with the manufacturer's recommended guidelines. Offset of pole must be greater than or equal to minimum clear zone requirements.

Notes:
1. The unit must be capable of detecting up to eight lanes of traffic (in either or both directions) when mounted perpendicular to the roadway.
2. Coverage area of the unit is affected by the roadway geometry: distance from the travel lanes, median type and width, barrier walls, etc.
3. Mounting height of the unit and offset from the roadway must be determined on a site-by-site basis, in accordance with the manufacturer's recommended guidelines. Offset of pole must be greater than or equal to minimum clear zone requirements.

Notes:
- Updated to show reinforcement added: See Sheet 9 for reinforcement and grounding details.
- Added: Solar Panel.
NOTE:
1. Cabinet installed per Index 676-010 except cabinet center will be 4 feet above grade.
2. Place pole in accordance with the Standard Specification 125-4 and 125-8.2.
3. Use #10 AWG stranded copper wire for Solar Panel Array installations. Red insulation THHN or THWN for positive 12 volts wiring. Black insulation THHN or THWN for negative, 12 volts wiring. Green insulation THHN or THWN for ground bonding of the solar panel frame to the pole and earth.
4. Solar panel should be installed facing due south with angle of tilt equal to the sum of the following equation: \[ \text{Latitude of the panel's location} \times 0.76 + 3.1 \text{°} \]
5. Encase all wiring from the weather head to the solar panel in outdoor flexible conduit.
6. Concrete Base Requirements:
   a. 4’ poles: 2'-0" X 2'-0" wide, a depth of 2'-0"
   b. 12', 15' or 20’ poles: 3'-0" X 3'-0" wide, a depth of 3'-0"
   c. 30’ or 35’ poles: 3'-0" X 3'-0" wide, a depth of 4'-0"

CHANGED TO: 4.5" OD

CHANGED TO: Dimensions

CHANGED TO: 4.5" OD

ADDED: ELEVATION

UPDATED NOTE 2: Meet the material requirements of Specification 646.

UPDATED NOTE 6b and 6c.

UPDATED NOTE 6b and 6c.
1. Traffic monitoring site cabinet includes:
   A. One adjustable shelf, equipped as shown.
   B. One backplane assembly, equipped as shown.
   C. One J1 receptacle with mounting bracket.
   D. One J1 equipment cable 5 ft. long (Reference Sheet 4).
   E. All associated wiring and wiring harnesses.

2. Basic backplane assembly consists of:
   A. Two inductive loop terminal strips.
   B. One piezo sensor terminal strip.
   C. One battery terminal strip.
   D. One solar panel terminal strip.

3. The contractor is responsible for contacting the TMS Manager at the Transportation Data and Analytics Office for lane number information and verification.

4. Speed/Classification Unit and Modem furnished separately.

5. Cable ends must be fabricated to fit the vehicle speed/classification unit. (Reference Sheet 4).

6. Provide a 12 fiber single mode cable, a 12 port patch panel, and a managed field ethernet switch separately.

CABINET LAYOUT DETAILS (Four Lanes or Less)
CABINET LAYOUT DETAILS (Five to Eight Lanes)

NOTES:
1. Traffic monitoring site cabinet includes:
   A. One adjustable shelf (equipped as shown)
   B. Two backplane assembly (equipped as shown)
   C. Two J1 receptacle with mounting bracket.
   D. One J1 equipment cable 5 ft. long (Reference Sheet 3).
   E. All associated wiring and wiring harnesses.

2. Basic backplane assembly consists of:
   A. Two inductive loop terminal strips.
   B. One piezo sensor terminal strip.
   C. One battery terminal strip.
   D. One solar panel terminal strip.

3. The contractor is responsible for contacting the TMS Manager in the Transportation Data and Analytics Office for lane number information and verification.

4. Speed/Classification Unit and modem furnished separately.

5. Cable ends must be fabricated to fit the vehicle speed/classification unit (Reference Sheet 4 for Pinout Charts, receptacle and plug details).

6. Provide a 12 fiber single mode cable, a 12 port patch panel, and a managed field ethernet switch separately.
NOTES:
1. Reference Sheet 1 or 2, Note 2 for items to be included with backplane.
2. All terminal strip contacts are on 3/4” centers (Clinch 142 Series or equal)
   Use insulated fork wire terminations.
3. The contractor is responsible for contacting the TMS Manager in the Transportation
   Data and Analytics Office for lane number information and verification.

DATA AND ANALYTICS OFFICE FOR LANE NUMBER INFORMATION AND VERIFICATION.
**NOTES:**

1. The contractor is responsible for contacting the EMS Manager in the Transportation Data and Analytics Office for lane number information and verification.

2. The equipment cable can accommodate up to four lanes of inductive loop and piezo sensor inputs. (Reference Sheet 1 for cabinet layout)

3. For more than four lanes and up to eight lanes of inputs, the following options are available:
   - A. Second Vehicle Speed/Class. Unit and separate equipment cable connecting to a second J1 receptacle, or
   - B. Single Vehicle Speed/Class. Unit (capable of up to eight lanes of inputs and a single equipment cable with split ends to fit two J1 receptacles. (Reference Sheet 2 detail)

4. Numbers in parenthesis in the pinout chart identify lane numbers when a second backplane for lanes 5 through 8 is required.

5. Cable ends must be fabricated to fit the vehicle Speed/Classification Unit.
TYPICAL FOR UP TO 4 LANES OF SENSOR LEADS PULLED TO ONE SIDE OF THE ROADWAY

LANE LAYOUT FOR TMS INDUCTIVE LOOP AND AXLE SENSOR

NOTES:

1. Install axle sensors and loops associated with axle sensors after placement of the friction course.

2. Cut a 3" deep slot for the Inductive loops. Loop slots will be cut wide enough to allow unforced placement of the wire into the bottom of the slot. Four turns of #14 AWG, place the IMASK-711 cable wire in the slot. Place short pieces of backer rod (2" to 3" in length) every 18" to 24" to hold the loop wire in the bottom of the slot.

3. Inductive Loops are 6' X 6' and centered in lane (Typ.).

4. Marking will consist of two rounds of contrasting colored tape, one color for the lane number and the second color for the lead loop location in the lane. The first band closest to the cabinet will represent the lane number, one round of tape will be for lane 1 and two rounds will be lane 2, etc. The lead loop in lane one would have one round of tape and a second round of a contrasting colored tape for the lead loop in the lane. The trailing loop would not have a second contrasting colored band of tape.

5. See Index 635-001 for pull box and apron details.

6. All splices will be performed using splice kits designed for direct burial. Splice kits will include screw on wire connectors and a housing with sufficient sealant to fully encapsulate the spliced connections. Taped splices are not permitted.

7. Use a chalk line or string and paint to layout the position of the sensor and lead-in cable slots. Ensure saw cuts do not deviate more than 0.5 inches from the chalk line. Use a single blade or ganged blade saw wide enough to cut the axle sensor slot at full width in a single pass. Cutting two slots and chipping out roadway material between them is not allowed.

8. All sensor slots and any cuts in the roadway will be thoroughly blown out to ensure there is no dust or debris prior to installation of sensors or leads.

9. Install Exit Windows at least 2' apart.

ROADWAYS WITH PAVED SHOULDERS

1. Install Exit Windows at least 2' apart.

2. All sensor slots and any cuts in the roadway will be thoroughly blown out to ensure there is no dust or debris prior to installation of sensors or leads.

3. All splices will be performed using splice kits designed for direct burial. Splice kits will include screw on wire connectors and a housing with sufficient sealant to fully encapsulate the spliced connections. Taped splices are not permitted.

4. Use a chalk line or string and paint to layout the position of the sensor and lead-in cable slots. Ensure saw cuts do not deviate more than 0.5 inches from the chalk line. Use a single blade or ganged blade saw wide enough to cut the axle sensor slot at full width in a single pass. Cutting two slots and chipping out roadway material between them is not allowed.

5. Install Exit Windows at least 2' apart.
TRAFFIC FLOW

Edge of Travel Way

PAVED SHOULDER

2'-0"

2'-0"

Leading Edge to Leading Edge

Inductive Loops are 6' x 6' and Centered in Lane (Typ.)

2'-0"

2'-0"

TRAFFIC FLOW

Quartz Axle Sensor (Typ.)

1 ½" to 2" Ø Corners Drilled to Full Depth of Loop (Smoothed, no Rough Edges)

Sensor Lead

Fast Windows

See Detail A

on Sheet 5

Inductive Loops are 6' x 6'

Sensor and Loop Leads

Pull Box with Concrete Apron

3" Ø PVC Conduit

or Non-Metallic

Flexible Conduit

3'-0"

TYPE I CONFIGURATION

(Vehicle Classification System)

of Loop (Smoothed, no Rough Edges)

LANE CONFIGURATION FOR TMS INDUCTIVE LOOP AND QUARTZ PIEZO AXLE SENSOR
LANE CONFIGURATION FOR TMS INDUCTIVE LOOP AND QUARTZ PIEZO AXLE SENSOR

NOTE:
Configuration A and Configuration B are based on the vehicle speed/classification unit. Contact the TMS Manager in the Transportation Data and Analytics Office for correct layout.
1. The unit must be capable of detecting up to eight lanes of traffic (in either or both directions) when mounted perpendicular to the roadway.

2. Coverage area of the unit is affected by the roadway geometry: distance from the travel lanes, median type and width, barrier walls, etc.

3. Mounting height of the unit and offset from the roadway must be determined on a site-by-site basis, in accordance with the manufacturer’s recommended guidelines. Offset of pole must be greater than or equal to minimum clear zone requirements.
NOTE:

1. Cabinet installed per Index 676-010 except cabinet center will be 4 feet above grade.

2. Meet the material requirements of Specification 646.

3. Use #10 AWG stranded copper wire for Solar Panel Array installations. Red insulation is THHN or THWN for positive 12 volts wiring; Black insulation is THHN or THWN for negative; 12 volts wiring; Green insulation is THHN or THWN for ground bonding of the solar panel frame to the pole and earth.

4. Solar panel should be installed facing due south with angle of tilt equal to the sum of the following equation. The Latitude of the panel's location multiplied by 0.76, plus 31 degrees. Equation expressed as (LAT)X(0.76)+(31°)

5. Encase all wiring from the weather head to the solar panel in outdoor flexible conduit.

6. Concrete Base Dimensions:
   a. 4 poles: depth of 2'-0"
   b. 12 or 19 poles: depth of 3'-0"
   c. 20 or 30 poles: depth of 4'-0"

   6.5" OD Aluminum Pole
   (See Std. Spec. 646)