942 Intelligent Transportation Systems Plans

942.1 General

This chapter provides the requirements for the development of Intelligent Transportation Systems (ITS) Plans. See ***FDM 233*** for the requirements of ITS designs.

ITS plans provide construction details, electrical circuits, and other relevant data for various types of ITS systems, including:

- Freeway Management Systems
- Incident Management Systems
- Arterial Management Systems
- Emergency Management Systems
- Transit Management Systems
- Highway Rail Intersections (under electronic surveillance)
- Regional Multimodal Traveler Information

ITS Plans are usually a component set of plans. Projects with minimal ITS improvements (e.g., requires limited discipline-specific design, can be adequately documented on a small number of plan sheets, does not warrant a separate plan package) may include ITS Plan sheets in either the Lead Component or the Signalization Plans set.

See ***FDM 285*** for toll-specific communications infrastructure associated with toll gantries, toll equipment buildings, roadside tolling cabinets, toll fiber optic laterals, and toll system backbone requirements.

942.1.1 FDOT Fiber Optic Cable

When FDOT fiber optic cable exists within the project limits, coordinate the proposed improvements with the ITS and TSM&O staff within the District Traffic Operations Office.

When the fiber optic cable is buried, include the pay item for “Fiber Optic Cable Locator” in the Estimated Quantities Report.

942.2 Key Sheet and Signature Sheet

The Key Sheet is the first sheet in the ITS Plans set. The Signature Sheet, when required, is placed behind the Key Sheet. These sheets are created using the FDOT CADD Software.

Follow the same requirements contained in ***FDM 910*** for the development of a Key Sheet and Signature Sheet. Assemble the ITS Plans in the following order:

Index of ITS Plans

(1) Key Sheet

(2) Signature Sheet

(3) General Notes

(4) Legend

(5) Pole Data Table

(6) ITS Plan

(7) Traffic Monitoring Site Plan (when applicable)

(8) Dynamic Message Sign Details

(9) Highway Advisory Radio Details

(10) Video Display System Details

(11) Network Devices Details

(12) Vehicle Detection Details

(13) Service Point Details

(14) Foundation Details

(15) ITS Cross Sections

(16) Report of Core Borings

ITS Plans may require the insertion of sheets that were prepared independently of the current design phase (aka early works). See ***FDM 910.2.6.1*** for guidance on including early works sheets.

See ***FDM 910*** for an example of a Key Sheet and Signature Sheet.

942.3 General Notes Sheet

General Notes sheets convey site-specific requirements not covered by the ***Standard Plans*** or ***Standard Specifications***.

General notes may include:

(1) Department's contact information for the fiber optic cable route marker label.

(2) Submittal of equipment specifications or design and shop drawings proposed for the project.

(3) Required coordination.

942.3.1 Pay Item Notes

Place pay item notes on the General Notes sheet.

Information on how quantities are determined is contained in the Estimated Quantities (EQ) Report and should not be repeated in the plans as a pay item note.

Pay item notes are used to provide unique project information not covered by the basis of payment information contained in the ***Standard Specifications***, such as:

- Clarify how incidental work is to be paid for.
- Clarify the purpose, uses, or requirements.

942.3.2 ITS Legend

Place an ITS legend (i.e., symbol and description) and other abbreviations used in the ITS Plans on the General Notes sheet or on a separate “ITS Legend” sheet. Use symbols in accordance with the requirements of the FDOT CADD Software.

942.4 ITS Plan Sheets

ITS Plan sheets convey a graphic depiction and necessary information for the installation of ITS systems, including:

- ITS cabinets, equipment, and devices
- Power sources and electrical circuits
- Conduits and pull boxes
- Pay item number, quantity, and description for each element of the ITS installation.

Assign a unique ID name to each proposed ITS device, hub, and service point. Refer to the Standard Naming Conventions per the FDOT Intelligent Transportation System Facilities Management (ITSFM) Standards. Examples of IDs include CCTV-SR91-126.2-NB-A; EPB-SR528-4.8-SB-B; FSV-SR417-52.2-WB-A.

Produce the ITS Plan sheet using sheets that are contained in the FDOT CADD Software.

The standard horizontal scale is 1″ = 100′, however an alternate scale may be approved by the Project Manager.

942.4.1 Required Information

Provide the same basic information required on the Roadway Plan sheet, including, roadway geometrics, project limits, street names, construction stationing or milepost, curb and gutter, drainage inlets, sidewalks and right of way lines. Where details normally shown on the Roadway Plan sheet would obscure ITS features, the details may be screened, so long as the details remain plainly legible.

Aerial photography may be used as a background in lieu of a topographic survey and the roadway design file.

Show underground and overhead utilities, signing structures, and lighting structures that may conflict with the installation of ITS components. Identify potential conflicts with utilities, drainage, landscape features, sidewalks, and driveways in the plans.

Provide the following on the ITS Plan sheet:

(1) Display existing ITS elements and label them to remain or to be removed.

(2) Display and label the following proposed ITS equipment with their associated ID name and pay item numbers:

  (a) Fiber optic cable, conduit, conductors, and access points.

  (b) System communication devices.

  (c) Electrical power service equipment, interconnects, and service voltage.

  (d) Grounding and transient voltage protection.

  (e) Structure-mounted or ground-mounted field cabinets for system electronics, maintenance service points, and interconnect.

  (f) Circuit numbers with load center identification.

(3) Display the location and placement of ITS installations, such as

  (a) Dynamic Message Signs

  (b) Highway Advisory Radio

  (c) Vehicle Detection Systems

  (d) Video Display Systems

(4) Illustrate the cone of vision or detection zone when applicable.

(5) Label the field-verified vertical elevation and horizontal location (V_{vh}) of existing utilities (SUE data) for ITS installations in the plan view. Include the following with the label (or in a summary table):

(a) V_{vh} number

(b) Utility type and owner

(c) Size and material

(d) Location (Sta/Offset/Lt or Rt)

(e) Existing ground and top of utility elevations

942.4.2 Modified ITS Plan Sheets Format

Modified plans format (aka “letter type” plans) provides the locations of ITS devices in table format in lieu of plan sheets. The table includes device ID, description, milepost (to 3 decimal places), offset from the edge of the traveled way to the aboveground ITS device installation, and a comment field. Global positioning system (GPS) coordinates can be utilized as supplemental information in the table.

The modified plans should also include the following:

(1) A cross section for devices such as DMS that require overhead structures.

(2) Number and sizes for conduit.

(3) Number of fibers for fiber optic cable.

(4) Size and numbers of pairs for twisted pair copper cables.

Aerial photographs should be furnished with the table above to provide supplementary information. The aerial plan sheets do not require R/W lines, baselines, or roadway edges to be shown. The aerial plan sheets are used as a base for the as-built plans.

942.5 ITS Details Sheet

Use ITS Details sheets to provide project-specific requirements and construction details not covered by the ***Standard Plans*** or ***Standard Specifications***.

Common ITS details include:

- Fiber optic cable splices, terminations, and designating systems
- Splice Diagrams and Logical Network Diagrams
- Electrical Information (e.g., transformers and disconnect switches, panel board schedules)

- Electrical Line Diagrams and Service Details
- Cabinet Details and Wiring Diagrams
- ITS Device Mounting Details

942.5.1 Dynamic Message Sign (DMS)

Provide the following details for DMS installations:

(1) DMS housing, including details and notes that identify the type of display (monochrome, full-color, or tricolor), the size of display matrix (height, width, number of lines, and number of characters per line), and the type of mechanical construction (walk-in, front access, or embedded).

(2) DMS controllers, cabinets, and associated electronic equipment. Include telemetry equipment details for remote sensing and control.

(3) DMS Uninterruptible Power Supply (UPS) systems.

(4) DMS support structures, including external walkways, safety railings, and ladders.

(5) DMS mounting brackets and hardware.

942.5.2 Highway Advisory Radio (HAR)

Provide the following details for HAR installations:

(1) HAR operator workstation and central recording facility.

(2) HAR antennas, transmitters, and electronics.

(3) HAR support structures, signage, and beacons.

(4) HAR mounting brackets and hardware.

942.5.3 Video Display System

Provide the following details for video display system installations:

(1) Detailed structural mounting information for each color video monitor, flat panel display, and rear projection video unit in the video display system, including support structures, wall attachment methods, and the weight of each display unit.

(2) Cable routing plan and diagrams, including maintenance and service points.

(3) Video display controller and operator workstations.

(4) Encoders, decoders, multiplexers, and routing equipment.

(5) Cross sections and elevations for all modifications to existing wall systems in the TMC facility.

For the rear projection video unit mounting and installation plans, include details that illustrate stacking configuration and support design, along with a ventilation and climate control plan. Provide cable routing plans that include detailed connection diagrams for individual and stacked configurations.

942.5.4 Network Devices

Provide the following details for network devices:

(1) System diagrams illustrating network and device interconnect.

(2) General network topology.

(3) Notes regarding special configurations or options for specific devices that are required to achieve a specific system function.

942.5.5 Vehicle Detection and Traffic Data Collection

Provide the following details for vehicle detection and traffic data collection systems:

(1) Diagrams illustrating detection system interconnect.

(2) General network topology.

(3) Notes regarding any special configurations or options for specific devices that are required to achieve a specific system function.

(4) Illustrate detection zones on respective lanes. Identify lanes numerically from the inside to the outside lane.

942.5.6 Service Point Details

Provide a one-line diagram and panel schedule for each service point. Panel schedules must include the following:

(1) Panel ratings: voltage, phases, capacity (main lugs or main circuit breaker) and short circuit current rating.

(2) Enclosure type.

(3) Neutral bus and ground bus requirements.

(4) Capacity of the circuit breakers.

(5) Circuit loads.

(6) Total and demand loads.

The panel schedules must comply with the load analysis submitted as part of the ITS Power Design Analysis Report (PDAR).

Provide a Technical Special Provision (TSP) for automatic transfer switches (ATS), fuel tanks and engine generators, when a permanent ITS generator is required.

942.5.7 Foundation Details Sheet

The required construction details for mast arm foundations are provided in ***Standard Plans, Index 649-030*** or ***Index 649-031***.

Provide necessary construction details on a Foundation Detail sheet when either of the following apply:

(1) Proposing a non-standard mast arm assembly.

(2) Project soil conditions are weaker than soil conditions which the standard foundation designs are based on.

(3) Unavoidable site restrictions (e.g., limited R/W, utility conflicts).

942.6 ITS Cross Sections Sheet

The ITS Cross Sections sheet provides a sectional view of the installation of camera poles and other similar ITS devices as they relate to the roadway elements. The sectional view also illustrates the cone of view or detection, location of R/W, and relevant utility or drainage features.

Follow the requirements contained in ***FDM 925*** for the development of Cross Sections sheets.

The section view must be shown at the proposed station of the ITS installation. Display, label, and dimension relevant information, such as setback, height of pole and IT device, depth of foundation and top elevation, and offset to R/W and centerline of construction.

942.7 Pole Data Table

The Pole Data Table sheet provides the following information for ITS poles:

(1) The ITS device to be mounted on the pole, and the mounting height

(2) The location of the pole (station/offset), and the slope of the ground at the pole

(3) The type of pole (e.g., concrete, P-III)

(4) The pole length, embedment depth, and height of the pole above ground

942.8 Report of Core Borings Sheet

The Report of Core Borings sheets provide soil information for each proposed ITS pole. See ***FDM 920*** for additional information.

The following information is required:

(1) Depiction of the boring identifying the type and depth of soil strata encountered, and the water level encountered. Provide boring number and location.

(2) Soil boring location map illustrating where the boring was taken. Provide boring number.

(3) Soil properties and environmental classification.