328 Intelligent Transportation Systems Plans

328.1 General

Intelligent transportation systems (ITS) plans include construction details, electrical circuits, and other data relevant to ITS projects. The following are some of the different systems that may be produced:

(1) Freeway Management System,

(2) Incident Management System,

(3) Arterial Management System,

(4) Emergency Management Systems,

(5) Transit Management Systems,

(6) Electronic Toll Collection,

(7) Electronic Fare Payment,

(8) Highway Rail Intersections (under electronic surveillance), and

(9) Regional Multimodal Traveler Information

ITS plans are usually a component set of plans. Component plans are assembled as a separate plans set complete with a Key Sheet, Tabulation of Quantities and all other required ITS sheets. Number the component plans with sheet numbers prefixed by the letter “IT”; e.g., IT-1, IT-2, IT-3.

Modification for Non-Conventional Projects:
Delete the second sentence from the above paragraph and replace with the following: Component plans are assembled as a separate plans set complete with a Key Sheet and all other required ITS sheets.

Projects with minimal ITS improvements may show these features on ITS sheets included in either the roadway or signalization plan set, or detailed on the Roadway or Signalization Plan sheets. Do not use the prefix letter “IT” when including ITS sheets in the roadway plan set. Use the prefix letter “T” when including ITS sheets in the signal plan set. See ***FDM 307.1*** for placing Tabulation of Quantities sheet in the Roadway plan set. Place the ITS Tabulation of Quantities sheet behind the Signal Tabulation of Quantities sheet when including ITS sheets in the signal plan set.

Modification for Non-Conventional Projects:
Delete the last two sentences from the above paragraph

328.2 Key Sheet

The Key Sheet is the first sheet in the component plans set. The location map and Contract Plans Components list are not required on this sheet. Show the Index of ITS Plans on the left side of the sheet. Assemble ITS plans in the following order:

(1) Key Sheet

(2) Signature Sheet (if required)

(3) Summary of Pay Items (when lead component)

(4) Tabulation of Quantities

(5) General Notes

(6) ITS Plan Sheets or “letter type” plan sets

(7) Detail Sheets (as required)

Modification for Non-Conventional Projects:
Delete Item (3) from the above list.

ITS plans may require insertion of sheets that were prepared early, or prior to the design process; i.e. early works. See ***FDM 302.6.1*** for instructions on including early works sheets.

See ***FDM 302*** for other Key Sheet requirements and ***Exhibit 302-3*** as an example Component Key Sheet.

328.3 Signature Sheet

See ***FDM 302*** for Signature Sheet requirements.

328.4 Tabulation of Quantities and Standard Notes

The Tabulation of Quantities sheet lists the item numbers, description and quantity of materials. List pay item numbers in numerical order. Provisions must be made to show the original and final quantities per sheet.

When there is not a roadway component, see ***FDM 307.1*** for placing Summary of Quantities sheets in the ITS plan set.

Place pay item notes and standard notes that refer to item numbers, description of work to be performed and quantity estimates on this sheet. If space is limited, notes may be shown on a General Notes sheet.

On contracts with multiple Financial Project ID numbers, or federal aid and non-Federal Aid quantities, provisions must be made to tabulate and summarize their respective quantities.

Modification for Non-Conventional Projects:
Delete ***FDM 328.4***.

328.5 General Notes

Show general notes on a separate General Notes sheet. The general notes sheet lists special ITS design information that is generally not covered in the ***Standard Specifications***, Supplemental or Special Provisions.

See ***FDM 311*** for instruction in creating a General Notes sheet.

328.6 ITS Plan Sheets

Prepare ITS Plan sheets on standard plan format. The scale must be such that all details are clear and legible. See the requirements of ***FDM 312*** as a guide. Place a north arrow and scale at a point of maximum visibility on the sheet.

328.6.1 Required Information

The basic information requirements include roadway geometrics, project limits, street names, construction stationing or milepost, curb and gutter, drainage inlets, sidewalks

and right of way lines as similarly required on the plan portion of the roadway plan-profile sheets. Show underground and overhead utilities, signing structures, and lighting structures that may cause construction conflicts with ITS components. Check drainage, landscape features, sidewalks, and driveways for conflicts. Identify those that may cause conflicts in the plans.

Where details normally shown on roadway plans would obscure ITS features, the details may be screened so long as the details remain plainly legible.

Clearly label all equipment shown on the plan with their respective pay item numbers and quantity indicated. In addition, the following plan elements should be shown:

Modification for Non-Conventional Projects:
Delete the above paragraph and replace with the following: Clearly label all equipment shown on the plan. In addition, the following plan elements should be shown:

(1) Cabling, fiber optic splicing, and interconnects.

(2) System communication devices.

(3) Electrical power service equipment and interconnects.

(4) Grounding and transient voltage protection details.

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

328.6.1.1 Dynamic Message Sign

Plans for a Dynamic Message Sign (DMS) installation should illustrate the location, placement, and typical details of the following components:

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

(2) DMS controller.

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

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

(5) DMS mounting brackets and hardware.

(6) A ground-level cabinet for a DMS controller and associated electronic equipment.

(7) Telemetry equipment details for remote sensing and control

328.6.1.2 Highway Advisory Radio

The design for a Highway Advisory Radio (HAR) installation should illustrate the location, placement, and typical details of the following components:

(1) HAR operator workstation and central recording facility.

(2) HAR antennas.

(3) HAR transmitter and electronics.

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

(5) HAR mounting brackets and hardware.

328.6.1.3 Video Display Equipment

Provide mounting and installation plan sheets for each color video monitor, flat panel display, and rear projection video unit in the video display system. Depict in the mounting plans detailed structural mounting information, including support structures, wall attachment methods, and the weights of the display units. Provide cable routing plan sheets and diagrams for the devices, along with maintenance/service points and structural certification.

The plans should illustrate the location, placement, and typical details of the following video display system components:

(1) Video display controller.

(2) Operator workstations.

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

Develop sheets that detail 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.

328.6.1.4 Network Devices

Plans including network devices should illustrate the following system attributes:

(1) System diagrams illustrating network and device 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.

328.6.1.5 Fiber Optic Cable and Interconnect

The plans for fiber optic cable systems should illustrate the location, placement, and typical details of the following components:

(1) Fiber optic conduits.

(2) Fiber optic cables.

(3) Fiber optic splices and terminations.

(4) Fiber optic cable designating system.

(5) Fiber optic cable access points.

328.6.1.6 Vehicle Detection and Data Collection

The plans for vehicle detection systems should illustrate the location, placement, and typical details of the following components:

(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.

328.7 Modified ITS Plans Format

The modified plans format allow for “letter type” plans and include a table to locate ITS devices by mile post to three decimal places, plus an offset dimension given for each aboveground structure. Global positioning system (GPS) coordinates can be utilized as supplemental information in the table.

The modified plans should include the following:

(1) Table (spreadsheet) to locate devices to include device ID, description, milepost three decimal places, offset, and a comment field. Add an extra column to the table if GPS coordinates are provided for the devices.

(2) Offset dimensions from the edge of the traveled way to the aboveground ITS device installations.

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

(4) Number and sizes for conduit.

(5) Number of fibers for fiber optic cable.

(6) 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 typically do not require R/W lines, baseline, or roadway edges to be shown. The aerial plan sheets are used as a base for the as-built plans.