

## 900 Production of NexGen Plans

### 900.1 General

The requirements provided in the **FDM 900 series** and the **FDOT [CADD Manual](#)** form the basis for format and assembly of the Contract Plans Set.

The **FDM 900 series** is being developed to replace the FDM 300 series. The new series reflects adopted practices, processes, and procedures because of the Department's transition from Bentley's Select Series Edition to OpenRoads Designer (ORD) Edition.

The **FDM 900 series** also provides instruction when Building Information Model (BIM) files are provided. ~~Signed and sealed~~ BIM files are required for:

- All related surfaces for earthwork ~~operations, and~~ operations and used to determine earthwork quantities ~~related surfaces.~~
- All ~~existing surface and pavement~~ related surfaces for ~~, and the use of~~ automated machine guidance (AMG) milling and pavement ~~construction methods~~ operations are anticipated.
- When appropriate, other files where the level of development is considered construction-ready (LOD 300 and higher).

If an **FDM 900 series** chapter is shown as “under development” for a required sheet, use the corresponding **FDM 300 series** chapter.

The **FDM 900 series** is divided into three sections:

- (1) Plans Production – This section provides general plans production information, and requirements for documents that are not delivered within a Contract Plans Set.
- (2) Roadway Plans Set – This section provides specific information concerning the content of each required sheet delivered within the Roadway Plans Set.
- (3) Component Plans Set – This section provides supplemental information concerning the content of a Component Plans Set.

Do not place ~~beginning the Consultant's business logos on any plans~~ plan sheet contained in the Contract Plans is prohibited ~~Consultant business logos will not be allowed on any material produced for or on behalf of the Department.~~

#### 900.1.1 Exhibits

Many chapters contain “generic” exhibits that provide examples of the plan sheets covered by that chapter. These exhibits were developed using criteria and standards in force at the time of their creation. These exhibits are not to be used as a source for criteria unless specified as such within the **FDM** chapter.

#### 900.1.2 Symbols and Abbreviations

Standard symbols for Roadway Design are shown in the CADD Symbol Cell Library.

Abbreviations may be used to save space. A list of standard abbreviations is contained in the **[Standard Plans](#)**. Minor deviations from these standard abbreviations are allowed, provided that the abbreviation used is clear and easily understood.

### 900.1.3 Photography

Plan sheets may use photography (aerial or other) when appropriate (e.g., for Drainage Maps, SWPPP supplemental site maps, bridge repair plans).

### 900.2 Labeling and Dimensioning Requirements

Orient horizontal and diagonal text to read left to right. Orient vertical text to read bottom to top.

Display information and data in accordance with the following:

- **Typical Section Elements** (e.g., lane widths, shoulder widths) - in feet, typically as a whole number.
- **Cross Slopes** (e.g., pavement, shoulder surfaces, sidewalks, bridge decks) - as a decimal part of a foot vertical per foot horizontal. These cross slopes are typically rounded to two decimal places (i.e., 0.02, 0.06) but may be shown to three decimal places when required.
- **Horizontal Control Points** (e.g., survey centerline, baseline, intersections and alignment) - in feet to 2 decimal places.
- **Vertical Control Points** (e.g., PVC, PVI, PVT) - in feet to 2 decimal places.
- **Profile Grade Elevations** - in feet to 2 decimal places.
- **Profile Grade Slope** - in percent to 3 decimal places.
- **Flow Line Elevations** - in feet to 2 decimal places.
- **Drainage Structure Elevations** (e.g., manhole tops, grate elevations) - in feet to 2 decimal places.
- **Ditch Elevations** - in feet to 1 decimal place (to nearest 0.05 when controlled by percent of grade).
- **Box or Three-sided Culvert Spans and Heights** - Show inside dimensions using “span by height” format (10 x 6 means the span is 10 feet and the height is 6 feet). In feet as a whole number for new construction; in feet to 2 decimal places for extensions of existing box culverts.
- **Alignment Bearings, Degree of Curve and Delta Angles** - in degrees, minutes and seconds, rounded to the nearest second.
- **Slope Ratios** - in vertical to horizontal (V:H) format; e.g., 1:6, 1:4.

### 900.3 Project Information Block

All plan sheet formats are contained in the FDOT CADD Software. Sheet borders include information blocks in the lower right corner. Enter the following information into the information box:

- (1) Sheet Number (far right corner) – Number plan sheets in sequential order as shown in the Index of Plans Sheets that is placed on the Key Sheet.
- (2) Sheet Title (immediately left of the sheet number) – This should be the same title that is shown in the Index of Plans Sheets that is placed on the Key Sheet.
- (3) Project Information (immediately left of the sheet title) - This should be the same information that is shown on the Key Sheet.
  - (a) State Road Number – Place the prefix “SR” before the number for clarification. When a county road is shown in the box use the prefix “CR”.

The box should remain blank when the facility is neither a state nor county road.

- (b) County
  - (c) Financial Project ID - On projects which have multiple Financial Project IDs, show only the lead Financial Project ID
- (4) Designer Information (immediately left of the project information) – provide information for the Professional of Record that Signs and Seals the sheet, as discussed in **FDM 130**.

#### **900.4 Revision Block**

11x17 sheet borders include revision blocks along the bottom of the sheet.

The Key Sheet and large format plan sheets require the placement of a revision block cell on the sheet when a revision to that sheet is necessary. Place the revision block at the bottom center on the Key Sheet. Place the revision block at the far right on large format plan sheets, as close to the project information block as possible.

See **FDM 132** for required information to be placed in the revision block.

## 901 Sequence of Plans Preparation

### 901.1 General

The set of plans depicting the proposed construction work is known as the "Contract Plans Set" and is comprised of component plans that are associated with a primary work type. The contract plans set should be prepared systematically, undergoing phases of review and updates to ensure technically correct and clear plans. Additional information can be found in **FDM 110, 111, 112, and 120**. These chapters contain a comprehensive discussion of design processes and activities from initial to final engineering.

Component plans are included in the Contract Plans Set in the following order:

- |  |                     |
|--|---------------------|
| (1) Roadway                                  | (6) Landscape       |
| (2) Signing and Pavement Marking             | (7) Architectural   |
| (3) Signalization                            | (8) Structures      |
| (4) Intelligent Transportation Systems (ITS) | (9) Toll Facilities |
| (5) Lighting                                 |                     |

Prepare Toll Facility Plans in accordance with the Florida's Turnpike Enterprise **General Tolling Requirements (GTR)**. Contact the Florida's Turnpike Enterprise Project Manager to request a copy of the GTR.

### 901.2 Phase Submittals

Modification for Non-Conventional Projects:

Delete **FDM 901.2** and follow **FDM 301.3**.

See **FDM 120** for design submittal requirements and guidance in preparing submittals for review by the Department. For bridge submittal requirements see **FDM 121**.

Standard phase submittals are: Phase I, Phase II, Phase III, Phase IV, and PS&E. RRR, operational improvement, and safety projects often omit some of these phase submittals.

Sheets typically required for each phase submittal and required level of completion are noted in **Table 901.2.1**. Levels of completion are indicated as follows:

- (1) Preliminary (P): Basic shapes, geometry, and information to convey the concept.
- (2) Complete but Subject to Change (C): The design, drawings and details are complete. Only reviewer-initiated changes should be expected at this level.
- (3) Final (F): All drawings and designs are complete. No changes are expected at this level. Plans are ready to be signed and sealed by the EOR.

**Table 901.2.1 Summary of Phase Submittals**

<b>ITEM</b>	<b>PHASE I</b>	<b>PHASE II*</b>	<b>PHASE III</b>	<b>PHASE IV</b>
Key Sheet	P	P	C	F
Signature Sheet		P	C	F
Typical Section	P	C	C	F
Model Management	C	C	C	F
Project Control	P	C	C	F
Roadway Plan-Profile	P	P	C	F
Traffic Monitoring Site		P	C	F
Drainage Structures		P	C	F
Stormwater Facility Plan		P	C	F
Drainage Map		P	C	F
Roadway Soil Survey		P	C	F
Stormwater Pollution Prevention Plan		P	C	F
Temporary Traffic Control Plans	P	P	C	F
Utility Adjustments		P	C	F
Selective Clearing and Grubbing		P	C	F
Developmental Standard Plans		C	C	F
Mitigation Plans		P	C	F
Miscellaneous Structures Plans		P	C	F
Signing and Pavement Marking Plans		P	C	F
Signalization Plans		P	C	F
Intelligent Transportation System (ITS) Plans		P	C	F
Lighting Plans		P	C	F
Landscape Plans	P	P	C	F
Utility Work by Highway Contractor Agreement Plans			C	F
<b>Toll Facility Plans</b>				
Site/Civil	P	P	C	F
Architectural	P	P	C	F
Structural	P	P	C	F
Electrical		P	C	F
Mechanical		P	C	F
Plumbing		P	C	F
Communications		P	C	F
Systems		P	C	F

**Status Key:** P - Preliminary C - Complete but subject to change F - Final

\* Projects with structures plans component must submit the latest set with the 60% roadway submittal.

## **901.2.1 Phase I Submittal**

Develop Phase I Plans to include the following:

### **KEY SHEET**

#### **All Components**

- All applicable Financial Project IDs
- (Federal Funds) notation, if applicable
- County Name and State Road Number
- Fiscal Year and sheet number
- Consultants name, address, and contract number, if applicable
- Department's Project Manager's Name

#### **Lead Component (typically Roadway)**

- Project Location Map (complete)
- Governing Standards and Specifications dates

### **TYPICAL SECTIONS**

- Proposed typical section(s)
- R/W lines
- Special details and notes
- Traffic data

### **MODEL MANAGEMENT**

- Complete

### **PROJECT CONTROL**

- Benchmarks
- Reference points
- Control points

## **PLAN AND PROFILE**

### **Plan View**

- Existing topography including utilities
- North arrow and scale
- Centerline of construction or baseline of survey
- Equations and exceptions
- Curve data
- Preliminary horizontal geometrics
- Existing R/W lines
- Begin & end stations for the project
- Begin & end bridge stations

### **Profile View**

- Scale
- Appropriate existing utilities
- Preliminary profile grade line
- Equations
- Existing ground line
- Begin & end stations for the project
- Begin & end bridge stations
- Preliminary highwater elevation

## **DRAINAGE MAP**

- Photographic (aerial) base map
- Centerline of construction or baseline of survey and stationing
- North arrow and scale
- Street names and R/W lines
- Begin & end of project stations
- Begin & end of bridges stations
- Drainage areas and flow direction
- Drainage divides and ground elevations
- Highwater information
- Existing structures and pipes with relevant information
- State, Federal, and county highway numbers
- Label existing water bodies (e.g., lakes, rivers)

## **TEMPORARY TRAFFIC CONTROL PLANS**

- Project specific
- Other worksheets as necessary to convey concept and scope

## LANDSCAPE PLANS

- Conceptual landscape plan

### 901.2.2 Phase II Submittal

Typically, the work to be done during this phase is the following:

- (1) Address Phase I comments.
- (2) Load pay item numbers into Designer Interface for AASHTOWare Project™ Preconstruction and print a PDF of the Summary of Pay Items Report. Notify the Department Project Manager when this is completed via email with the PDF report attached.

(3) Develop models to be contained in the BIM.zip file to the appropriate Level of Development specified in the *FDOT CADD Manual*. Do not include BIM.zip with Phase II Submittal.

- (34) Develop Phase II Plans to include the following:

### KEY SHEET

- Index of sheets including Developmental Standard Plans ~~(if appropriate)~~
- Contract plans and component plans list (lead component only)

### SIGNATURE SHEET

- Sections for each Professional of Record with Index of Sheets
- Image of the seals ~~(if appropriate)~~

### TYPICAL SECTIONS

- Complete

### PROJECT CONTROL

- Complete





## **PLAN AND PROFILE**

### **Plan View**

- Begin & end stations for construction
- Curb return numbers, station ties, and elevations
- Proposed drainage structures with pipes
- Proposed R/W lines
- Proposed side drainpipes
- Proposed geometrics
- Limits of wetlands

### **Profile View**

- Final profile grades and vertical curve data
- Mainline storm drainpipes
- Special ditch gradients with DPI station and elevation
- Special gutter grades with DPI station and elevation.
- Nonstandard superelevation transition details
- Highwater elevations
- Existing utilities

## **TRAFFIC MONITORING SITE**

- Complete

## **DRAINAGE STRUCTURES**

- Drainage tabular information
- Vertical and horizontal scale
- Special sections at conflict points

### **Plan View**

- Centerline of construction or baseline of construction with stationing
- All elements of roadway template and R/W lines
- Proposed drainage system with structure and pipe labeling
- Underground utilities

### **Profile View**

- Sectional view along pipe runs with structure and pipe labeling
- Existing and proposed surface
- Underground utilities

### **STORMWATER FACILITY PLAN**

- North arrow and scale
- Proposed baseline with stationing with ties to roadway centerline of construction or baseline of survey
- Existing topography, drainage structures, and utilities
- R/W lines
- Soil boring locations
- Fence and gate locations
- Drainage structures with structure and pipe labeling
- Stormwater facility delineation with side slopes, dimensions, and elevations
- Stormwater facility section views
- Outlet structure details and notes
- 100-year flood plain boundaries and elevations, contamination sites, delineated wetlands, and sink holes and depressions

### **DRAINAGE MAP**

- Proposed drainage structures with structure numbers
- Proposed cross drains with pipe sizes and structure numbers
- Flow arrows along proposed ditches
- Retention and detention ponds, pond number and area size
- Bridges and bridge culverts with begin & end stations
- Flood Data Summary (if applicable)

### **ROADWAY SOIL SURVEY**

- Soil data

### **STORMWATER POLLUTION PREVENTION PLAN (SWPPP)**

- Narrative Description (with supplemental topographic maps, when used)

## **TEMPORARY TRAFFIC CONTROL PLANS**

- Preliminary traffic control plan
- Detour plan
- Phasing plan
- R/W information
- Existing Utilities

## **UTILITY ADJUSTMENTS**

- All existing utilities highlighted

## **SELECTIVE CLEARING AND GRUBBING**

- Existing vegetation to be protected, relocated, or removed
- Project-specific notes and details

## **MITIGATION PLANS**

- Project specific

## **MISCELLANEOUS STRUCTURES PLANS**

- Retaining walls (cast in place, proprietary, or temporary) if required

## **SIGNING AND PAVEMENT MARKING PLANS - PLAN SHEETS**

- North arrow and scale
- Basic roadway geometrics
- Begin & end stations and exceptions
- Station equations
- Conflicting utilities, lighting, and drainage
- Pavement markings
- Sign locations
- Applicable pay items

## **SIGNING AND PAVEMENT MARKING PLANS - SIGN DETAIL SHEETS, GUIDE SIGN WORK SHEETS**

- Project specific

## **SIGNALIZATION PLAN SHEET**

- North arrow and scale
- Basic roadway geometrics
- Begin & end stations and exceptions
- Station equations
- Conflicting utilities, lighting, and drainage
- Signal pole location
- Type and location of loops
- Type and location of signal heads
- Pedestrian signals including station and offset
- Location of stop bars
- Location of crosswalks
- Sheet title
- Applicable pay items

## **SIGNALIZATION PLANS - POLE SCHEDULE**

- Pole location, number, and type
- Pole dimensions
- Pay item number and quantity
- Joint-use pole details, if applicable
- Foundation design

## **SIGNALIZATION PLANS - INTERCONNECT/ COMMUNICATION CABLE PLAN**

- Placement of interconnect/communication cable
- Conflicting utilities, lighting, and drainage
- Other project-specific details

## **ITS PLANS - PLAN SHEETS**

- North arrow and scale
- Basic roadway geometrics
- Begin & end stations and exceptions
- Station equations
- Conflicting utilities, lighting, and drainage
- Applicable pay items

## **ITS PLANS - DETAIL SHEETS**

- Project specific

## LIGHTING PLANS - POLE DATA AND LEGEND SHEET

- Each pole listed by number with location, arm length, mounting height, and luminaire wattage
- Design value for light intensities and uniformity ratios shown
- Legend and sheet title

## LIGHTING PLANS - PLAN SHEETS

- North arrow and scale
- Baseline of construction
- Begin & end stations and equations
- Basic roadway geometrics
- Conflicting utilities, drainage, signal poles, etc.
- Sheet title
- Applicable pay items
- Pole symbols shown at correct station location and approximate offset

## LIGHTING PLANS - HIGH MAST

- Project-specific foundation detail sheets
- Project-specific boring data sheets
- Conflicting utilities, drainage, and lighting

## LANDSCAPE PLANS

- Complete

### 901.2.3 Phase III Submittal

Along with the Plans, the Phase III Submittal includes the BIM.zip file, and the Estimate of Quantities Report. Typically, the work to be done during this phase is the following:~~the remaining work to be done is to:~~

- (1) Address Phase II comments
- (2) Complete all remaining Plan Sheets

- ~~(3)~~ Complete the development of models to be contained in the BIM.zip file. Place the BIM manifest on the Signature Sheet.
- ~~(3)~~ Complete the development of models to be contained in the BIM.zip file
- ~~(4)~~ Confirm that project ~~B~~egin Milepost and ~~E~~nd Project milepost, and project exceptions are consistent with the limits of work shown in the Work Program Administration (WPA) system. Coordinate any needed changes to the WPA system with the District Work Program Coordinator.
- ~~(5)~~ Complete the Estimated Quantities Report (see **FDM 902**). ~~and~~
- ~~(4)~~ Input quantities into Designer Interface for AASHTOWare Project™ Preconstruction. Submit the Estimated Quantities Report with the Phase III Submittal.
- ~~(5)~~ ~~(6)~~ Estimate the Work Zone Traffic Control items paid for on a 'per day' basis and include them in the Estimated Quantities Report. The Department's Construction Office will perform a biddability review and will establish construction duration as a part of the Phase III ~~review after receiving the plan set. Include this information in the Phase III review comments transmitted back to the EOR.~~ The Construction Time Memo and biddability review comments are typically included with the Phase III review comments.

Utility Work by Highway Contractor (UWHC) Agreement Plans consisting of a Key Sheet and mainline plan-profile showing proposed utility horizontal and vertical locations are also to be included in the Phase III submittal.

#### 901.2.4 Phase IV Submittal

Along with the Plans, the Phase IV Submittal includes the BIM.zip file, and the Estimate of Quantities Report. Typically, the work to be done during this phase is the following:

- (1) Address Phase III review comments
- ~~(2)~~ Update the Work Program Administration (WPA) system (see **FDM 111.2.1**) to reflect the project begin and end project milepost.
- ~~(3)~~ ~~(2)~~ Finalize all plan sheets, including:
  - (a) Place the assigned Construction Contract Number on the Key Sheet
  - (b) Update Work Zone Traffic Control pay items based on established construction duration.
- ~~(4)~~ ~~(3)~~ Finalize the models to be contained in the BIM.zip file. Update the BIM manifest on the Signature Sheet.

~~(5)~~(4) Finalize the Estimate of Quantities Report ~~and~~ ~~update~~ Update quantities in Designer Interface for AASHTOWare Project™ Preconstruction. Submit the Estimated Quantities Report with the Phase IV Submittal

~~(6)~~(5) Provide an EOR's construction cost estimate to the Department Project Manager (when requested).

After corrections noted during the Phase IV submittal review are completed and verified, the plans are referred to as Final Plans.

## 901.2.5 PS&E Submittal

There are two required submittals during the Plans, Specifications, and Estimates (PS&E) phase. Coordinate with the District Final Plans Office for scheduling these required submittals.

The first submittal consists of the Final Plans and BIM.zip, draft Specifications Package and Estimated Quantities Report. See the [Specifications Handbook](#) for information on preparing Specifications Packages and Supplemental Specifications Packages.

A review of the first submittal by the District Final Plans Office often require changes (e.g., pay item numbers and quantities, notes, design details). After changes to the Final Plans ~~and~~, [BIM zip file](#), Specifications Package, and Estimated Quantities Report, have been completed and verified, deliver the second submittal consisting of the following:

- (1) Signed and Sealed Plans
- (2) Signed and Sealed Specifications
- (3) Signed and Sealed Estimated Quantities Report
- (1) —
- ~~(2)~~(4) Signed and Sealed BIM.zip file
- (3) — Signed and Sealed Specifications
- ~~(4)~~ — Signed and Sealed Estimated Quantities Report
- (5) —

CADD [zip Files](#) file is provided when the project does not require a BIM zip file.

Provide the Total Roadway Length, Total Bridge Length, and Total Project Length to the Department Project Manager (when requested). This information is shown on the transmittal form in the PSEE PS&E Module and used by the Contracts Office when



posting the advertisement. These lengths are in miles to three decimals, and calculated as follows:

- Total Project Length = End Project MP – Begin Project MP
- Total Bridge Length = Sum of all bridge lengths ( $\sum e_{\text{End Bridge MP}} - e_{\text{Begin Bridge MP}}$ ). Do not include bridge culverts.
- Total Roadway Length = Total Project Length – Total Bridge Length - Exceptions

Information on District activities during PS&E Phase is described in **FDM 131**.

Information on the delivery of Project Documentation is described in **FDM 111.7**.

### **901.3 Design-Build Phase Submittals**

See **FDM 301.3** for requirements relating to Design-Build projects.

## **901.4 Alternative Intersection and Interchange Submittals**

Alternative Intersection and Interchange reviews are generally required for the following configurations:

- Roundabout
- Median U-Turn (MUT)
- Restricted Crossing U-Turn (RCUT)
- Diverging Diamond Interchange (DDI)
- Jug Handle
- Displaced Left Turn
- Continuous Green-T
- Quadrant Roadway

Include Alternative Intersection and Interchange Review Packages with the Phase I Submittal and designate a representative of the State Roadway Design Office as a Lead Reviewer in ERC.

The following items are required for an Alternative Intersection and Interchange Review Package:

- (1) Geometric Layout (PDF and CADD):
  - (a) North Arrow and scale, Survey Baseline, equations
  - (b) Significant topographic features including buildings, driveways, bridges, drainage structures, utilities, bicycle and pedestrian facilities, and transit facilities
  - (c) Preliminary horizontal geometry including pavement edges, curb and gutter, traffic separators, islands, sidewalks, and curb ramps
  - (d) Preliminary pavement markings including edge lines, interior lane lines, extension lines, stop bars, crosswalks, direction arrows, and gore markings
- (2) Design Vehicle Turning Movements (PDF and CADD):
  - (a) Design vehicle swept path diagrams for all through movements, left turn movements, and right turn movements
- (3) Traffic Forecast (PDF)
  - (a) Opening year and design year, a.m. and p.m., peak hour volumes for all movements through the intersection
  - (b) Peak hour factor
  - (c) Percentage of heavy vehicles
  - (d) Volume distribution across lanes for multi-lane entries

- (4) Operational Analysis input and output (PDF)

### **901.4.1 Roundabouts**

The following additional items are required for Roundabout Review Packages:

- (1) Fastest Path Speed Checks in accordance with NCHRP 672 Section 6.71 (PDF and CADD)
- (2) Sight Distance Checks in accordance with NCHRP 672 Section 6.7.3 (PDF and CADD)

### **901.4.2 Diverging Diamond Interchanges**

The following additional items are required for Diverging Diamond Interchange Review Packages:

- (1) Horizontal alignment data including baseline locations, curve data, stationing, and cardinal points (PC, PT, etc.)
- (2) Vertical alignments
- (3) Cross slopes
- (4) Conceptual Drainage Plan

## 902 Estimated Quantities Report

Modification for Non-Conventional Projects:

Delete **FDM 902** and replace with the following:

Provide a Summary of Pavement summary box with planned asphalt quantities on a General Notes sheet within the “Released for Construction” plan set. Develop and report quantities in accordance with the [Basis of Estimates Manual](#). Include documentation that supports the asphalt quantities shown in the summary box.

The Estimated Quantities (EQ) Report is required for all projects that begin the design phase starting in January 2021. The EQ Report ~~may be provided~~ **is also required** for projects being produced in OpenRoads Designer that began design prior to January 2021.

### 902.1 General

The EQ Report is a single PDF file that contains all pay item and quantity information for the project. The EQ Report consists of a signature page and a series of summary tables, and must be developed and delivered according to the guidelines and formats defined by:

- [Basis of Estimates Manual](#)
- Structures Manual
- [CADD Manual](#), Section 8.4.3
- **FDM 902**

The FDOT Automated Quantities Training Guides [s for FDOT Connect](#) provides additional instructional information.

Beginning with the Phase III submittal include the EQ Report with each required phase submittal. Submittals are to include the electronic shape files and other appropriate documentation (e.g., calculations, sketches, or spreadsheets) that support the quantities shown in the report.

For a strung project with two or more FPID numbers, develop an EQ Report for each FPID number.

For a single project with multiple ~~funding sources~~ (FPID number sequencing), develop a single EQ Report with separate summary tables for each ~~funding source~~ **sequencing**.

## 902.2 Signature Page

The signature page is typically an 11”x17” sheet (landscape). Place this page at the front of the EQ Report and include the information shown in **Figure 902.2.1**. Show all FPID numbers on the signature page when a project has multiple funding sources.

The final EQ Report document is digitally signed and sealed only by the Department’s lead designer or lead consultant firm Engineer of Record (EOR). The page must show the Digital Signature Appearance of the EOR along with a representation of their Seal.

See **FDM 130** for digital Signing and Sealing requirements.

**Figure 902.2.1 Signature Page Information**

<b>ESTIMATED QUANTITIES REPORT</b>	
Financial Project ID: 123456-1-52-01	
Contract Number: T0000	
Project Description: SR 22 (Wewa Highway), Bay County	
This document has been digitally signed and sealed by:	
Luke S. Walker	
2020.10.14 16:52:48 – 4’00’	
on the date adjacent to the seal.	
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.	
Roadway Engineers, Inc.	
123 Main Street	
Tallahassee, FL 32301	
Luke S. Walker, P.E. No. 99991	
The estimated quantities contained in this document:	
1. Were developed in compliance with Florida Department of Transportation procedures, processes, and requirements.	
2. Contain no known errors or omissions.	
3. Match the pay item numbers and quantities in Designer Interface for AASHTOWare Project Preconstruction™.	

## **902.3 Summary Tables**

The summary tables to be used to create the EQ Report must be generated using the Quantity Takeoff Manager (QTM). The [CADD Manual](#) provides a list of summary tables that will be generated by the QTM. Do not modify the filename of the spreadsheets or format of the summary tables. Any modification to file name or format creates errors in the generated EQ Report.

Place quantity and location information into the created summary tables for those items that are not auto populated (extracted quantities from the design files). Once the Excel summary tables are fully populated use the Summary Reports Builder tool to create the EQ Report. The created report is done on 11"x17" pages (landscape) and are generally in ascending order of pay item numbers.

Each page of the report will contain only one summary table type. A continuation of a summary table onto subsequent pages may occur.

### **902.3.1 Designer Notes and Construction Remarks**

Designer notes can be added to the summary tables prior to generating the EQ Report. The Designer Notes column is used to provide clarification on how the quantities were derived. Do not use this column to provide direction to the contractor.

Do not place any data or information in the Construction Remarks column.

## **902.4 EQ Report Requirements**

The Department's lead designer or lead firm Engineer of Record (EOR) is responsible for generating the EQ Report and for validating that the pay items and quantities contained in the report are the same as those loaded into Designer Interface for AASHTOWare Project™ Preconstruction.

Title the EQ Report PDF file with the FPID number followed by "-ESTIMATES-QUANTITIES.pdf. (e.g., 12345615201-ESTIMATES-QUANTITIES.pdf).

## **902.5 Loading Pay Item Information into Designer Interface**

For the Phase II submittal the designer is typically responsible for loading only pay item numbers into Designer Interface for AASHTOWare Project™ Preconstruction. When only loading pay item numbers, create a PDF file of the Summary of Pay Item Report

generated in AASHTOWare Project™ Webgate Reporting. Notify the Department Project Manager when this is completed via email with the report PDF file attached.

When including preliminary quantities at Phase II (at request of the district), create the EQ Report and include with Phase II submittal. Creating the Summary of Pay Item Report and notifying the Department Project Manager is not required.

For the Phase III submittal, and subsequent submittals, the designer is responsible for entering (or updating) pay items and quantities into Designer Interface.

### **902.5.1 Designer Interface Quantities Builder**

When the summary tables are populated with quantities, the Designer Interface Quantities Builder tool can be used to upload pay item number and quantity information into Designer Interface for Phase III submittal and all subsequent submittals.

Only the Department's lead designer or the lead consultant firm EOR may use the quantity tool to upload pay items and quantities. Each time the export tool is used the existing Designer Interface information is over-written.

## 905 Cross Sections

### 905.1 General

Cross sections depict the existing ground and manmade features, and proposed roadway template as sections perpendicular to the respective stations along a centerline or baseline of construction.

Cross section sheets are used to provide supplemental information during the plans phase review process. These sheets may also be used for coordination purposes (e.g., permit or utility, local agency, public meetings). These sheets are not to be placed within the Contract Plans Set. Signing and sealing these sheets is not required.

Enter a PDF of these sheets into the Electronic Review Comments (ERC) system with the Phase II and Phase III plans submittals. Include these sheets with the Phase IV ERC submittal when there are Phase III comments related to the cross sections. Provide a PDF of the cross section sheets for coordination purposed as needed (e.g., permits, utilities, public meetings).

See *Exhibit 905-1* for an example of a Cross Section Sheet.

### 905.2 Sheet Set Up

This sheet may be produced on a standard-format sheet (11"x17") or a large-format sheet (36"x48" or 36"x72"). Use landscape orientation regardless of sheet size selected.

Place as many cross sections on a sheet as possible using multiple columns of sections when appropriate. Create cross sections using a scale of 1" = 20' horizontal and 1" = 10' vertical. The standard cross section interval is 50 feet. Another interval may be used when appropriate based on the type and complexity of the project.

Show cross sections with stations increasing from the bottom to the top of the sheet and multiple columns placed from the left to the right.

Cross sections for mainline, side streets, and ramps are typically shown on separate sheets within a single PDF. The order of cross sections contained in the PDF should be the mainline, side streets, then ramps.

Display the begin and end earthwork stations and include the name of the mainline (e.g., SR 22), side street (e.g., Easy Street), or ramp (e.g., Ramp A). Indicate exception limits (e.g., Bridge No. 770175 STA 105+20 to 109+60).



### 905.3 Required Information

As illustrated in **Exhibit 905-1**, each cross section must include a background grid at the appropriate scale. Display the station for each cross section must be shown in the lower right area of the grid. Display (in feet) the horizontal offset from centerline along the bottom of the grid. Display the vertical elevation along both sides of the grid.

Each cross section must provide the following:

- (1) Label the centerline or baseline of construction.
- (2) Show and label R/W limits.
- (3) Show existing ground lines.
- (4) Show below ground portions of existing features, e.g., pavement, curb, sidewalk.
- (5) Show and label parallel underground utilities.
- (6) Show the proposed roadway template and include:
  - (a) Profile grade elevation
  - (b) Special ditch elevation
  - (c) Pavement and sidewalk cross slope
  - (d) Median and outer slope ratio
- (7) Show, and label, the lower limits (undercut line) of the removal of organic or plastic material. See **FDM 216** and [Standard Plans, Index 120-002](#) for the requirements of subsoil excavation; i.e., removal of unsuitable organic or plastic soils.

Showing parallel drainage pipes or structures is not required.

## **Exhibit 905-1: Cross Sections**

## 911 Model Management Sheet

### 911.1 General

The Model Management sheet provides information for the order and naming of the models developed for the project.

The Model Management sheet is produced as a contract document and placed within the Roadway Plans. The sheet may be a standard-format plan sheet (11"x17") or a large-format plan sheet (36"x48" or 36"x72") and may use any scale provided that the required information is clearly depicted.

The required information should be shown on a single plan sheet. Development of this sheet early in the design phase establishes an effective segmentation of the project.

See *Exhibit 911-1* for an illustration of the Model Management sheet.

### 911.2 Creation of Model Management Sheet

Display and label the centerline or baseline of construction on the sheet with station numbers close to station ticks. Include a north arrow, typically in the upper right portion.

Display proposed limits of pavement, curbs, traffic separators, sidewalks, curb ramps, and driveways. Show proposed bridges and approach slabs by simple outline. The labeling of any of these features is not required. If the topographic file is displayed, it should be gray scale. The intent is to show an outline of the proposed roadway to give context to the limits of each model segment.

Indicate the segments (portions of the centerline) that the project is broken into for the purpose of model development. Provide labeling that includes:

- (1) File name of model(s) associated with a segment.
- (2) Name of roadway centerline or baseline construction.
- (3) Station limits contained within the model.

## **Exhibit 911-1: Model Management**

## 915 Roadway Plan-Profile Sheet

### 915.1 General

The signed and sealed Building Information Model (BIM) files contain the complete horizontal and vertical geometry definitions for the project. The Roadway Plan-Profile sheet shows a 2D representation of the design contained within the model(s). Various roadway elements such as pavement width, medians, paved shoulders, curbs, drainage elements, tapers, turn provisions, and intersecting roadways, are annotated on this sheet.

This sheet may be produced on a standard-format sheet (11"x17") or a large-format sheet (36"x48" or 36"x72"). Use landscape orientation regardless of sheet size selected.

Roadway profiles are typically provided for new construction and reconstruction projects and are shown with the plan view on the same sheet. When roadway profiles are not needed, title the sheet as Roadway Plan Sheet.

When appropriate, the plan or plan-profile sheet may utilize multi-stacking (subdividing sheet horizontally); each panel containing a roadway plan view with (when appropriate) the corresponding roadway profile directly below.

Use the following horizontal scales:

	<u>Standard</u>	<u>Optional</u>
Curbed Roadways	1" = 40'	1" = 50'
Flush-shoulder Roadways	1" = 50'	1" = 100'

See **Exhibit 915-1** for an example of a Roadway Plan-Profile sheet.

### 915.2 Roadway Plan

Display a north arrow and scale within each plan view, typically in the upper right portion.

Display roadway plan view such that the centerline of construction or baseline of construction stationing is increasing from left to right. Display bearings for tangent sections (in the direction of stationing) below the centerline or baseline. Display station numbers close to station ticks.

Display and label existing topography, including roads, streets, drives, buildings, underground and overhead utilities, walls, curbs, pavements, fences, railroads, bridges, drainage structures and similar items, as well as streams, ponds, lakes, wooded areas,

ditches, existing gasoline storage tanks within limits of topographical survey, and other physical features.

## **915.2.1 Required Labeling and Information**

Include labeling and dimensions only to the extent necessary to convey the design intent of the improvements. Provide the following labeling and dimensions:

- Flag and station the begin and end project limits, and construction limits. Project limits should be at the beginning and the end of the full typical sections. Begin construction and end construction where construction limits are other than project limits. Transitions for maintenance of traffic and other construction work such as feathering, friction course, guardrail, drainage work, signing and marking work, and sidewalk may fall outside of the project limits but must be included within the construction limits. If plans include more than one project, identify the limits for each by Financial Project ID.
- Display station equations along centerline or baseline of construction.
- Flag and station the begin and end of project exceptions (e.g., excluded intersections, bridges).
- Indicate each type of construction classification where more than one type is involved (e.g., new construction, resurfacing, bridge work, widening, and milling). Use shading, patterning, or labeling to convey the information. Indicate the limits of pavement and grading at side street intersections. Provide a legend when shading or patterning is used.
- Display proposed curbs, traffic separators, sidewalks, curb ramps, retaining walls, and driveways. Label curbs and curb ramps indicating type. Label and dimension sidewalks, medians, and traffic separators at intervals no greater than 2,500 ft.
- Dimension traveled way along mainline at intervals no greater than 2,500 ft., or where pavement widths change. Dimension traveled way of side streets and driveways.
- Display drainage system by depicting drainage pipes and French drain with a single line, and the outline of inlets, manholes, junction boxes, and outfall features (e.g., MES, end wall). Identify by structure number only. Do not label pipe size or length.
- Display box culverts and three-sided culverts. Identify by structure number only. Do not label culvert size or length.
- Display and label R/W lines at intervals no greater than 2,500 ft. Display and label construction easements or license agreements.
- Display and label the limits of wetlands based on permit or regulatory requirements.

- Display and label utilities. Indicate the line voltage for all overhead electrical power lines. Label field verified underground utilities with the following symbol:

$V_{vh}$  = Verified Vertical Elevation and Horizontal Location

- Identify all traffic monitoring sites in or within one-half mile of the project limits with the following notation:

Traffic Monitoring Site Number (XXXX)

Roadway Section Number (XXXX)

Milepost (XX.XXX)

Site includes vehicle detectors in roadway and pedestal, pole or base mounted cabinet, buried cable, and solar power unit on R/W. Inquiries about monitoring sites should be addressed to the Traffic Data Section Manager of the [Transportation Statistics Section](#) [Transportation Data and Analytics Office](#), Office of Planning.

Projects with minor utility work or impacts may include these features on the Roadway Plan-Profile sheet.

## 915.2.2 Horizontal Curves

PC and PT points of horizontal curves are designated by small circles with short radial lines from these points, and PI points by a small triangle with a short section of tangent on either side. Display horizontal curve data using the following format:

### CURVE DATA

PI	(Station)	R	(Radius Length)
$\Delta$	(Delta Angle with Direction)	PC	(Station)
D	(Degree of Curve)	PT	(Station)
T	(Tangent Length)	e	(Superelevation Rate)
L	(Length of Curve)		

## 915.2.3 Bridges and Bridge Culverts

Bridge-sized culverts (a.k.a., bridge culverts) are defined in **FDM 265.1**. Flag and station the begin station and end station for the bridge culvert (outside wall to outside wall). Provide a bridge number and a drainage structure number for all bridge culverts.

Display proposed bridges and approach slabs by simple outline. Flag and station the begin station and end station for the bridge and for the approach slabs. Provide a bridge number for all bridges.

When appropriate, display a short section of lateral ditch/outfall centerline on the Roadway Plan-Profile sheet.

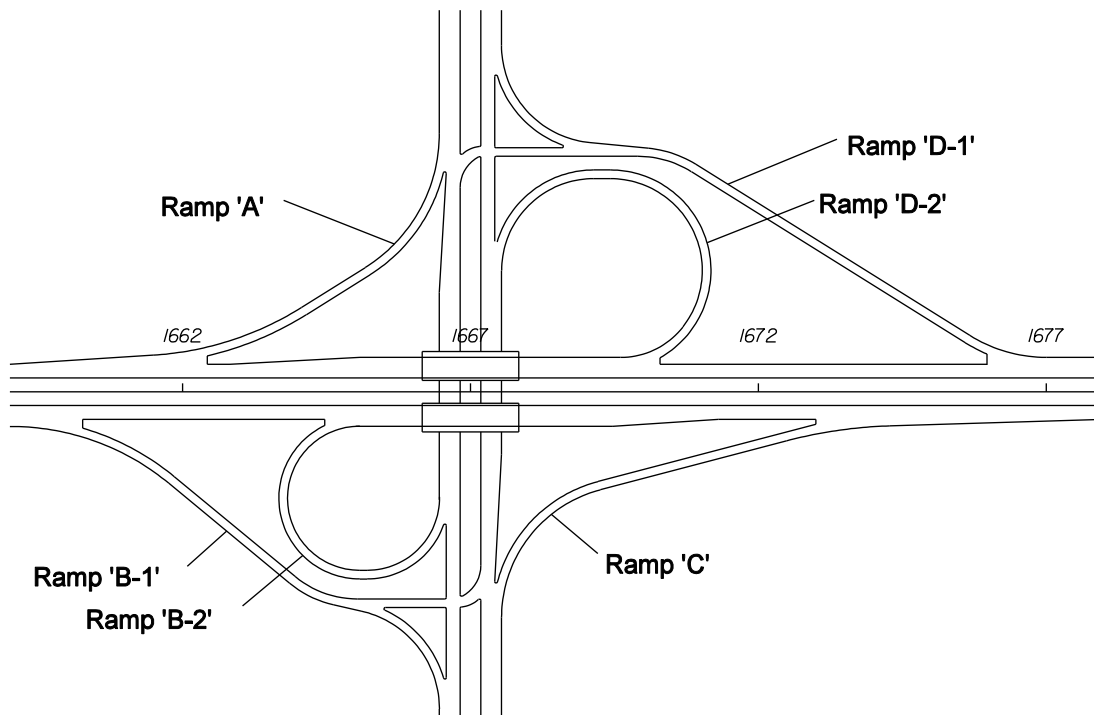
## 915.2.4 Interchanges

The entire interchange should be shown on one sheet using a 1" = 100' scale. With larger interchanges, consider using match lines and placing extended portions of alignment in available space on the sheet.

Display the ramp baseline of construction, typically located on the right edge of the pavement with respect to the direction of traffic. Ramp stationing should be increasing in the same direction as the project.

Identify ramps using letters or a combination of letters and numbers (e.g., Ramp A, Ramp B-1, Ramp B-2). Ramps in the first left quadrant along mainline stationing should be assigned first. Name assignments progress in a counterclockwise direction around the interchange (see **Figure 915.2.1**). For projects with two or more interchanges, continue name assignments with the next letter and in same counterclockwise direction noted above.

**Figure 915.2.1 Interchange Layout**





Frontage roads should be assigned a unique alpha or numeric designation to avoid confusion with ramp nomenclature.

### **915.2.4.1 Ramp Terminal Details**

Consider providing ramp terminal details at a scale of 1" = 40'. Ramp terminal details should be shown on the same page as the interchange.

## **915.3 Roadway Profile**

Display roadway profiles directly below the corresponding roadway plan view. As illustrated in **Exhibit 915-1**, each roadway profile must include a background grid at the appropriate scale. The horizontal scale and interval stationing for the roadway profile must be the same as that used for the roadway plan view. The vertical scale is typically 10% of the horizontal scale (e.g., 1" = 100' horizontal scale would typically use a 1" = 10' vertical scale)

Align the begin roadway profile stationing with the begin roadway plan view stationing. Display stationing along the bottom of the grid. Display the vertical elevation along both sides of the grid.

### **915.3.1 Required Labeling and Information**

Include labeling and dimensions only to the extent necessary to convey the design intent of the improvements. Provide the following labeling and dimensions:

- Flag and station the begin and end project, and construction limits matching what is shown in the roadway plan view.
- Label percent grade for each tangent section. When two tangent grades intersect and no vertical curve is required, label the PI station and elevation.
- Flag and station the superelevated sections (see **FDM 915.3.3**).
- Show the cross-section template of the underlying road, railroad, or waterway for bridges and box culverts along the centerline or baseline of construction. Display minimum vertical clearances for bridges.
- Display and label only transverse underground utilities.

Do not display proposed drainage pipes or inlets in the profile view.

### **915.3.1 Vertical Curves**

Indicate vertical curve PCs and PTs by small circles and PIs by a small triangle with short sections of tangent shown on each side. Extend vertical lines from the PC and PT points and place a dimension line indicating the length of the vertical curve. The PC and PT stations and elevations must be labeled on the vertical lines.

For vertical curves, show the profile grade elevations on even stations and at appropriate intervals. Place the elevations between the dimension line and the grade line. Also, place the curve length, dimension lines and the profile grade elevations above the grade line for sag vertical curves and below the grade line for crest vertical curves. Place the dimensions and elevations reasonably near the grade line. The PI station and elevation must be noted, lettered vertically above the PI symbol for crest curves and below for sag curves.

Show the profile grade elevation of the beginning and ending station of each sheet vertically just above the grade line, except when the beginning or ending station is on a vertical curve.

### **915.3.2 Superelevation**

Standard superelevation details shown in [Standard Plans](#), *Indexes 000-510* and *000-511* may be used for projects with simple curves.

Show superelevation profiles for:

- Reverse curves
- Compound curves
- Other conditions requiring special superelevation not covered in the standards

Show complete profile grade line and edges of pavement (right and left) within the superelevation zone on the grid format. Label the begin and end superelevation stations and indicate the section in full superelevation.

### **915.3.4 Special Ditch Profile**

For flush-shoulder roadways, display and label special ditches in the profile. Show percent ditch grade and a beginning or ending ditch PI with elevation and station plus. For multi-lane divided projects, three special ditch grades (right and left roadway ditches and median ditch) sometimes occur at the same location. In such cases, it may be advantageous to show the median ditch at a convenient location on the sheet with a separate elevation datum.

Depict uniform ditches of non-standard depth by a dimension line in the lower portion of the grid and label as a special ditch with location and depth or show them by flagging the DPIs at each end with station elevation and side. Standard depth ditches are not labeled.

### **915.3.5 Special Gutter Grades**

Show special gutter grades in profile for cases where the gutter grades are not controlled by the typical section. Include prolongations of gutter profile grades across street intersections on plan-profile sheets if an inlet is not provided before the intersection.

### **915.3.6 Special Sidewalk Profiles**

Display and label special sidewalk profiles when the profile grade of the proposed sidewalk is independent of the roadway profile. Sidewalk profiles are typically located at the back of the proposed sidewalk (closest to the R/W).

When special sidewalk profiles are included on the Roadway Plan-Profile sheet, indicate the location of the sidewalk profile grade line (PGL) on the typical section.

## **915.4 Ramp Profiles**

Develop ramp profile grades along the baseline of each ramp. A profile of the edge of the pavement opposite the baseline is typically shown as well. Show ramp profiles anywhere within available space on the Roadway Plan-Profile sheet.

Use the same scales used for the Roadway Plan-Profile sheet displaying the interchange. Each ramp profile must include a background grid at the appropriate scale.

### **915.4.4 Spline Grade**

Spline grades are used to show the interconnection and interrelation of the ramp edge of pavement with the mainline edge of pavement. Showing this profile in the plans is typically not necessary. However, if the mainline pavement is superelevated or within the superelevation transition zone, the profile can be beneficial to illustrate the design intent.

Display the spline grade elevations at intervals of 20 or 40 feet. Show elevations for the outer edge of mainline pavement and inner and outer edges of the ramp pavement at the nose areas.

Join the grades of each pavement edge by smooth splines or simple curves. Label the three grade profiles and all equality stations. Flag and label nose stations. Place the scale in proximity of the profile.

## **915.5 Special Profiles**

Showing special profiles in the plans is typically not necessary. However, if it is determined that providing a special profile in the plans is beneficial to show the design intent, they should be shown anywhere within available space on the Roadway Plan-Profile sheet.

Standard scale used for special profiles should be 1" = 20' horizontally and 1" = 2' vertically. Each profile must include a background grid at the appropriate scale.

### **915.5.1 Intersections**

Supplemental profiles at intersections may be necessary to define edge of pavement profiles. Include sections showing pavement surface elevations for nose points and other critical locations. Label the existing ground line and curb line per the [CADD Manual](#).

### **915.5.2 Curb Returns**

Curb return profiles may be necessary to define the gutter flow line from the PC to the PT point of the return at an intersection.

Identify each return profile and its PC and PT stations shown. Elevations should be shown at appropriate intervals and low and high spots must be identified by location and elevation.

### **915.5.3 At-Grade Railroad Crossings**

Supplemental profiles for at-grade railroad crossings may be necessary to define lane lines, edges of pavement, and gutter flow lines.

## **Exhibit 915-1: Roadway Plan-Profile**

## 916 Drainage Structures Sheet

### 916.1 General

The signed and sealed Building Information Model (BIM) files contain the complete drainage system information for the project. The Drainage Structures sheet provides supplemental data and information for proposed drainage structures, including:

- (1) Drainage Plan View
- (2) Drainage Profiles
- (3) Drainage Tabular Information
- (4) Drainage Special Details and Notes
- (5) Optional Materials Tabulation

The Drainage Structures sheet is produced as a contract document and placed within the Roadway Plans. This sheet may be produced on a standard-format sheet (11"x17") or a large-format sheet (36"x48" or 36"x72"). Use landscape orientation regardless of sheet size selected. Sheet size selection should be based on size and extent of drainage network(s). The Drainage Structures sheet should display the complete extents of individual drainage network(s).

Use the following horizontal scales:

	<u>Standard</u>	<u>Optional</u>
Curbed Roadways	1" = 40'	1" = 50'
Flush-shoulder Roadways	1" = 50'	1" = 100'

Provide a legend for all abbreviations included in the drainage tabular information. See **Exhibit 916-1** for an illustration of the Drainage Structures sheet.

### 916.2 Drainage Plan View

The drainage plan view is typically shown in the upper half of the sheet. The purpose of this view is to highlight the drainage network(s) that will be shown in the profile views and included in the tabular data. The display limits of the drainage plan view should contain the entire proposed drainage network. If multiple drainage networks are shown or overlap, clearly indicate which network the profile and tabular information is associated with.

## 916.2.1 Required Information

Provide the following information in the plan view:

- Display the view such that the centerline of construction or baseline of survey stationing is increasing from left to right. Display station numbers close to station ticks. Include a north arrow and scale above and near the drainage plan view.
- Display proposed limits of pavement, curbs, traffic separators, sidewalks, curb ramps, and driveways. Show proposed bridges and approach slabs by simple outline and indicate the bridge structure number. The intent is to show an outline of the proposed roadway to give context to the location of the drainage structures. The elements of the proposed roadway should be gray scaled.
- Display and label existing and proposed underground utilities only where a conflict exists. Identify the underground utility as a conflict node.
- Display the proposed drainage system by depicting drainpipes with a single pipeline style indicating direction of flow, and the outline of inlets, manholes, junction boxes, and outfall features (e.g., MES, endwall).
- Display and label existing structures that are to be filled, plugged, and remain in place.

Do not display existing topography, except to the extent those elements are to be incorporated into, affected by, or accommodated by the proposed drainage system. Existing topography elements may include roads, streets, driveways, buildings, underground and overhead utilities, walls, curbs, pavements, fences, railroads, bridges, drainage structures and similar items, as well as streams, ponds, lakes, wooded areas, ditches, existing gasoline storage tanks within limits of topographical survey, and other physical features. When shown, display existing topography elements as gray scaled.

## 916.2.2 Structure and Pipe Numbers

Provide drainage structure numbers, and a pipe number between structures. Include the bridge number for proposed bridge culverts. Establish the structure and pipe numbers using the convention shown in **Exhibit 916-1** and described as follows:

- (1) Storm drain networks: Assign structure numbers in ascending order along the centerline of construction or baseline of construction. Assign pipe numbers to correlate with the structure at the hydraulically upper end of pipe.

- (2) **Cross drains:** Assign structure number in ascending order along the direction of flow (hydraulic upper end to lower end). Intermediate structure numbers along the same cross drain typically use the same beginning structure number with suffix letter. Assign pipe numbers to correlate with the structure at the hydraulically upper end of pipe.

## 916.3 Drainage Profile

Drainage profiles are typically shown in the lower left portion of the sheet as illustrated in **Exhibit 916-1**. Stack or space the profiles to avoid overlapping of structures or notes. Display drainage profiles from left to right, beginning with the structure at the hydraulically upper end of the system run to the outfall or structure at the hydraulically lower end. All storm drain networks, cross drains and side drains are to be shown in profile view.

Each drainage profile must include a background grid at the appropriate scale. Use the same horizontal scale for the profile portion that is used for the plan portion. The vertical scale is typically 10% of the horizontal scale (e.g., 1" = 50' horizontal scale would typically use a 1" = 5' vertical scale).

### 916.3.1 Required Information

Drainage profiles depict vertical relationships of the drainage network or cross drain along the centerline of the pipes. Provide the following information for each drainage profile:

- Display drainage structures (typically depicted as rectangles) and connecting pipes. Place the outside edge of the first structure at the first vertical grid line as shown in **Exhibit 916-1**. Assign the value of zero to the first vertical grid line; subsequent vertical grid lines reflect the true distance along the pipe system.
- Label drainage pipes and structure numbers.
- Display and label existing and proposed surfaces along centerline of pipe. Displaying surfaces past the limits of the first and last pipes is not required.
- Provide horizontal grid line elevations along the left side of the background grid.
- Display and label existing and proposed underground utilities. When appropriate, identify underground utility as a conflict node.



## **916.4 Drainage Tabular Information**

The Drainage Tabular Information is typically shown on the lower right portion of the sheet and consists of four tables:

- (1) Pipe Data
- (2) Structures Data
- (3) Endwall and MES Data
- (4) Optional Materials

If there is insufficient space on the Drainage Structures sheet, the Drainage Tabular Information may be placed on a separate sheet titled "Drainage Structures Data".

### **916.4.1 Pipe Data**

The Pipe Data table contains the following information:

- Pipe number, length, and size
- Hydraulic upper end structure number with invert elevation
- Hydraulic lower end structure number with elevation
- Optional materials group number

### **916.4.2 Structures Data**

The Structure Data table contains the following information for each structure:

- Structure number
- Baseline feature
- Structure location (baseline station and offset)
- Structure type and bottom dimensions
- FDOT Standard Plans (Index 400 series) Notes
- Reference point elevation
- Pipe label for each pipe entering or exiting the structure

### 916.4.3 Endwall and MES Data

The Endwall and MES Data table contains the following information:

- Structure number
- Baseline feature
- Structure location (baseline station and offset)
- Structure type
- Pipe invert elevation
- Structure notes

### 916.4.4 Optional Materials

Modification for Non-Conventional Projects:

Delete **FDM 916.6** and see **Chapter 6** of the [Drainage Manual](#) for Optional Material requirements.

Consider optional materials for all pipes; however, match pipe extensions and end section replacements to the existing pipe material. See the Department's [Drainage Design Guide](#) (Optional Pipe Material Chapter) for more information.

Conduct an Optional Pipe Materials Analysis and place an Optional Materials table with the Drainage Tabular Information. The Optional Materials table shows all materials allowed and indicates which material is plotted in the plans and used as the basis for pay item quantities. The Optional Materials table is to include:

- Optional Pipe Group Number
- Size(s)
- Material, thickness or class, corrugation requirements, and protective coating
- Plotted and as-built notations, and construction remarks

## **916.5 Drainage Special Details**

Showing special horizontal or vertical details in the plans is typically not necessary. However, if it is determined that providing a special drainage detail is beneficial to show the design intent, the detail is typically placed in the upper right portion of the sheet but may be shown anywhere within available space on the sheet. Any scale may be used.

The following are examples of information that may be depicted:

- Clash detection results and utility clearances
- Drainage structure details (non-standard structures, pond outfall structures multiple or off-centered pipe connections to a structure wall)
- Isometric and 3D views with identifying labels

## 917 Stormwater Facilities

### 917.1 General

A stormwater facility is often located at the downstream end of the drainage system for the purpose of treatment and attenuation of stormwater runoff. The Stormwater Facilities sheet provides data and information for proposed stormwater facilities, including:

- (1) Stormwater Facility Plan View
- (2) Stormwater Facility Sectional Views
- (3) Outlet Structure Details

This sheet may be produced on a standard-format sheet (11"x17") or a large-format sheet (36"x48" or 36"x72"). Use landscape orientation regardless of sheet size selected.

See *Exhibit 917-1* for an example of a Stormwater Facilities sheet.

### 917.2 Stormwater Facility Plan View

The stormwater facility plan view is typically located in the upper left area of the sheet. It is preferable to display a stormwater facility in its entirety on a single plan sheet. A common horizontal scale for the plan view is 1" = 50' and should not be larger than 1" = 20'.

#### 917.2.1 Required Information

Display and label the following information in the plan view:

- Baseline of construction stationing (typically increasing from left to right) with station and offset ties to the project centerline of construction. Include a north arrow and scale above and near the drainage plan view.
- Elements of the proposed roadway, including drainage pipes and structures.
- Location of stormwater facility sectional views (i.e., A-A, B-B).
- Location of soil borings
- Stormwater facility delineations:

- a) Facility bottom and top (often referred to as Top of Bank). Provide Station/Offset callouts and radiuses along the Top of Bank delineation.
- b) Change of side slope (e.g., 1:2 to 1:4)
- c) Maintenance berm limits
- Maintenance access road, fence and gates, and R/W lines
- Stormwater facility drainage structures and pipes with location of outlet structure sectional views (i.e., C-C, D-D)

### **917.3 Stormwater Facility Sectional Views**

The stormwater facility sectional views are typically located below or adjacent to the plan view. Include a minimum of two sectional views, taken in directions perpendicular to each other (as shown on **Exhibit 917-1**). The horizontal scale should be the same as used for the stormwater facility plan view. The vertical scale is typically 4 to 5 times larger than the horizontal scale; e.g., 1" = 20' horizontal and 1" = 4' vertical.

#### **917.3.1 Required Information**

Display and label the following information in the sectional views:

- Stormwater facility bottom and top (often referred to as Top of Bank) with elevations, side slopes, and maintenance berm.
- Existing groundline, limits of clearing and grubbing, limits of sod or vegetation, and location of R/W and fence
- Symbols and elevation for Normal Highwater and Peak Design Stage.
- Soil borings

Dimension the maintenance berm, and horizontal distance between stormwater facility delineations.

## 917.3.2 Cross Sections

Showing cross sections of the stormwater facility in the plans is typically not necessary. However, if it is determined that the sectional views do not adequately show the design intent, cross sections may be included. Place cross sections anywhere within available space on the Stormwater Facilities sheet and include required information specified in **FDM 917.3.1**.

## 917.4 Outlet Structure Details

The stormwater facility outlet structure details are typically shown adjacent to the plan view. Outlet structure information, elevations, and dimensions may be placed in a data table (as shown on **Exhibit 917-1**) or shown and labeled directly on the outlet structure sectional views. Information, elevation, and dimensions should clearly indicate the fabrication requirement of the modified inlet and skimmers.

### 917.4.1 3D Isometric View

Provide a 3D isometric view of the stormwater facility outlet structure that illustrates:

- Inlet with weir and drawdown. Provide outlet structure drainage structure number.
- Outlet pipe(s), with pipe number
- Skimmer(s)
- Concrete apron

Placement of the 3D isometric view may use any scale and angle that best displays the various components of the outlet structure.

### 917.4.2 Sectional Views

Provide a sectional view across each outlet structure side that contains a weir or drawdown. Sectional views must provide all pertinent dimensions and elevations needed to fabricate the outlet structure and at a minimum illustrate the same elements required for the 3D isometric view. Any scale may be used that clearly conveys the requirements of the outlet structure. Elevation data may be provided in table format as shown in **Exhibit 917-1**.

## **Exhibit 917-1: Stormwater Facility**

## 918 Drainage Map

### 918.1 General

The Drainage Map sheet is required for new construction and reconstruction projects, and for other project types that propose significant changes to the existing hydrology and hydraulics.

The Drainage Map sheet provides an overview of the overland drainage patterns as well as the storm drain system layout and outfall locations. This sheet is used for establishing the appropriate drainage facilities during design, confirmation of overland flow patterns during construction, and for emergency response and maintenance purposes.

This sheet may be produced on a standard-format sheet (11"x17") or a large-format sheet (36"x48" or 36"x72"). Use landscape orientation regardless of sheet size selected.

Use the following horizontal scales:

	<u>Standard</u>	<u>Optional</u>
Closed Drainage System	1" = 200'	1" = 500'
Open Drainage System	1" = 1000'	1" = 2000'

See **Exhibit 918-1** for an example of a Drainage Map.

### 918.2 Required Information

The Drainage Map sheet must comply with the following:

- (1) Use a grey-scaled photographic (aerial) base map as shown in **Exhibit 918-1**.
- (2) Display a north arrow and scale, typically in the upper right portion.
- (3) Display the centerline or baseline of construction with station equations. Show stationing at an appropriate interval.
- (4) Flag and station the begin and end project limits.
- (5) Flag and station the begin and end of bridges and bridge culverts.
- (6) Label road names and state numbers, and side street names.
- (7) Display and label existing physical land features affecting drainage (e.g., lakes, streams, swamps) by name and direction of flow. Show past highwater elevations with date of occurrence, if available, and present water elevations with date of reading.



- (8) Show drainage divides and other information (e.g., pop-off elevations, spot elevations) to indicate the overland flow of water. Show drainage areas in acres.  
Use inserts to show areas that are of such magnitude that the boundaries cannot be plotted at the selected scale. Display basin or subbasin names.
- (9) Display the 100-year flood plain boundaries and elevations. Display delineated wetlands. Identify sink holes and depressions.
- (10) Display arrows to indicate direction of flow along proposed ditches. Show flow arrows from offsite areas at the point where stormwater would approach the FDOT R/W to be routed or controlled by FDOT. Show flow arrows from onsite areas where the flow leaves FDOT R/W.
- (11) Display and label existing drainage structures with type, size, flow line elevations, flow arrows and any other pertinent data. Refer to the ***FDOT CADD Manual*** for correct symbols for existing drainage facilities.  
Data relating to existing drainage structures and pipes may be compiled in a table format and placed within available space on the sheet.
- (12) Display proposed drainage structures, cross drains, storm drainpipes, outfall structures and retention/detention pond locations.
  - (a) Label cross drains by pipe size and structure number
  - (b) Label structures by structure number
  - (c) Label ponds by pond number

### **918.2.1 Flood Data Summary Box**

The Flood Data Summary box provides design discharge, base discharge, and overtopping or greatest flood discharge with corresponding stage values.

Provide the Flood Data Summary box when a new or modified cross drain or box culvert (regardless of size) is proposed, or an existing cross drain or box culvert is impacted by changes to the existing hydrology and hydraulics, and the location of the cross drain or box culvert is within the 100-year floodplain or has a history of flooding or other hydraulic problems.

If there is insufficient space on the Drainage Map sheet, or the Drainage Map is not produced, place the Flood Data Summary box on its own sheet titled "Flood Data Sheet".

The required preformatted summary box is available within in the FDOT CADD Software. An example of a Flood Data Summary box is shown in ***Table 918.2.1***.

**Table 918.2.1      Example of a Flood Data Summary Box**

## **Exhibit 918-1: Drainage Map**