916 Drainage Sheets

916.1 General

The signed and sealed Building Information Model (BIM) files contain the complete drainage system information for the project. The Drainage Sheets provide supplemental data and information for the proposed drainage networks, including:

(1) The Drainage Network Plan sheet shows the plan view of each drainage network, with the proposed project components and underground utilities. This sheet shows the drainage structure information. See ***Exhibit 916-1*** for an example of a Drainage Network Plan sheet.

(2) The Drainage Network Profile sheet shows the portions of each drainage network that run parallel to the baseline or centerline, or may be used for extended pipe networks to off-site ponds. This sheet indicates the pipe network's longitudinal line and grade. See ***Exhibit 916-2*** for an example of a Drainage Network Profile sheet.

(3) The Drainage Network Cross Section sheet is required at all drainage structure(s). See ***Exhibit 916-3*** for an example of a Drainage Network Cross Section sheet.

(4) The Optional Materials Tabulation sheet provides acceptable options for pipe materials and sizes that will satisfy the Design Service Life. The sheet format is available in the FDOT CADD Software. See ***Exhibit 916-4*** for an example of an Optional Materials Tabulation sheet.

(5) The Drainage Special Details sheet shows the design intent of special, non-standard drainage features.

Each proposed drainage network typically has its own Drainage Network Plan sheet(s), Drainage Network Profile sheet(s), and Drainage Network Cross Section sheet(s). Number each proposed drainage network sequentially. See ***Exhibit 910-1*** for an example of a Key Sheet for a project with two (2) drainage networks.

The Drainage Sheets are produced as contract documents and are placed within the Roadway Plans set. The Drainage Sheets should display the complete extents of the individual drainage network(s).

Use the following horizontal scales:

	Standard	Optional
Curbed Roadways	1″ = 40′	1″ = 50′
Flush-Shoulder Roadways	1″ = 50′	1″ = 100′

916.2 Drainage Network Plan Sheet

The purpose of the Drainage Network Plan sheet is to highlight the proposed storm drain pipe network(s), cross drains, and side drains that will be shown in the profile and cross section views.

A Drainage Network Plan sheet is not required when side drains are the only drainage structures included with the project; however, side drains must be shown and labeled on the Roadway Plan sheet and must be included in the Estimated Quantities Report.

The display limits of the Drainage Network Plan sheets should contain the entire proposed drainage pipe networks (using multiple sheets if needed). Where multiple drainage networks are shown or overlap, clearly indicate which network the plan is associated with.

916.2.1 Required Information

Provide the following information:

(1) 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.

(2) Display proposed limits of pavement, curbs, traffic separators, sidewalks, curb ramps, driveways, and R/W lines. 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.

(3) Display and label existing and proposed underground utilities only where conflicts exist. Identify the underground utility as a conflict node.

(4) Display the proposed drainage system by depicting drainage pipes with a single pipeline style indicating direction of flow, and the outline of inlets, manholes, junction boxes, and outfall features (e.g., MES, endwall). The outlines of structure bottoms may be shown.

(5) Label the pipe number, size, and length, in linear feet, between structures.

(6) Display and label existing structures and pipes. Indicate existing structures and pipes that are to be filled or plugged and will remain in place.

(7) When appropriate, show a short section of lateral ditch/outfall centerline on the Drainage Network Plan sheet, and include a note referring to the Lateral Ditch sheet for details.

(8) Place a note as close to the drainage structure as possible, or on a separate sheet if space does not allow, with following information for each structure:

(a) Structure number, station and offset, structure type including J-Bottom dimensions as applicable, standard plan index, end treatment (if applicable), and flow line elevations.

(b) Provide elevations for manhole tops and ditch bottom inlet grates and slots. Show reference point elevations, as indicated in the ***Standard Plans***. Include special grate treatment requirements in the inlet note. Include additional details; e.g., special bedding, 36" manhole rings.

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 (w/ prefix “S”) and a pipe number (w/ prefix “P”) 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 survey. Assign pipe numbers that correlate with the structure at the hydraulically upper end of pipe.

(2) Cross drains and side drains: Assign structure numbers in ascending order along the direction of flow (hydraulically upper end to lower end). Assign the same structure number to intermediate or end structures with a suffix letter (i.e., A, B, C). Assign pipe numbers to correlate with the structure at the hydraulically upper end of pipe. When there are multiple pipes associated with a cross drain or side drain, include a suffix letter.

916.3 Drainage Network Profile Sheet

Stack or space the profiles to avoid overlapping of structures or notes. Stack profiles from top to bottom of the plan sheet. Display drainage profiles from left to right, in the order of the roadway stationing. Drainage Network Profiles are not intended to include the entire project limits, but must be shown where there are drainage structures and pipe networks along the roadway.

Do not include profile views for side drains.

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:

(1) Plot the profile along the drainage network sequentially along the alignment stationing from the beginning to the end of the pipe network.

(2) 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 916-2***. Assign the value of zero to the first vertical grid line; subsequent vertical grid lines reflect the true distance along the pipe system.

(3) Label wall zone pipes.

(4) Label drainage pipe number, flow lines, slope, and structure numbers.

(5) Display and label existing and proposed surfaces along the centerline of the pipe network. Displaying surfaces past the limits of the first and last structures is not required.

(6) Provide horizontal grid line elevations along the left side of the background grid.

(7) Display and label existing and proposed underground utilities. When appropriate, identify an underground utility as a conflict node.

(8) Plot proposed cross drain pipes and culverts at the correct location and elevation of the proposed structure crossing the centerline of the pipe network. Identify cross drains by structure number only.

916.4 Drainage Network Cross Section Sheet

Drainage Network Cross Section sheets show the following information:

(1) All drainage structures and their location

(2) Flow line elevation(s)

(3) Utilities

(4) Vertical relationships of the drainage system

Plot Drainage Network Cross Section sheets for all projects. When only cross drains are proposed for construction or modification, drainage structures may be plotted on the

Roadway Cross Section sheets. Otherwise, plot drainage structures on separate Drainage Network Cross Section sheets utilizing the sheet available in the FDOT CADD Software. See ***FDM 922*** for additional requirements for box and three-sided culverts proposed as drainage structures.

916.4.1 Required Information

For flush shoulder projects, show the existing ground line at the location of the structure, with the existing elevation placed immediately below the ground line at the survey baseline. Do not show existing structures, except those proposed for incorporation into the proposed drainage system or otherwise modified. Note the flow line elevations of the drainage structures shown in the plans. Where storm drains run laterally or diagonally across the project, the drawing should show the pipe cover.

Show the roadway template and proposed structures, with the proposed profile grade elevation, placed above the grade point. Locate the structure by station and offset from the centerline of construction. Provide flow line information at each structure and at each culvert end. Plot drainage structure details according to the applicable ***Standard Plans Index***; e.g., show walls, grates, tops, pipes.

Include the size and length of each proposed J-bottom structure. Show box and three-sided culvert lengths. Depict sections for skewed cross drains along the centerline of the structure. Measure clear zone distances at right angles to the traffic lane for all structures.

Show R/W lines and determine where the construction of a drainage structure may have potential impact on existing R/W.

916.4.2 Utility Conflicts

Identify and resolve drainage structure conflicts with existing or proposed utilities as early in the design process as possible. Plot major underground utilities, as defined in ***FDM 221***, in conjunction with the structures to identify potential conflicts.

Note and plot (to scale) utilities that have been field-verified (Quality Level "A" locate) in the appropriate locations on the Drainage Network Cross Section sheets. These utilities should be labeled with the following symbol:

Vvh = Verified Vertical Elevation and Horizontal Location

916.4.3 Sheet Setup

Place as many cross sections on a sheet as possible using multiple columns of sections when appropriate. Use the same scale that is used for the Roadway Cross Sections.

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. Show the sections successively by stations and number them sequentially, from the beginning to the end of the project.

Label the station and offsets from the appropriate baseline or centerline, as indicated in the ***Standard Plans***.

916.5 Optional Materials Tabulation Sheet

Consider optional materials for all pipes; however, match pipe extensions and end section replacements to the existing pipe material. See the Department's ***Drainage Manual Chapter 6*** and ***Drainage Design Guide*** (Optional Pipe Material Chapter) for more information.

Conduct an Optional Pipe Materials Analysis and prepare an Optional Materials Tabulation sheet. The Optional Materials table shows all pipe materials allowed and indicates which material is plotted in the plans and used as the basis for pay item quantities. The Optional Materials Tabulation sheet includes:

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

Include a separate flex table which identifies the Pipe Label and the Optional Pipe Group Number for each pipe.

Modification for Non-Conventional Projects:
Delete ***FDM 916.5*** and see ***Chapter 6*** of the ***Drainage Manual*** for Optional Material requirements.

916.6 Drainage Special Details Sheet

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 conveying the design intent, the detail is typically placed on a plan 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

S–101
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CONST. CURB INLET TYPE 1
INDEX NO. 425–020
ELEV. 33.18
FL 28.00 (P–101)

S–102
STA. 703+00.00 (45.50 RT)
CONST. CURB INLET TYPE 1
INDEX NO. 425–020
ELEV. 33.10
FL 27.00 (P–101)
FL 27.00 (P–102)

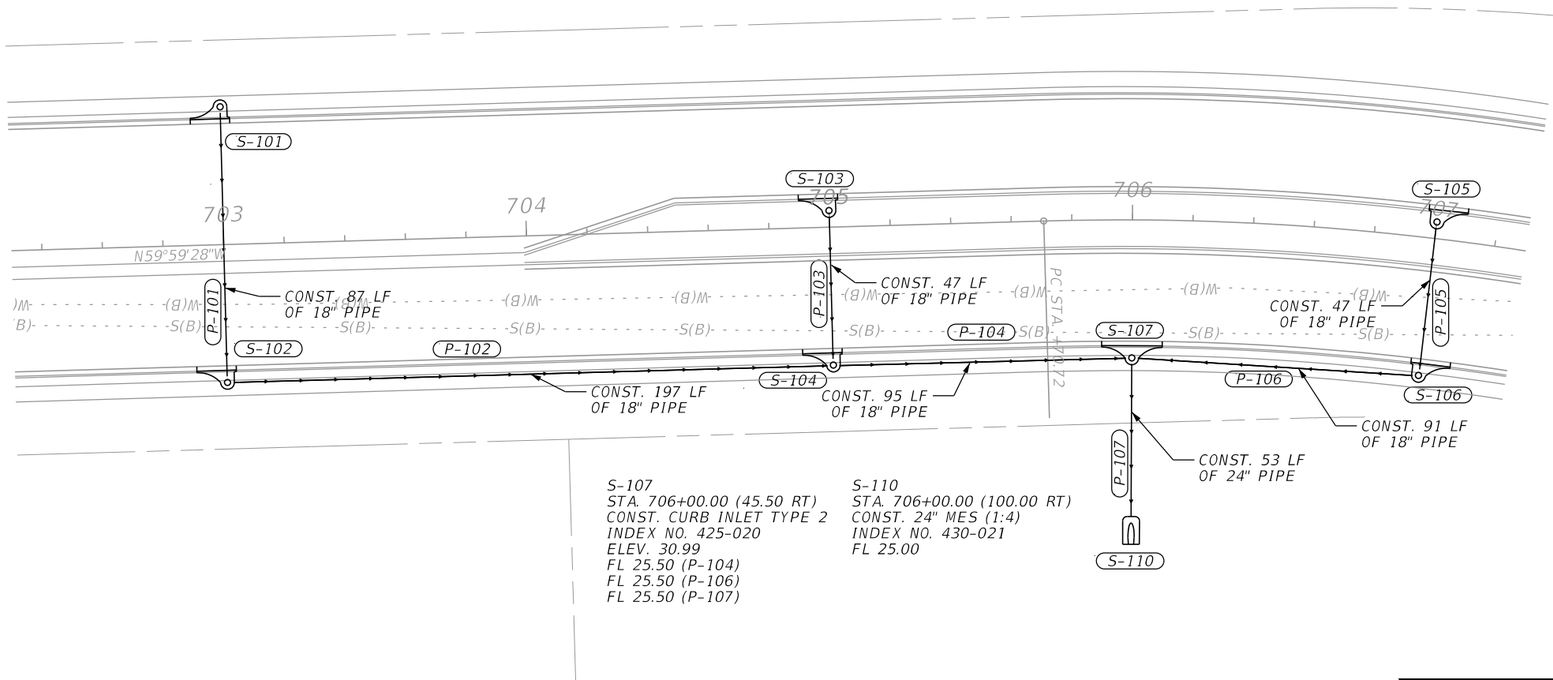
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INDEX NO. 425–020
ELEV. 32.54
FL 26.50 (P–103)

S–104
STA. 705+00.00 (45.50 RT)
CONST. CURB INLET TYPE 1
INDEX NO. 425–020
ELEV. 31.69
FL 26.00 (P–102)
FL 26.00 (P–103)
FL 26.00 (P–104)

S–105
STA. 707+00.00 (5.50 LT)
CONST. CURB INLET TYPE 1
INDEX NO. 425–020
ELEV. 31.69
FL 26.50 (P–105)

S–106
STA. 707+00.00 (45.50 RT)
CONST. CURB INLET TYPE 1
INDEX NO. 425–020
ELEV. 30.47
FL 26.00 (P–105)
FL 26.00 (P–106)

N
1"=50'



S–107
STA. 706+00.00 (45.50 RT)
CONST. CURB INLET TYPE 2
INDEX NO. 425–020
ELEV. 30.99
FL 25.50 (P–104)
FL 25.50 (P–106)
FL 25.50 (P–107)

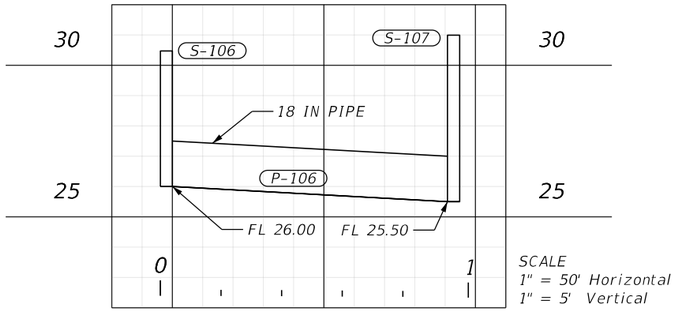
S–110
STA. 706+00.00 (100.00 RT)
CONST. 24" MES (1:4)
INDEX NO. 430–021
FL 25.00

Exhibit 916–1
Drainage Network Plan
Date: 1/1/2026

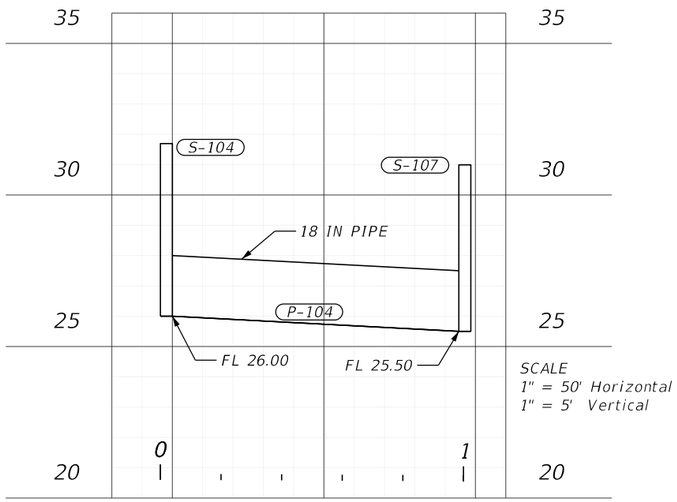
THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15–23.004, F.A.C.

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			DRAINAGE NETWORK 1 PLAN	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOE ENGINEER, P.E. LICENSE NUMBER: 12345 ROADWAY ENGINEERS, INC. PO BOX 125 ANYTOWN, FL 12345	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		1
					SR 22	BAY	123456-1-52-01		

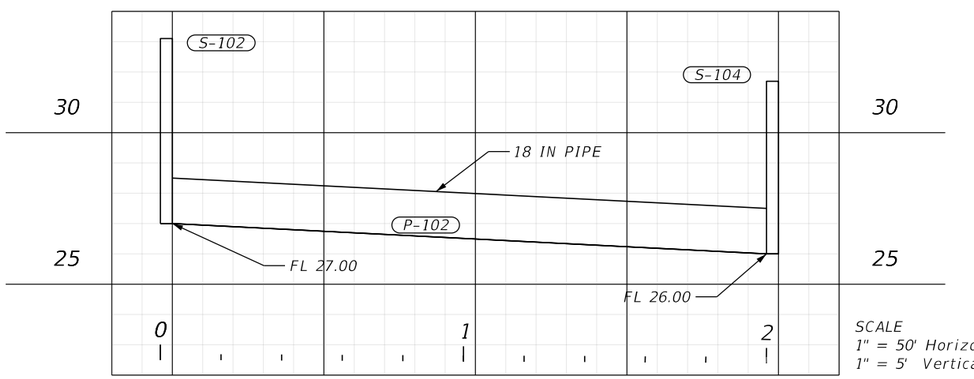
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SCALE
1" = 50' Horizontal
1" = 5' Vertical



SCALE
1" = 50' Horizontal
1" = 5' Vertical



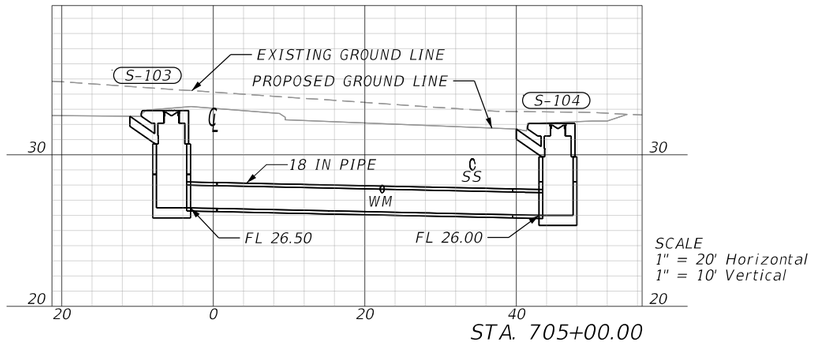
SCALE
1" = 50' Horizontal
1" = 5' Vertical

Exhibit 916-2
Drainage Network Profile
Date: 1/1/2026

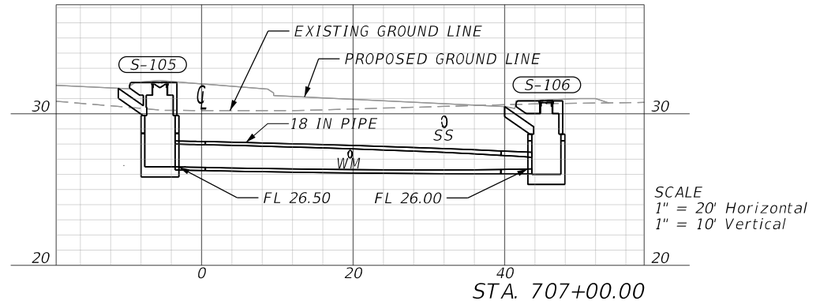
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DATE	DESCRIPTION	DATE	DESCRIPTION	JOE ENGINEER, P.E. LICENSE NUMBER: 12345 ROADWAY ENGINEERS, INC. PO BOX 125 ANYTOWN, FL 12345	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	PROFILE	2
					SR 22	BAY	123456-1-52-01		

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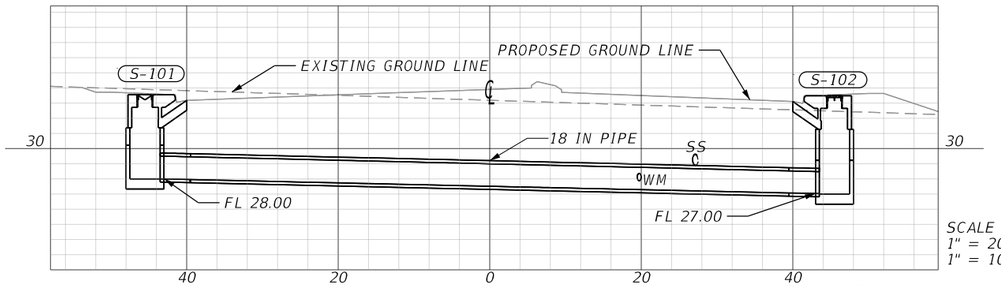
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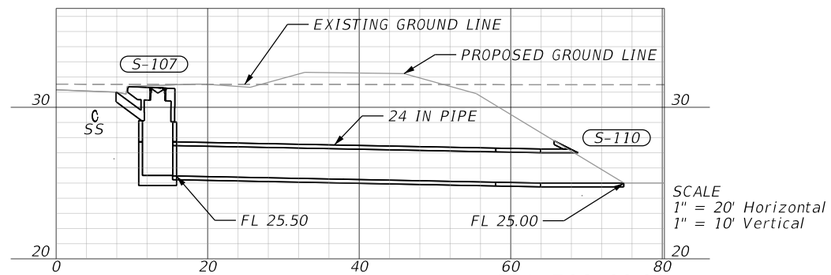
STA. 705+00.00



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STA. 703+00.00



STA. 706+00.00

Exhibit 916-3
Drainage Network Cross Sections
Date: 1/1/2026

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			DRAINAGE NETWORK 1	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOE ENGINEER, P.E. LICENSE NUMBER: 12345 ROADWAY ENGINEERS, INC. PO BOX 125 ANYTOWN, FL 12345	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	CROSS SECTIONS	3
					SR 22	BAY	123456-1-52-01		

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Optional Materials Tabulation					
Group Number	Size(s)	Material	Plotted	As-Built	Remarks
Group 1	18-24	RCP Class II	X		
		SRAP, 16 GA.			
		SRSP, 14 GA.			
Group 2	30	RCP Class IV	X		
		SRAP, 14 GA.			
Group 3	18	RCP Class I	X		
		HDPE Class II			
		PVC ASTM F-949			
		PP			
Group 4	14x23	ERCP, Class II	X		

Pipe Data			
Label	Barrels	Size	Optional Pipe
P-101	1	18	Group 1
P-102	1	18	Group 1
P-103	1	18	Group 3
P-104	1	18	Group 1
P-105	1	18	Group 3
P-106	1	18	Group 3
P-107	1	24	Group 1
P-201	1	14x23	Group 4
P-207	1	30	Group 2

Exhibit 916-4
Optional Materials Tabulation
Date: 1/1/2026

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			OPTIONAL MATERIALS TABULATION	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOE ENGINEER, P.E. LICENSE NUMBER: 12345 ROADWAY ENGINEERS, INC. PO BOX 125 ANYTOWN, FL 12345	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		4
					SR 22	BAY	123456-1-52-01		

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