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SUPPLEMENTAL CONDITIONS

1. Progress Payment Details

3.1 Measurement and Payment and Method of Payment shall be as per the Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction 2010 edition except as indicated below.

3.2 Measurement and Payment and Method of Payment for FDOT and Non-FDOT Pay items shall be as follows.

**Item 1, Work Zone Sign** – Each Day for the purpose of informing motorists of the work zone and work zone related (i.e. temporary regulatory or temporary route) conditions that will be encountered. Provide all materials for the construction and maintenance of all detours. Use only the materials meeting the requirements of Section 990, Design Standards and the MUTCD. Payment will be based on the number of days times the unit bid price.

**Item 2, Temporary Barricades/Channeling Device (Type I)** – Each Day included for the protection of workers and the public from hazards within the traffic control zone. Provide all materials for the construction and maintenance of all detours. Use only the materials meeting the requirements of Section 990, Design Standards and the MUTCD. Payment will be based on the number of days times the unit bid price.

**Item 3, Temporary Barricades/Channeling Device (Type III)** – Each Day included for the protection of workers and the public from hazards within the traffic control zone. Provide all materials for the construction and maintenance of all detours. Use only the materials meeting the requirements of Section 990, Design Standards and the MUTCD. Payment will be based on the number of days times the unit bid price.

**Item 4, Portable Changeable Message Sign** – Temporary - Furnish changeable (variable) message signs that meet the requirements of Section 990 as required by the plans and Design Standards to supplement other temporary traffic control devices used in work zones.

**Item 5, Inlet Protection System** – Each for furnishing and installing Inlet Protection System within the limits defined by Details on the Plans and/or the City of Miami Standard Details and in accordance with the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor,
materials, tools, and equipment and for performing all work required for the complete installation of the Inlet Protection System, ready of service, and shall include all other appurtenant and miscellaneous items and work. Included in the unit cost are all loading, unloading, and transport costs. Payment will be based on the number of Inlet Protection Systems times the unit bid price.

**Item 6, Clearing & Grubbing** – Lump Sum for furnishing the work required for Selective Clearing and Grubbing within the limits defined by Details on the Plans and/or the City of Miami Standards Details and in accordance with the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the removal and disposal of all trees, stumps, roots, tree removal, tree trimming and other such protruding objects, structures, pipes, appurtenances, existing flexible asphalt pavement, and other facilities necessary to prepare the area for the proposed construction. This includes roadway area, ditch area, and areas where culverts or pipe lines will be constructed. Payment will be based on a Lump Sum for Clearing and Grubbing.

**Item 7, Removal of Existing Concrete Pavement** – Square Yards to Remove Existing Concrete Pavement within the limits defined by the Plans, the FDOT Specifications and/or the City of Miami Standard Details or the quantity identified on the plans and as directed by the City. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the demolition of existing concrete sidewalk, the loading, transporting, and proper disposal of the concrete debris. Payment will be based on the number of square yards of Removal of Existing Concrete Pavement times the unit bid price.

**Item 8, Regular Excavation** – Cubic Yards for Regular Excavation within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of Miami Standard Details. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for excavation, widening and other required general excavation, including the loading, transporting, and proper disposal of the removed materials. Payment will be paid for based on the number of Cubic Yards times the unit bid price for Regular Excavation.

**Item 9, Embankment** – Cubic Yards for furnishing and constructing Embankment within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of Miami Standard Details. Greater widths are the Contractor’s option and expense. The price bid shall be full compensation for
furnishing all necessary labor, materials, tools, and equipment and for performing all work required for preparing and transporting mixture, placing, spreading, shaping, compacting and testing for a complete installation of Embankment. Payment will be based on the number of Cubic Yards times the unit bid price for Embankment.

**Item 10. Type B Stabilization** – Square Yards to Install Type B Stabilization within the limits defined by the Plans, the FDOT Specifications and/or the City of Miami Standard Details or the quantity identified on the plans and as directed by the City. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for preparing and transporting mixture, formwork, placing for a complete Type B stabilization. Payment will be based on the number of Square Yards of Type B Stabilization times the unit bid price.

**Item 11, Optional Base, Group 04** – Square Yards to Install Optional Base Group 04 within the limits defined by the Plans, the FDOT Specifications and/or the City of Miami Standard Details or the quantity identified on the plans and as directed by the City. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for preparing and transporting mixture, formwork, placing for a complete Optional Base Group 04. Payment will be based on the number of Square Yards of Optional Base Group 04 times the unit bid price.

**Item 12, Optional Base, Group 06** – Square Yards to Install Optional Base Group 06 within the limits defined by the Plans, the FDOT Specifications and/or the City of Miami Standard Details or the quantity identified on the plans and as directed by the City. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for preparing and transporting mixture, formwork, placing for a complete Optional Base Group 06. Payment will be based on the number of Square Yards of Optional Base Group 06 times the unit bid price.

**Item 13, Milling Existing Asphalt Pavement, 1” Average Depth** – Square Yards for milling the existing asphalt pavement (1-inch average depth) within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of Miami Standard Details. Greater widths are the Contractor’s option and expense. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for milling of the existing asphaltic concrete surface, including the cost of removal and disposal of milled material from the project site. Payment will be based on
the number of square yards of milled asphalt (1-inch average depth) times the unit bid price for Milling Existing Asphalt Pavement (1-inch average depth).

**Item 14, Milling Existing Asphalt Pavement, 2” Average Depth** – Square Yards for milling the existing asphalt pavement (2-inch average depth) within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of Miami Standard Details. Greater widths are the Contractor’s option and expense. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for milling of the existing asphaltic concrete surface, including the cost of removal and disposal of milled material from the project site. Payment will be based on the number of square yards of milled asphalt (2-inch average depth) times the unit bid price for Milling Existing Asphalt Pavement (2-inch average depth).

**Item 15, Milling Existing Asphalt Pavement, 1 1/4” Average Depth** – Square Yards for milling the existing asphalt pavement (1 1/4-inch average depth) within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of Miami Standard Details. Greater widths are the Contractor’s option and expense. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for milling of the existing asphaltic concrete surface, including the cost of removal and disposal of milled material from the project site. Payment will be based on the number of square yards of milled asphalt (1 1/4-inch average depth) times the unit bid price for Milling Existing Asphalt Pavement (1 1/4-inch average depth).

**Item 16, Milling Existing Asphalt Pavement, 1/2” Average Depth** – Square Yards for milling the existing asphalt pavement (1/2-inch average depth) within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of Miami Standard Details. Greater widths are the Contractor’s option and expense. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for milling of the existing asphaltic concrete surface, including the cost of removal and disposal of milled material from the project site. Payment will be based on the number of square yards of milled asphalt (1/2-inch average depth) times the unit bid price for Milling Existing Asphalt Pavement (1/2-inch average depth).

**Item 17, Milling Existing Asphalt Pavement, 3/4” Average Depth** – Square Yards for milling the existing asphalt pavement (3/4-inch average depth) within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of Miami Standard Details. Greater widths are the Contractor’s option and expense. The price bid shall be full compensation for furnishing all necessary
labor, materials, tools, and equipment and for performing all work required for milling of the existing asphaltic concrete surface, including the cost of removal and disposal of milled material from the project site. Payment will be based on the number of square yards of milled asphalt (3/4-inch average depth) times the unit bid price for Milling Existing Asphalt Pavement (3/4-inch average depth).

**Item 18, Type S Structural Course** – Tons for Type S Structural Course within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of expense. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for installing Type S Structural Course, including the cost of removal and disposal of material from the project site. Payment will be based on the number of tons of Type S Structural Course times the unit bid price.

**Item 19, Asphalt Concrete Friction Course, Traffic B, FC-9.5, Rubber** – Tons for Asphalt Concrete Friction Course (Traffic B, FC-9.5, Rubber) within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of Miami Standard Details. Greater widths are the Contractor’s option and expense. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for installing Asphalt Concrete Friction Course (Traffic B, FC-9.5, Rubber), including the cost of removal and disposal of material from the project site. Payment will be based on the number of tons of Asphalnic Concrete Friction Course (Traffic B, FC-9.5, Rubber) times the unit bid price.

**Item 20, Miscellaneous Asphalt Pavement** – Tons for Miscellaneous Asphalt Pavement within the limits defined by Details on the Plans, the FDOT Specifications and/or the City of Miami Standard Details. Greater widths are the Contractor’s option and expense. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for installing Miscellaneous Asphalt Pavement, including the cost of removal and disposal of material from the project site. Payment will be based on the number of tons of Miscellaneous Asphalt Pavement times the unit bid price.

**Item 21, City of Miami Inlets Type “D”** – Each for the furnishing and installing of City of Miami Inlets Type “D” at any depth of cut within the limits defined by the Plans and Details and in accordance with the City of Miami Standards Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of the inlets, ready for service, including exploratory excavation; any sheeting, shoring or bracing;
dewatering; disposing of excess or unsuitable fill material; placing the structures in the trench; all rims, manhole covers, and anchors as required; protecting existing utilities; making all pipe connections; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, and sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of Inlets Type “D” times the unit bid price.

Item 22. FDOT Inlet, DT BOT, Type C, < 10’ — Each for the furnishing and installing of FDOT Ditch Bottom Inlet Type “C” at any depth of cut within the limits defined by the Plans and Details and in accordance with the City of Miami Standards Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of the inlets, ready for service, including exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; placing the structures in the trench; all rims, manhole covers, and anchors as required; protecting existing utilities; making all pipe connections; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, and sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of Inlets Type “D” times the unit bid price.

Item 23. Manholes Type “A” — Each for the furnishing and installing of Manholes Type “A” at any depth of cut within the limits defined by the Plans and Details and in accordance with the City of Miami Standards Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of the manholes, ready for service, including exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; placing the structures in the trench; all rims, manhole covers, and anchors as required; protecting existing utilities; making all pipe connections; cleaning and testing; placing and
compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, and sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of Manholes Type “A” times the unit bid price.

**Item 24, Manhole, Adjust** – Each for the adjusting of an existing Manhole at any depth of cut within the limits defined by the Plans and Details and in accordance with the City of Miami Standards Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete adjustment of the existing manhole, ready for service, including exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; placing the structures in the trench; all rims, manhole covers, and anchors as required; protecting existing utilities; making all pipe connections; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, and sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of existing Manholes to be adjusted times the unit bid price.

**Item 25, Valve Boxes, Adjust** – Each for the adjusting of an existing Valve Box at any depth of cut within the limits defined by the Plans and Details and in accordance with the City of Miami Standards Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete adjustment of the valve box, ready for service, including exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; placing the structures in the trench; all rims, manhole covers, and anchors as required; protecting existing utilities; making all pipe connections; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, and sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal
or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of existing Valve Boxes to be adjusted times the unit bid price.

**Item 26, Drainage Structure – Modify Existing** – Each for the modification of an existing Drainage Structure at any depth of cut within the limits defined by the Plans and Details and in accordance with the City of Miami Standards Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete modification of the drainage structure, ready for service, including exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; placing the structures in the trench; all rims, manhole covers, and anchors as required; protecting existing utilities; making all pipe connections; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, and sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of Modified Existing Drainage Structures times the unit bid price.

**Item 27, Manholes & Inlets Cleaning & Sealing, <10’** – Each for Cleaning and Sealing of Manholes and Inlets (<10-ft) within the limits defined by Details on the Plans and/or the City of Miami Standard Details and in accordance with the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete Cleaning and Sealing of Manholes and Inlets (<10-ft), ready for service, and shall include all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of Cleaned and Sealed Manholes and Inlets (<10-ft) times the unit bid price.

**Item 28, Desilting Pipe (0-24” diameter)** – Linear Feet for Desilting of Pipes (0-24” diameter) within the limits defined by Details on the Plans and/or the City of Miami Standard Details and in accordance with the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete
Desilting of Pipes, ready for service, and shall include all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, transport and disposal cost. Payment will be based on the number of Linear Feet of Desilted Pipe (0-24” diameter) times the unit bid price.

Item 29. Pipe Culvert, Optional Material, Round, 0-24” S/CD – Linear Feet for furnishing and installing Pipe Culvert Round Shape at any depth of cut within the limits defined by Details on the Plans and/or the City of Miami Standard Details and in accordance with the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of the pipe, ready for service, and shall include exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; placing the pipe in the trench; cutting and installing plugs; furnishing joint materials including lubricant; protecting existing utilities; making all pipe connections; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs ditch side. Payment will be based on the number of linear feet of Pipe Culvert (Round) times the unit bid price.

Item 30. Pipe Culvert, Optional Material, Elliptical, 0-24” S/CD – Linear Feet for furnishing and installing Pipe Culvert Elliptical Shape at any depth of cut within the limits defined by Details on the Plans and/or the City of Miami Standard Details and in accordance with the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of the pipe, ready for service, and shall include exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; placing the pipe in the trench; cutting and installing plugs; furnishing joint materials including lubricant; protecting existing utilities; making all pipe connections; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the
unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs ditch side. Payment will be based on the number of linear feet of Pipe Culvert (Elliptical) times the unit bid price.

**Item 31, French Drain, 24”** – Linear Feet for furnishing and installing French Drain at the depth of cut within the limits defined by Details on the Plans and/or the City of Miami Standard Details and in accordance with the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of the pipe, ballast rock, pre gravel, suitable backfill material and filter fabric, ready for service, and shall include exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; placing the pipe in the trench; cutting and installing plugs; furnishing joint materials including lubricant; protecting existing utilities; making all pipe connections; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of linear feet of French Drain times the unit bid price.

**Item 32, Concrete Curb, Type D** – Linear Feet for furnishing and installing Concrete Curb (Type D) at the depth of cut within the limits defined by Details on the Plans and/or the City of Miami Standard Details and in accordance with the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of the pipe, ballast rock, pre gravel, suitable backfill material and filter fabric, ready for service, and shall include exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; placing the pipe in the trench; cutting and installing plugs; furnishing joint materials including lubricant; protecting existing utilities; making all pipe connections; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs ditch side. Payment
will be based on the number of linear feet of Concrete Curb (Type D) times the unit bid price.

**Item 33, Sidewalk Concrete, 4” Thick** – Square Yards to Install New Sidewalks and Pedestrian Ramps, 4” Thick within the limits defined by the Plans, the FDOT Specifications and/or the City of Miami Standard Details or the quantity identified on the plans and as directed by the City. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for preparing and transporting mixture, formwork, placing, compacting and testing for a complete Concrete Sidewalks and Concrete Pedestrian Ramps. Payment will be based on the number of square yards of new installed Concrete Sidewalks and Pedestrian Ramps, 4” thick times the unit bid price.

**Item 34, Sidewalk Concrete, 6” Thick** – Square Yards to Install New Sidewalks, 6” Thick within the limits defined by the Plans, the FDOT Specifications and/or the City of Miami Standard Details or the quantity identified on the plans and as directed by the City. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for preparing and transporting mixture, formwork, placing, compacting and testing for a complete Concrete Sidewalks. Payment will be based on the number of square yards of new installed Concrete Sidewalks, 6” thick times the unit bid price.

**Item 35, Performance Turf, Sod** – Square Yards for sodding within the limits defined by Details on the Plans and Specifications, the City of Miami Standard Details and the FDOT specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for sodding of new swales and any other grassy areas disturbed during construction, including the loading, transporting, and proper disposal of the removed materials. Payment will be based on the number of square yards of installed Sodding times the unit bid price.

**Item 36, Loop Assembly, F&I, Type A** – Each for the furnishing and installing of Loop Assembly (Type A) at locations within the limits defined by the Plans and Details and in accordance with the City of Miami Standards Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of the loop assembly, ready for service, including exploratory excavation; any sheeting, shoring or bracing; disposing of excess or unsuitable fill material; protecting existing utilities; cleaning and testing; installing additional suitable temporary paving; and all other
appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of Furnished and Installed Loop Assemblies (Type A) times the unit bid price.

**Item 37, Single Post Sign, F&I, Less Than 12 SF** – Each for furnishing and installing Single Post Signs (Less than 12 square feet) within the limits defined by Details on the Plans, the Specifications, the City of Miami Standard Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor materials, tools and equipment and for performing all work required for the complete installation of a single post signage, ready for service and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs to installation location. Payment will be based on the number of Single Post Signs (Less than 12 square feet) times the unit bid price.

**Item 38, Single Post Sign, F&I, 12-20 SF** – Each for furnishing and installing Single Post Signs (12-20 square feet) within the limits defined by Details on the Plans, the Specifications, the City of Miami Standard Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor materials, tools and equipment and for performing all work required for the complete installation of a single post signage, ready for service and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs to installation location. Payment will be based on the number of Single Post Signs (12-20 square feet) times the unit bid price.

**Item 39, Single Post Sign, Relocate** – Assembly for Relocating Single Post Signs within the limits defined by Details on the Plans, the Specifications, the City of Miami Standard Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor materials, tools, and equipment and for performing all work required for the complete relocation of single post signage, ready for service and all other similar items as required or necessary, to new locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs to installation location. Payment will be based on the number of relocated Single Post Signs assemblies times the unit bid price.
**Item 40, Single Post Sign, Remove** – Each for removing Single Post Signs within the limits defined by Details on the Plans, the Specifications, the City of Miami Standard Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor materials, tools and equipment and for performing all work required for the complete removal of single post signage; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs for removal. Payment will be based on the number of Single Post Signs to be removed times the unit bid price.

**Item 41, Painted Pavement Marking, Standard, White, Solid, 12”** – Linear Feet for furnishing and installing Solid Painted Pavement Marking (White, 12-inch) within the limits defined by Details on the Plans, the Specifications, the City of Miami Standard Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of solid traffic stripe (white, 12-inch), ready for service, and shall include temporary paving, pavement marking, pedestrian crossings markings and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs to installation location. Payment will be based on the number of linear feet of Solid Painted Pavement Marking (white, 12-inch) times the unit bid price.

**Item 42, Painted Pavement Marking, Standard, White, Solid, 24”** – Linear Feet for furnishing and installing Solid Painted Pavement Marking (White, 24-inch) within the limits defined by Details on the Plans, the Specifications, the City of Miami Standard Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of solid traffic stripe (white, 24-inch), ready for service, and shall include temporary paving, pavement marking, pedestrian crossings markings and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs to installation location. Payment will be based on the number of linear feet of Solid Painted Pavement Marking (white, 24-inch) times the unit bid price.
Item 43, Painted Pavement Marking, Standard, Yellow, Solid, 6” – Net Mile for furnishing and installing Solid Painted Pavement Marking (Yellow, 6-inch) within the limits defined by Details on the Plans, the Specifications, the City of Miami Standard Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of solid traffic stripe (yellow, 6-inch), ready for service, and shall include temporary paving, pavement marking, pedestrian crossings markings and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs to installation location. Payment will be based on the net mile of Solid Painted Pavement Marking (yellow, 6-inch) times the unit bid price.

Item 44, Utility Fixture, F&I, 0-1.9”, Valve/Meter Box – Each for the furnishing and installing of Utility Fixture (0-1.9-in, Valve/Meter Box) at any depth of cut within the limits defined by the Plans and Details and in accordance with the City of Miami Standards Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete installation of the utility fixture, ready for service, including exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill material; protecting existing utilities; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, and sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of Furnished and Installed Utility Fixtures (0-1.9-in, Valve/Meter Box) times the unit bid price.

Item 45, Fire Hydrant, Adjust & Modify – Each for the adjusting and modification of Fire Hydrant at any depth of cut within the limits defined by the Plans and Details and in accordance with the City of Miami Standards Details and/or the FDOT Specifications. The price bid shall be full compensation for furnishing all necessary labor, materials, tools, and equipment and for performing all work required for the complete adjustment and modification of the fire hydrant, ready for service, including exploratory excavation; any sheeting, shoring or bracing; dewatering; disposing of excess or unsuitable fill
material; protecting existing utilities; cleaning and testing; placing and compacting backfill (including rock bed); installing additional suitable backfill material and temporary paving, replacing water and sanitary services, trees, shrubs, sod, and sidewalks, mail boxes, fences, walls, sprinkler systems, and all other similar items as required or necessary, to original locations and to equal or better than original conditions; and all other appurtenant and miscellaneous items and work. Included in the unit cost are all survey, submittals, and shop drawing work; all loading, unloading, and transport costs. Payment will be based on the number of Fire Hydrants Adjusted and Modified times the unit bid price.

**Item 46, Mobilization** – Lump Sum for work and operations necessary to begin work on project. Includes moving equipment and personnel, establishing temporary offices, safety equipment and sanitary facilities. May include surveying, bond and insurance expenses. In some cases, may consist of security services and/or expenses associated with night work. Since this item is bid as a lump sum, payment will be in accordance with the cost breakdown as approved by the Consultant and measured as required by and satisfactory to the Consultant.

**Item 47, Maintenance of Traffic** – Lump Sum for furnishing traffic control including but not limited to flag persons, cones, markers, signs, lighting, flags, and other control devices for directing traffic and maintaining safety, and other aids for the duration of project. Included in this bid item is the payment for off duty Law Enforcement Officers to control and direct traffic. Since this item is bid as a lump sum, payment will be in accordance with the cost breakdown as approved by the Consultant and measured as required by and satisfactory to the Consultant. In addition to all MOT devices required to conform to FDOT Standards, the MUTCD and the City of Miami Standards, an additional 100 (ED) Type II barricades and 50 (ED) temporary construction signs are to be included in the Maintenance of Traffic pay item for the specific use as directed by the Consultant.

**Item 48, Off-Duty Officer** – Hourly for the number of officers required and the number of hours on duty necessary for the maintenance and regulation of traffic flow shall be provided by the City of Miami Police Department.

**Item 49, Tree Removal** - Completely remove and dispose of all timber, brush, stumps, roots, rubbish, debris, and all other obstructions resting on or protruding through the surface of the existing ground and the surface of excavated areas, and all other structures and obstructions necessary to be removed. Payment will be based on the number of trees removed times the unit bid price.
2. **Geotechnical Testing**

The CITY has included as an attachment the geotechnical test report from HR Engineering Services, Inc., dated September 14, 2009.

The Contractor is responsible for any conclusions to be drawn from the boring(s) including the character of the materials to be encountered. The Contractor shall not assume that materials other than those disclosed by the borings will not be encountered or that the proportions and character of the various materials will not vary from those indicated in the boring logs.

3. **Technical Specifications**

5.1 Division 2, Construction Details and Division 3, Materials, Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction 2010 Edition are hereby incorporated by reference except as modified below.

1.1 Bidders shall replace the word “Department” with “CITY” in said FDOT Divisions whenever they appear.

1.2 Bidders shall replace the word “Engineer” with “CONSULTANT” in said FDOT Divisions whenever they appear.

1.3 As revised on the following sheets:

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**SECTION 102**

**Article 102-3 Traffic Control** is expanded by the following subarticles:

**102-3.4 Special Use Permits:** The Contractor shall be required to apply for and obtain a Special Use Permit from the Miami Police Department. Contractor will be required to provide a schedule of activities which affect the flow of traffic on the right-of-way such as overall project scope, lane closures, Traffic Control Plan, construction schedule/time frame, etc. The Contractor will be required to renew the Special Use Permit each month for construction projects and pay the permit fee monthly. Cost shall be included under Pay Item 102-1.

**102-3.5 No Parking Signs:** The contractor shall install ‘NO PARKING’ signs within each block of the proposed Work Zone. Signs shall be in place no more than 48 hours per installation and shall be installed only during milling and repaving operations. Signs shall be installed separately for each operation unless both operations are to occur within a 48 hour period. Sufficient signs shall be
posted to clearly indicate where parking is prohibited. In addition, the Contractor will furnish and install door hangers and vehicle parking notices for all residents living on the street that will have “No Parking” signs installed, at least 24 hours but not more than 48 hours prior to posting “No Parking” signs. Cost shall be included under Pay Item 102-1.

SECTION 104
PREVENTING, CONTROL, AND ABATEMENT OF EROSION AND WATER POLLUTION

Subarticle 104-1 Description is modified as follows:

The Bidder is alerted that strict compliance with Department of Capital Improvements Bulletin No. 25 is required for this project. This bulletin establishes rules, regulations and requirements for discharges originated from construction sites or resulting from construction activities. A copy of Bulletin No. 25 and corresponding Engineering Standards is included in the City of Miami Engineering Standards.

SECTION 125
EXCAVATION FOR STRUCTURES

Subarticle 125-8 Backfilling is expanded as follows:

During backfilling the Contractor shall install a neoprene mat over the top of existing conduits in those areas as indicated on the Drawings and in accordance with the Drawing Details. The neoprene mat shall be installed 3-inches above the top crown of the existing pipe and after careful compaction of the soil envelope over the top of the pipe. Commence and end the length of the neoprene mat at not less than 18-inches from the edge of the outer diameter of pipe and width of the neoprene mat across the full exposed trench width of pipe to be protected.

Material: Neoprene Elastomer
Thickness: ¼” minimum

SECTION 327
MILLING OF EXISTING ASPHALT PAVEMENT

Article 327-3 Construction is modified and expanded by the following:

The maximum time allowed between milling and resurfacing operations shall be 72 hours unless written permission is received from the Consultant to delay resurfacing due to rain or other events not under control of the Contractor.

When the asphalt pavement, remaining after milling, is one inch or less in thickness, the first layer of asphalt shall be placed before the lane is reopened to traffic.
SECTION 443

FRENCH DRAINS

**Article 443-2 Materials** is modified and expanded by the following:

443.2.2 Course Aggregate (Ballast Rock): Meet the requirements of 901-1.4 for No. 3 stone.

443.2.4 Course Aggregate (Pea Gravel): Meet the requirements of 901-1.4 for No. 8 stone.
# SECTION 01015

## INDEX OF DRAWINGS

### PART 1 – GENERAL

#### CONTRACT DRAWINGS

A. Drawings dated MAY 2010, and any subsequent revision thereto introduced by Addenda prior to Bid, showing the work of the Contract are hereby made a part of the Contract Documents and are listed as follows:

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<th>DESCRIPTION</th>
<th>SHEET NO.</th>
<th>DESCRIPTION</th>
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<td>128-274</td>
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B. Due to the possibility of typing errors or omissions, the above list shall not be considered as necessarily complete. Perform all Work shown on all sheets of the Drawings, as specified herein or necessary for a complete functional installation and no extra compensation will be made due to the omission or incorrect listing of a Drawing in this Section.
CITY OF MIAMI

NORTHWEST STORM SEWER PROJECT

PROJECT B-30014

TECHNICAL SPECIFICATIONS

PREPARED BY

RS&H

JULY 2010
SECTION 351
PERVIOUS CONCRETE PAVEMENT

1.01  DESCRIPTION

A. The work specified under this section includes furnishing all labor, tools, equipment, materials, and supplies for the construction of Pervious Concrete Pavement.

1.02  REFERENCE

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C29  “Test for Unit Weight and Voids in Aggregate”

ASTM C33  “Specification for Concrete Aggregates”

ASTM C42  “Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.”


ASTM C138  “Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete.”

ASTM C150  “Specifications for Portland Cement” (Types I and II only)

ASTM C172  “Practice for Sampling Fresh Concrete”

ASTM C260  “Specification for Air-Entraining Admixtures for Concrete”

ASTM C494  “Specification for Chemical Admixtures for Concrete”

ASTM C595  “Specification for Blended Hydraulic Cements” (Types IP or IS only)

ASTM C618  “Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.”

ASTM C989  “Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.”

ASTM C1077  “Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and criteria for Laboratory Evaluation.”


ASTM E329  “Standard Recommended Practice for Inspection and testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction.”

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T-180  “Moisture-Density Relations of Soils Using a 101 pound (45.4 kg) Rammer and an 18 in. (457 mm) Drop.”

1.03 SUBMITTALS

A. CONCRETE MIX DESIGN

Contractor shall furnish a proposed mix design with proportions of materials to Owner or Agent prior to commencement of work. Cement content shall be a minimum of 580 pounds per cubic yard, with total cementitious content to be a minimum of 630 pounds per cubic yard. Water cement ratio shall be a maximum of 0.30. The data shall include unit weights determined in accordance with ASTM C29 paragraph 11, jigging procedure. Based on the unit weight of the mix, compacted void content of the mix shall be a minimum of 10% and a maximum of 20%.

B. QUALITY ASSURANCE

1. Prior to the awarding of the contract, the placing contractor shall furnish owner/engineer/architect a statement attesting to qualifications, experience, sample of workmanship and installed product (e.g. references and project addresses).

2. If either the Pervious Placing Contractor or the Pervious Concrete Producer have no prior experience with Pervious Concrete Pavement, the Contractor shall retain an experienced Consultant to supervise base preparation, production, placement, finishing and curing. Expense of the consultant shall be the responsibility of the contractor.

3. Test Panels: If so required by the contract, the Pervious Contractor may be required to prepare test panels. Cost of creating and, if necessary, removing such panels shall be covered by a line item in the contract and contract proposal. Test panels shall be of the same thickness and on the same sub-base as the project slab, and shall be identified by a copy of the truck ticket (including batch date, time and truck #).
   a. Requirements for acceptance of the test panels:
      - Test panels shall be tested for thickness in accordance with ASTM C 42 and thickness of the slab shall measure no less than 1/4" of the design.
      - Unit weights are to be determined in accordance with ASTM C 29 using a 0.25 cubic foot cylindrical metal measure. The measure is to be filled and compacted in accordance with ASTM C 29 paragraph 11,
jigging procedure. Based on the unit weight of the mix, compacted void content of the mix shall be a minimum of 10% and a maximum of 20%.

2.01 MATERIALS

A. GENERAL

1. Locally available materials having a record of satisfactory performance shall be used.

B. CEMENT

1. Portland cement Type I or II conforming to ASTM C150 or Portland cement Type IP or IS conforming to ASTM C595

C. AGGREGATE

1. Use 3/8 coarse aggregate that meets 3/8 to No. 16 per ASTM C33, or meeting 3/8 to No. 50 per ASTM D448. Smooth rock aggregate is recommended and has been found to perform better than crushed rock aggregates. If other gradation of aggregate is to be used, submit data on proposed material to owner for approval. Larger aggregate sizes increase pore size but decrease workability. Aggregates that are well graded reduce porosity, and may require reduction of cementitious content to meet void specifications. Note that reductions below the cement minimums of paragraphs 3.03.A & 2.01.G.1 require written approval from the Engineer and Owner’s Representative

D. CHEMICAL ADMIXTURES

1. Air entraining agents shall comply with ASTM C260.

2. Type A Water Reducing Admixtures shall comply with ASTM C494

3. Type B Retarding Admixtures shall comply with ASTM C494

4. Type D Water Reducing/Retarding Admixtures shall comply with ASTM C494

5. Hydration stabilizer shall meet the requirements of ASTM C494 Type B Retarding Admixtures or Type D Water Reducing/Retarding Admixtures

Note: A hydration stabilizer can be utilized and is recommended in the design and production of pervious concrete. Hydration stabilizer suspends cement hydration by forming a protective barrier around the cementitious particles, which delays the particles from achieving initial set.

E. MINERAL ADMIXTURES

1. Flyash conforming to ASTM C618 may be used in amounts not to exceed 20% of total cementitious material.
2. Ground Iron Blast-Furnace Slag conforming to ASTM C989 may be used in amounts not to exceed 50% by weight of total cementitous material.

F. WATER

1. Potable water shall comply with conventional local good concrete practice.

G. PROPORTIONS

1. Cement Content:
   For pavement subject to vehicular traffic loading, the total cementitous content shall not be less than 630 pounds per cubic yard. Portland cement content shall be at least 580 pounds per cubic yard.

2. Water Cement Ratio:
   Maximum of 0.30

3. Aggregate Content:
   The volume of aggregate per cubic yard shall be equal to 27 cubic foot when calculated as a function of the unit weight determined in accordance with ASTM C29 jigging procedure. Fine aggregate, if used, shall not exceed 3 cu. ft. and shall be included in the total aggregate volume.

4. Admixtures:
   Shall be used in accordance with the manufacturer’s instructions and recommendations.

5. Mix Water:
   Mix water shall be such that the cement paste displays a wet metallic sheen without causing the paste to flow from the aggregate. (Mix water yielding a cement paste with a dull-dry appearance has insufficient water for hydration).

   NOTE: Insufficient water results in inconsistency in the mix and poor bond strength between aggregate particles. High water content results in the paste reducing or eliminating the void system required for porosity.

3.01 EXECUTION

A. SUBGRADE PREPARATION AND FORM-WORK

1. Subgrade Material:
   The top 6 inches shall be composed of granular or gravelly soil that is predominantly sandy with no more than a moderate amount of silt or clay. Granular sub-base may be placed over the subgrade.

2. Subgrade Permeability:
Subgrade shall have a reasonable level of permeability.

3. Subgrade Support:
   a. The subgrade shall be scarified to a depth of 12” and compacted by a mechanical vibratory compactor to 92-95% of a maximum dry density as established by ASTM D1557 or AASHTO T180. Subgrade stabilization shall not be permitted.
   b. If fill material (embankment) is required to bring the subgrade to final elevation, it shall be clean and free of deleterious materials. It shall be placed in 8-inch maximum layers, and compacted by a mechanical vibratory compactor to a minimum density of 92% of a dry density as established by ASTM D1557 or AASHTO T180.

4. Subgrade Moisture:
   To avoid moisture being absorbed from the concrete mix upon placement, the subgrade shall be in a moist condition.

5. Formwork:
   Forms may be of wood or steel and shall be the depth of the pavement. Forms shall be of sufficient strength and stability to support mechanical equipment without deformation of plan profiles following spreading, strike-off and compaction operations. Forms shall have a removable spacer of ½” to 5/8” thickness placed above the depth of pavement. The spacers are removed following placement and vibratory strike-off to allow roller compaction. Forms shall allow for tie-in to adjacent concrete via the use of fiberglass reinforced plastic (FRP) reinforcing bar.

6. Mixing, Hauling and Placing:
   a. Mix Time:
      Truck mixers shall be operated at the speed designated as mixing speed by the manufacturer for 75 to 100 revolutions of the drum.
   b. Transportation:
      The Portland cement aggregate mixture may be transported or mixed on site and shall be used within one (1) hour of the introduction of mix water, unless otherwise approved by an engineer. This time can be increased to 90 minutes when utilizing a hydration stabilizer as specified in section D.5.
   c. Discharge:
      Each mixer will be inspected for appearance of concrete uniformity. Water may be added to obtain the required mix consistency. A minimum of 20 revolutions at the manufacturer’s designated mixing speed shall be required following the addition of any water to the mix. Discharge shall be a continuous operation
and shall be completed as quickly as possible. Concrete shall be deposited as close to its final position as practicable and such that fresh concrete enters the mass of previously placed concrete.

d. Placing and Finishing:

- The pervious concrete pavement will be placed to the required cross-section and shall not deviate more than +/- 3/8 inch in 10 feet from profile grade.
- Unless otherwise approved by the Owner or Engineer in writing, the Contractor shall provide either slip form or form riding equipment to place the concrete. Normal placement procedures involve utilizing a mechanical vibratory screed to strike off the concrete ½” to 5/8” above final height, utilizing the form spacers described in section 3.01.A.5.
- Following strike-off, the spacers are removed, and the concrete shall be compacted to form level, utilizing a steel roller made from nominal 10” diameter steel pipe of ¼” thickness. The roller shall have enough weight to provide a minimum of 10 psi vertical force. This compaction secures the surface materials assuring pavement durability. Care shall be taken during compaction that sufficient compactive force is achieved without working the concrete surface enough to seal off the surface porosity.
- Workers shall avoid stepping on the mix immediately after its placement. Footprints can compress and force cement paste into the voids at the bottom of the slab, forming resistance to the percolation through the slab.
- Any apparent defects in the surface can be carefully remedied by placing some fresh concrete into any depressions and compacting with a hand tamper.
- Upon strike-off, a compactive roller will provide a minimum of 10 psi vertical force in order to secure the surface materials and assure durability. The pervious concrete pavement will be placed to the required cross-section and shall not deviate more than +/- 3/8 inch in 10 feet from profile grade.
- After roller compacting and defect inspection and repair, no further finishing is performed on the concrete. Surface shall be immediately cured.

e. Curing:

Note: The low water/cement ratio and high amount of exposed surface of pervious concrete makes it especially susceptible to drying out. Keeping the surface moist is critical to strength gain. Curing procedures shall begin immediately after and no longer than 20 minutes after final placement.
operations. The pavement surface shall be covered with a minimum of six (6) mil thick polyethylene sheet or other approved covering material. Prior to covering, a fog or light mist shall be sprayed above the surface when required due to ambient conditions (temperature, wind and humidity). The cover shall overlap all exposed edges and shall be secured to prevent dislocation due to winds or adjacent traffic conditions.

- Due to the moisture required for proper hydration and strength gain, the curing cover shall remain securely in place for the suggested curing periods. The following cure times are ideal:
  - Portland Cement Type I, II or IS – 7 days minimum
  - Portland Cement Type I or II with Class F Flyash (as part of the 630 lbs/cy minimum cementitious) or Type IP – 10 days minimum

- No truck traffic shall be allowed for 10 days (no passenger car/light trucks for 7 days).

f. Jointing (optional):
This pavement will generate cracking similar to conventional concrete pavements. Due to the porous surface of Pervious Concrete, cracking is not as readily noticeable as with an impervious concrete. For this reason jointing is considered optional.

- If it is deemed desirable to specify control (contraction) joints, they shall be installed at regular intervals not to exceed 40 feet, or two times the width of the placement.

- The control joints shall be installed at ¼ the depth (to a maximum depth of 1½”) of the thickness of the pavement.

- These joints can be installed in the plastic concrete or saw cut.
  - Jointing plastic concrete.
    Joints installed in the plastic concrete are generally rolled in utilizing a small roller with a flange welded to the center. This type of jointing is done immediately after roller compaction and immediately prior to curing.
  - Jointing hardened concrete:
    If joints are saw-cut, the procedure shall begin as soon as the pavement has hardened sufficiently to prevent raveling and uncontrolled cracking (normally after 24 hours, so curing cover shall be removed and surface re-misted and securely recovered after joint sawing).

- Transverse construction joints:
  Transverse construction joints shall be installed whenever placing is suspended for a sufficient length of time that concrete may begin to harden. In order to assure aggregate bond at construction joints, a bonding agent suitable for bonding fresh concrete to existing concrete shall be brushed, rolled or sprayed on existing pavement surface edge. Isolation (expansion) joints
will not be used except when pavement is abutting slabs or other adjoining structures.

g. Grinding (optional):
Grinding will provide a more uniform surface texture and will increase durability by preventing future surface raveling. Note that grinding requires a greater initial thickness to allow for the loss of thickness due to the grinding.
- Upon completion of curing, concrete is to be surface ground. Surface is ground to a depth such that the surface aggregate is ground to about its midpoint.

7. Testing and Acceptance:
Note: Traditional portland cement pavement testing procedures based on strength, air content and slump control are not applicable to this type of pavement material. As continued testing of this product yields test methods that are reproducible in the field, these recommended specifications will be modified.

a. A minimum of one test for each day’s placement of pervious concrete in accordance with ASTM C 172 and ASTM C 29 to verify unit weight shall be conducted. Delivered unit weights are to be determined in accordance with ASTM C 29 using a 0.25 cubic foot cylindrical metal measure. The measure is to be filled and compacted in accordance with ASTM C 29 paragraph 11, jigging procedure. The unit weight of the delivered concrete shall be +/- 5 pcf of the design unit weight. Based on the unit weight of the mix, compacted void content of the mix shall be a minimum of 10% and a maximum of 20%.

END OF SECTION
SECTION 331
TYPE S ASPHALT CONCRETE, QUALITY
ASSURANCE AND ACCEPTANCE PROCEDURES

331-1 Description.

331-1.1 General: Construct a Type S Asphalt Concrete course (using the Quality Assurance acceptance system) using the type of mixture specified in the Contract, or when offered as alternates, as selected. If offered as alternates, meet the layer thickness criteria specified in 331-1.2. Type S mixes are identified as Type S-I, Type S-II, or Type S-III. The composition and physical test properties for all mixes including Type S Asphalt Concrete are shown in Tables 331-1 and 331-2. This Section establishes Acceptance Procedures for materials and work performed under Sections 280, 290, 331, 332, 333, 335, and 337.

Where Type S Asphalt Concrete is specified in the Contract, if approved by the Engineer, the equivalent fine Type SP Asphalt Concrete mixture (Traffic Level C) meeting the requirements of Section 334 may be selected as an alternate at no additional cost to the Department. The equivalent mixes are as follows:

- Type S-I................................. Type SP-12.5
- Type S-II................................. Type SP-19.0
- Type S-III............................... Type SP-9.5

Meet the requirements for plant and equipment specified in Section 320. Meet the general construction requirements specified in Section 330.

<table>
<thead>
<tr>
<th>Type</th>
<th>3/4 inch [19.0 mm]</th>
<th>1/2 inch [12.5 mm]</th>
<th>3/8 inch [9.5 mm]</th>
<th>No. 4 [4.75 mm]</th>
<th>No. 10 [2.0 mm]</th>
<th>No. 40 [425 μm]</th>
<th>No. 80 [180 μm]</th>
<th>No. 200 [75 μm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-I</td>
<td>100</td>
<td>88-98</td>
<td>75-93</td>
<td>47-75</td>
<td>31-53</td>
<td>19-35</td>
<td>7-21</td>
<td>2-6</td>
</tr>
<tr>
<td>S-II</td>
<td>83-98</td>
<td>71-87</td>
<td>62-78</td>
<td>47-63</td>
<td>33-49</td>
<td>19-35</td>
<td>9-18</td>
<td>2-6</td>
</tr>
<tr>
<td>S-III</td>
<td>100</td>
<td>88-98</td>
<td>60-90</td>
<td>40-70</td>
<td>20-45</td>
<td>10-30</td>
<td>2-6</td>
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<td>Type II</td>
<td>100</td>
<td>90-100</td>
<td>80-100</td>
<td>55-90</td>
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<td></td>
<td></td>
<td>2-12</td>
</tr>
<tr>
<td>Type III</td>
<td>100</td>
<td>80-100</td>
<td>65-100</td>
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<td>10-30</td>
<td>2-10</td>
<td></td>
</tr>
<tr>
<td>SAHM</td>
<td>100</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0-10</td>
</tr>
<tr>
<td>ABC-1</td>
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<td>0-12</td>
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<td></td>
<td>30-70</td>
<td>20-60</td>
<td>10-40</td>
<td>2-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FC-2</td>
<td>100</td>
<td>85-100</td>
<td>10-40</td>
<td>4-12</td>
<td></td>
<td></td>
<td></td>
<td>2-5</td>
</tr>
<tr>
<td>FC-3</td>
<td>100</td>
<td>88-98</td>
<td>60-90</td>
<td>40-70</td>
<td>20-45</td>
<td>10-30</td>
<td>2-6</td>
<td></td>
</tr>
</tbody>
</table>

1. In inches [mm] or sieves [μm].
2. 100% passing 1 1/4 inch [31.5 mm] sieve and 94 to 100% passing 1 inch [25.0 mm] sieve.
3. 100% passing 1 1/2 inch [37.5 mm] sieve.
4. The Engineer may increase the design range for the No. 10 [2.00 mm] sieve for lightweight aggregates.
5. The Engineer may retain up to 1% on the maximum sieve size.
### Table 331-2 Non SI Units
Marshall Design Properties For Bituminous Concrete Mixes

<table>
<thead>
<tr>
<th>Mix Type</th>
<th>Minimum Marshall Stability (lbs.)</th>
<th>Flow** (0.01 in.)</th>
<th>Minimum VMA (%)</th>
<th>Air Voids (%)</th>
<th>Minimum Effective Asphalt Content (%)</th>
<th>VFA Voids Filled with Asphalt (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-I</td>
<td>1,500*</td>
<td>8-13</td>
<td>14.5</td>
<td>4-5</td>
<td>***</td>
<td>65-75</td>
</tr>
<tr>
<td>S-II</td>
<td>1,500*</td>
<td>8-13</td>
<td>13.5</td>
<td>4-5</td>
<td>***</td>
<td>65-75</td>
</tr>
<tr>
<td>S-III</td>
<td>1,500*</td>
<td>8-13</td>
<td>15.5</td>
<td>4-6</td>
<td>***</td>
<td>65-75</td>
</tr>
<tr>
<td>Type II</td>
<td>500-750</td>
<td>7-15</td>
<td>18</td>
<td>5-16</td>
<td>6.0</td>
<td>-</td>
</tr>
<tr>
<td>Type III</td>
<td>750-1,000</td>
<td>7-15</td>
<td>15</td>
<td>5-12</td>
<td>5.5</td>
<td>-</td>
</tr>
<tr>
<td>SAHM</td>
<td>300-500</td>
<td>7-15</td>
<td>15</td>
<td>5-16</td>
<td>6.0</td>
<td>-</td>
</tr>
<tr>
<td>ABC-1</td>
<td>500</td>
<td>7-15</td>
<td>15</td>
<td>5-16</td>
<td>6.0</td>
<td>-</td>
</tr>
<tr>
<td>ABC-2</td>
<td>750</td>
<td>7-15</td>
<td>15</td>
<td>5-14</td>
<td>5.5</td>
<td>-</td>
</tr>
<tr>
<td>ABC-3</td>
<td>1,000</td>
<td>8-13</td>
<td>14</td>
<td>4-7</td>
<td>***</td>
<td>65-78</td>
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<tr>
<td>FC-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>FC-3</td>
<td>1,500</td>
<td>8-13</td>
<td>15.5</td>
<td>4-6</td>
<td>***</td>
<td>65-75</td>
</tr>
</tbody>
</table>

*The minimum Marshall Stability for Type S mixes used on limited access facilities (Interstate, Turnpike, and Expressways) shall be 1,800 lbs.

**The maximum Flow value during production shall not exceed one point more than shown in the Table.

***The ratio of the percentage by weight of total aggregate passing the No. 200 sieve to the effective asphalt content expressed as a percentage by weight of total mix shall be in the range of 0.6 to 1.2.

### Table 331-2 SI Units
Marshall Design Properties For Bituminous Concrete Mixes

<table>
<thead>
<tr>
<th>Mix Type</th>
<th>Minimum Marshall Stability (kN)</th>
<th>Flow** (mm)</th>
<th>Minimum VMA (%)</th>
<th>Air Voids (%)</th>
<th>Minimum Effective Asphalt Content (%)</th>
<th>VFA Voids Filled with Asphalt (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-I</td>
<td>6.7*</td>
<td>2.0-3.3</td>
<td>14.5</td>
<td>4-5</td>
<td>***</td>
<td>65-75</td>
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<tr>
<td>S-II</td>
<td>6.7*</td>
<td>2.0-3.3</td>
<td>13.5</td>
<td>4-5</td>
<td>***</td>
<td>65-75</td>
</tr>
<tr>
<td>S-III</td>
<td>6.7*</td>
<td>2.0-3.3</td>
<td>15.5</td>
<td>4-6</td>
<td>***</td>
<td>65-75</td>
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<tr>
<td>Type II</td>
<td>2.2-3.3</td>
<td>1.8-3.8</td>
<td>18</td>
<td>5-16</td>
<td>6.0</td>
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<tr>
<td>Type III</td>
<td>3.3-4.4</td>
<td>1.8-3.8</td>
<td>15</td>
<td>5-12</td>
<td>5.5</td>
<td>-</td>
</tr>
<tr>
<td>SAHM</td>
<td>1.3-2.2</td>
<td>1.8-3.8</td>
<td>15</td>
<td>5-16</td>
<td>6.0</td>
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<tr>
<td>ABC-1</td>
<td>2.2</td>
<td>1.8-3.8</td>
<td>15</td>
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<tr>
<td>ABC-2</td>
<td>3.3</td>
<td>1.8-3.8</td>
<td>15</td>
<td>5-14</td>
<td>5.5</td>
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<tr>
<td>ABC-3</td>
<td>4.4</td>
<td>2.0-3.3</td>
<td>14</td>
<td>4-7</td>
<td>***</td>
<td>65-78</td>
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<tr>
<td>FC-2</td>
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<td></td>
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<tr>
<td>FC-3</td>
<td>6.7</td>
<td>2.0-3.3</td>
<td>15.5</td>
<td>4-6</td>
<td>***</td>
<td>65-75</td>
</tr>
</tbody>
</table>

*The minimum Marshall Stability for Type S mixes used on limited access facilities (Interstate, Turnpike, and Expressways) shall be 8.0 kN.

**The maximum Flow value during production shall not exceed 0.25 mm more than shown in the Table.

***The ratio of the percentage by weight of total aggregate passing the 75μm sieve to the effective asphalt content expressed as a percentage by weight of total mix shall be in the range of 0.6 to 1.2.
The Engineer will accept the work on a LOT to LOT basis in accordance with the applicable requirements of Sections 5, 6, and 9. The size of the LOT will be as specified in 331-6 for the bituminous mixture produced at the plant and as stipulated in 331-7 for the material placed on the roadway.

331-1.2 Layer Thicknesses:

**331-1.2.1 Structural Layers:** The allowable layer thicknesses for Type S Asphalt Concrete mixtures used in structural and overbuild applications is as follows:

- Type S-III ........... 3/4 – 1 1/4 inches [20 – 30 mm]
- Type S-I ............ 1 1/4 – 2 1/2 inches [30 – 60 mm]
- Type S-II ............ 2 – 2 3/4 inches [50 – 70 mm]

In addition to the minimum and maximum thickness requirements, the following restrictions are placed on Type S mixtures when used as a structural course:

- Type S-III – Limited to the final (top) structural layer, one layer only.
- Type S-I – May not be used in the first layer of courses over 3 1/2 inches [90 mm] thick, nor in the first layer of courses over 2 3/4 inches [70 mm] thick on limited access facilities.
- Type S-II – May not be used in the final (top) structural layer.

**331-1.2.2 Additional Requirements:** The following requirements also apply to Type S Asphalt Concrete mixtures:

1. A minimum 1 1/2 inch [40 mm] initial lift is required over an Asphalt Rubber Membrane Interlayer (ARMI).
2. When construction includes the paving of adjacent shoulders (#5 feet [#1.5 m] wide), the layer thickness for the upper pavement layer and shoulder shall be the same and paved in a single pass, unless shown differently in the plans.
3. All overbuild layers shall be Type S asphalt concrete. Use the minimum and maximum layer thicknesses as specified in 331-1.2.1 unless shown differently in the plans. On variable thickness overbuild layers, the minimum allowable thickness may be reduced by 1/2 inch [13 mm], and the maximum allowable thickness may be increased 1/2 inch [13 mm], unless shown differently in the plans. Other variations from these thicknesses must be approved by the Engineer.

331-2 Materials.

**331-2.1 General Requirements:** Meet the material requirements specified in Division III. Specific references are as follows:

- Superpave PG Asphalt Binder or Recycling Agent ....... 916-1, 916-2
- Mineral Filler .......................................................... 917-1, 917-2
- Coarse Aggregate, Stone, Slag or Crushed Gravel ....... Section 901
- Fine Aggregate.......................................................... Section 902

Asphalt concrete mixes containing crushed gravel as coarse aggregate component must show no potential for stripping during laboratory testing for mix design verification.

Crushed Reclaimed Portland Cement Concrete Pavement may be used as a coarse aggregate or screenings component subject to meeting all applicable specifications.

**331-2.2 Specific Requirements:**

**331-2.2.1 Condition of Aggregate:** Use clean aggregate containing no deleterious substances. Do not use coarse or fine aggregate which contains more than 0.5% of phosphate.
331-2.2.2 Fine Aggregate and Mineral Filler: In laboratory tests, and for the purpose of proportioning the paving mixture, consider all material passing the No. 10 [2.00 mm] sieve and retained on the No. 200 [75 μm] sieve as fine aggregate, and the material passing the No. 200 [75 μm] sieve as mineral filler.

331-2.2.3 Screenings: Do not use any screenings in the combination of aggregates containing more than 15% of material passing the No. 200 [75 μm] sieve. When two screenings are blended to produce the screening component of the aggregate, one of such screenings may contain up to 18% of material passing the No. 200 [75 μm] sieve, as long as the combination of the two does not contain over 15% material passing the No. 200 [75 μm] sieve. Screenings may be washed to meet these requirements.

331-2.2.4 Use of Reclaimed Asphalt Pavement (RAP): Subject to certain requirements, Reclaimed Asphalt Pavement (RAP) may be used as a component material of the asphalt mixture. Where the material is recovered from a FDOT project, the Composition of Existing pavement may be available on the Department’s web site. The URL for obtaining this information, if available, is:

www11.myflorida.com/statematerialsoffice/Bituminous/CentralBitLab/AsphaltCompositions/Compositions.htm

RAP may be used as a component material of the bituminous mixture subject to the following:

1. Assume responsibility for the design of asphalt mixes which incorporate RAP as a component part.
2. Do not allow RAP to exceed 60% by weight of total aggregates for Asphalt Base Courses nor more than 50% by weight of total aggregates for Structural and Leveling Courses. Do not use RAP in Friction Courses.
3. Mount a grizzly or grid with openings of a sufficient size to prevent clogging of the cold feed over the RAP cold bin. Use a grizzly or grid over the RAP cold bin, in-line roller crusher, screen, or other suitable means to prevent oversized RAP material from showing up in the completed recycled mixture. If oversized RAP material appears in the completed recycled mix, cease plant operations and take appropriate corrective action.
4. Ensure that the RAP material as stockpiled is reasonably uniform in characteristics and contains no aggregate particles which are soft or conglomerates of fines.
5. Ensure that the RAP has a minimum average asphalt content of 4% by weight of total mix. The Department reserves the right to sample the stockpile in order that this requirement is met.

When material milled from the project is used as a component of the asphalt mixture and a Composition of Existing Pavement is known, use the following procedures for obtaining representative samples for the mix design:

1. Cut ten 6-inch [150 mm] cores in area(s) approved by the Engineer. Fill the core holes immediately prior to opening to traffic.
2. Representative samples may also be obtained by milling the existing pavement to the full depth shown on the plans for pavement removal for a length of approximately 200 feet [60 m]. Immediately replace the pavement removed with the specified mix in the Contract.
3. Submit a request in writing to the Engineer for any variance from the above outlined methods of obtaining samples for mix designs.
When the RAP to be used as a component in a mix design is stockpiled from a previous
DOT project and the Composition of Existing Pavement is known, design the mix and
submit to the Department for verification.

When the composition of stockpiled RAP to be used as a component in a mix
design is not known, design the mix as follows:
1. Submit a bag of RAP, composed of samples from several locations in
the stockpile(s), to the Department at least four weeks prior to the
planned start of mix design. The Engineer will run viscosities on the
reclaimed asphalt pavement and furnish the information to the
Contractor.
2. Run a minimum of six extraction gradation analyses of the RAP. Take
the samples at random locations around the stockpile(s).
3. Request the Engineer to make a visual inspection of the stockpile(s) of
RAP. Based on visual inspection, the Engineer will determine the
suitability of the stockpiled materials.
4. When the proposed mix design is submitted to the Department for
verification, submit the data from the extraction gradation analyses
required above.

331-2.2.5 Binder for Mixes with RAP: Use a PG 67-22 where RAP is less than 20% by
weight of total aggregate; use a PG 64-22 where RAP is 20% or greater but less than 30%
by weight of total aggregate; use appropriate recycle agent where RAP is 30% or
greater.
The Engineer reserves the right to change binder type and grade at design based
on the characteristics of the RAP binder, and reserves the right to request reasonable
changes during the production based on the requirements of 331-4.4.4.

331-2.2.6 Use of Recycled Crushed Glass: Recycled crushed glass may be used as a
component of the bituminous mixture subject to the following:
1. Consider the recycled crushed glass a local material and meet all
requirements specified in 902-6.
2. The percentage of recycled crushed glass in any bituminous mixture does not
exceed 15% of the total aggregate weight.
3. The asphalt binder used with mixtures containing recycled crushed glass
contains 0.5% anti-stripping agent from an approved source. The addition of the
specified amount of anti-stripping agent must be certified by the supplier.
4. Test bituminous mixtures containing recycled crushed glass in accordance
with AASHTO T 283 as part of the mix design approval. The minimum tensile
strength ratio must not be less than 80%. An increase in the amount of anti-
stripping agent may be necessary in order to meet this requirement.
5. Recycled crushed glass must not be used in friction course mixtures nor in
structural course mixtures which are to be used as the final wearing course.

331-3 Permissible Variation for the Coarse Aggregate.
Size and uniformly grade or combine the aggregate or aggregates shipped to the job in such
proportions that the resulting mixture meets the grading requirements of the mix design.

331-4 General Composition of Mixture.
331-4.1 General: Use a bituminous mixture composed of a combination of aggregate (coarse,
fine or mixtures thereof), mineral filler, if required, and bituminous material. Ensure that not
more than 20% by weight of the total aggregate used is silica sand or local materials as defined in Section 902. Consider the silica sand and local materials contained in any RAP material, if used in the mix, in this limitation. Size, grade and combine the several aggregate fractions in such proportions that the resulting mixture meets the grading and physical properties of the verified mix design.

RAP meeting the requirements of 331-2.2.4 may be approved as a substitution for a portion of the combination of aggregates, subject to all applicable specification requirements being met.

**331-4.2 Grading Requirements:** In all cases, use a mix design within the design ranges specified in Table 331-1.

**331-4.3 Mix Design:**

**331-4.3.1 General:** Prior to the production of any asphalt paving mixture, submit a mix design and representative samples of all component materials to the Department at least two weeks before the scheduled start of production. The Engineer will verify the mix design before use. Send a copy of the proposed mix design to the Engineer at the same time. (Open-graded mixes will be designed by the Engineer.) Furnish the following information:

1. The specific project on which the mixture will be used.
2. The source and description of the materials to be used.
3. The gradation and approximate proportions of the raw materials as intended to be combined in the paving mixture. The gradation of the component materials shall be representative of the material at the time of use.
4. A single percentage of the combined mineral aggregate passing each specified sieve. Degradation of the aggregate due to processing (particularly No. 200 [75 μm]) should be accounted for and identified for the applicable sieves.
5. A single percentage of asphalt by weight of total mix intended to be incorporated in the completed mixture, shown to the nearest 0.1%. For structural mixes (S-I, S-II and S-III) establish the optimum asphalt content at a level corresponding to a minimum of 4.5% air voids. For FC-3 mixes, establish optimum asphalt content at a level corresponding to a minimum of 5.0% air voids.
6. A single temperature at which the mixture is intended to be discharged from the plant.
7. The laboratory density of the asphalt mixture for all mixes except Open-Graded Friction Courses.
8. Evidence that the completed mixture will meet all specified physical requirements.
9. The name of the individual responsible for the Quality Control of the mixture during production.

**331-4.3.2 Revision of Mix Design:** Submit all requests for revisions to approved mix designs, along with supporting documentation, in writing to the Engineer. In order to expedite the revision process, a verbal revision request or discussion of the possibility of a revision request may be made, but must be followed up with a written request. The verified mix design will remain in effect until a change is authorized by the Engineer. In no case will the effective date of the revision be established earlier than the date of the first communication with the Engineer regarding the revision.

Provide a new mix design for any change in source of aggregate.

**331-4.3.3 Resistance to Plastic Flow:** Include with the submitted mix design test data showing that the material as produced will meet the requirements specified in Table
331-2 when tested in accordance with FM 1-T 245. Further, determine the bulk specific gravity of the laboratory compacted bituminous mixture in accordance with FM 1-T 166.

Determine the percent of unfilled voids and the percent of aggregate voids filled with asphalt using the maximum specific gravity of the bituminous mixture and on the asphalt content of each group of specimens prepared from the same sample. Determine maximum specific gravity of the bituminous mixture by FM 1-T 209.

**331-4.3.4 Revocation of Mix Design:** The Engineer will consider any marked variations from original test data for a mix design or any evidence of inadequate field performance of a mix design as sufficient evidence that the properties of the mix design have changed, and the Engineer will no longer allow the use of the mix design.

**331-4.4 Contractor’s Quality Control:**

**331-4.4.1 Personnel:** In accordance with the requirements of 331-5.2 provide the necessary quality control personnel. Ensure that the Quality Control Technician is certified by the Department and possesses a valid certificate of qualification. When it becomes evident to the Department that the Quality Control Technician cannot perform as required by the position, the Department will revoke the certification and require replacement with a certified technician.

**331-4.4.2 Extraction Gradation Analysis:** Sample the bituminous mixture at the plant in accordance with FM 1-T 168. Determine the percent bitumen content of the mixture in accordance with FM 5-563, and determine the percent passing the standard sieves in accordance with FM 1-T 030. In the event the calibration factor for the mix exceeds 0.50%, conduct the extraction and gradation analysis in accordance with FM 5-544 and FM 5-545, respectively. Show all test results to the nearest 0.01. Carry all calculations to the nearest 0.001 and rounded to the nearest 0.01, in accordance with the Department’s rules of rounding.

Run a minimum of one extraction gradation analysis of the mixture for each day’s or part of a day’s production and immediately following any change in the production process. Take the quality control sample of mixture for the extraction gradation analysis each day as soon as the plant operations have stabilized. Obtain the results in a timely manner (no later than the end of the day) so that adjustments can be made if necessary.

On initial use of a Type S or FC-3 mix design at a particular plant, as a minimum, run an additional extraction gradation analysis if more than 500 tons [450 metric tons] of mixture are produced on the first day of production.

Extraction gradation analysis will not be required on the days when mix production is less than 100 tons [90 metric tons]. However, when mix production is less than 100 tons [90 metric tons] per day on successive days, run the test when the accumulative tonnage on such days exceeds 100 tons [90 metric tons].

Use the target gradation and asphalt content as shown on the mix design. Any changes in target will require a change in the mix design in accordance with 331-4.3.2.

If the percentage of bitumen deviates from the optimum asphalt content by more than 0.55% or the percentage passing any sieve falls outside the limits shown in Table 331-3, make the necessary correction. If the results for two consecutive tests deviate from the optimum asphalt content by more than 0.55% or exceeds the limits as shown in Table 331-3 for any sieve, stop the plant operations until the problem has been corrected. In addition, if the results of two consecutive tests show an amount greater than 99.0% passing the 1/2 inch [12.5 mm] sieve for Type S-I, an amount greater
than 99.0% passing the 3/4 inch [19.0 mm] sieve for Type S-II, or an amount greater than 99.0% passing the 3/8 inch [9.5 mm] sieve for Types S-III or FC-3, stop the plant operation until the problem has been corrected.

Maintain control charts showing the results of the extraction gradation analysis (bitumen content and sieve analysis).

<table>
<thead>
<tr>
<th>Table 331-3</th>
<th>Tolerances for Quality Control Tests (Extraction Gradation Analysis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size</td>
<td>Percent Passing</td>
</tr>
<tr>
<td>1 inch [25.0 mm]</td>
<td>7</td>
</tr>
<tr>
<td>3/4 inch [19.0 mm]</td>
<td>7</td>
</tr>
<tr>
<td>1/2 inch [12.5 mm]</td>
<td>7</td>
</tr>
<tr>
<td>3/8 inch [9.5 mm]</td>
<td>7</td>
</tr>
<tr>
<td>No. 4 [4.75 mm]</td>
<td>7</td>
</tr>
<tr>
<td>No. 10 [2.00 mm]</td>
<td>5.5</td>
</tr>
<tr>
<td>No. 40* (*425 μm)</td>
<td>4.5</td>
</tr>
<tr>
<td>No. 80* (*180 μm)</td>
<td>3</td>
</tr>
<tr>
<td>No. 200 [75 μm]</td>
<td>2</td>
</tr>
</tbody>
</table>

*Does not apply to SAHM, ABC-1 or Type II.

331-4.4.3 Plant Calibration: At or before the start of mix production, perform a wash gradation on a set of hot bin samples for batch or continuous mix plants or belt cut for drum mix plants to verify calibration of the plant. When approved by the Engineer, extraction gradation analysis of the mix may be used to verify calibration of the plant. This extraction gradation analysis may also be used to fulfill the quality control requirements for the first day’s production.

331-4.4.4 Viscosity of Asphalt in Mixes Containing RAP: When RAP is a component material, the viscosity of the asphalt material in the bituminous mixture, determined by the Engineer in accordance with ASTM D 2171, shall be 6,000 ± 2,000 poises [600 ± 200 Pa·s]. This determination will be made on samples obtained by the Department on a random basis at a frequency of approximately one per 2,000 tons [1,800 metric tons] of mix.

If the viscosity determined by the Engineer is out of the specified range, adjust the binder formulation or blend of RAP in the mix to bring the viscosity within tolerance.

331-5 Acceptance Procedures.

The Department will approve all materials for acceptance through the Department’s Acceptance Procedures specified herein. The Engineer is responsible for determining the acceptability of the construction and materials incorporated therein. The Contractor is responsible for the quality of construction and materials incorporated therein. Accomplish all quality control sampling and testing on a random basis in accordance with the approved Quality Control Plan. The Department will perform all necessary sampling and testing for acceptance purposes on a random basis as specified herein, in addition to monitoring and observing the Contractor’s quality control test procedures and results. Maintain effective quality control until final project acceptance.

A LOT is defined as an isolated quantity of a specified material produced from a single source or operation, or it is a measured amount of specified construction produced by the same process. In order to change the process, thereby necessitating the termination of the current LOT and starting a new LOT,
submit a written request, with justification, to the Engineer for approval. Obtain the Engineer’s approval prior to making the process change.

Perform all quality control sampling and testing of materials in strict conformance with the Florida Method of Sampling and Testing as found in the Field Sampling and Testing Manual. The Department will perform all acceptance sampling and testing of materials in strict conformance with the Florida Method of Sampling and Testing as found in the Field Sampling and Testing Manual. This manual, developed and distributed by the FDOT Materials Office, contains the detailed sampling and testing procedures from AASHTO and ASTM as modified by the Department.

331-5.1 Acceptance Plans:

331-5.1.1 Payment Based on Acceptance Results: The Department will adjust the payment for each LOT of material, product, item of construction or completed construction on the basis of acceptance test results in accordance with the requirements specified hereinafter in the applicable Sections.

331-5.1.2 Resampling of LOTs: The Department requires that LOTs of materials, products, items of construction or completed construction meet the requirements of these Specifications at the time of submission. The Department will not take check samples for acceptance purposes.

331-5.1.3 Referee System: The Department has established a referee system to verify the validity of the acceptance test results on LOTs at the asphalt plant. The Department will evaluate the acceptance test results with data from split samples run by the District and Central Labs. The Engineer will make a final determination and disposition of the acceptance test results. Acceptance results will be considered non-representative if the test results from the Field and Referee samples differ by more than 0.44% for asphalt content when obtained by the use of FM 5-563 or 0.56% for FM 5-544. Acceptance results for gradation will be considered non-representative if the test results from the Field and Referee samples differ by more than the precision values given in Figure 2 of FM 1-T 030 when using FM 5-563 or Figure 2 of FM 5-545 when using FM 5-544. When the referee analysis indicates that one or more test results are not representative, the Engineer will discard the non-representative test value(s) and base payment calculations for the LOT (including the sublot with the non-representative test values) on the remaining sublot(s) test data as defined in 331-6.

331-5.2 Quality Control by the Contractor: Provide and maintain a quality control system that provides reasonable assurance that all materials, products and completed construction submitted for acceptance meet Contract requirements. Develop and maintain a quality control system in conformance with the following requirements:

CONTRACTOR QUALITY CONTROL SYSTEM

I. SCOPE:

These Specifications establish minimum requirements and activities for a Contractor quality control system. These requirements pertain to the inspections and tests necessary to substantiate material and product conformance to Contract requirements and to all inspections and tests required by the Contract.

II. FUNCTIONS AND RESPONSIBILITIES:

1. The Department. The Department will verify the Contractor’s design mixes, inspect plants and monitor control of the operations to ensure conformance with these Specifications. The Department will design all open-graded friction mixes (FC-2 and FC-5).
At no time will the Engineer issue instructions to the Contractor or producer as to the setting of dials, gauges, scales and meters. However, the Department's representatives may question and warn the Contractor against the continuance of any operations or sequence of operations that obviously do not result in satisfactory compliance with the requirements of these Specifications.

2. The Contractor. Submit in writing the proposed Quality Control Plan for each asphalt plant for the Engineer’s approval. Maintain the approved Quality Control Plan in effect for the plant to which it is assigned until the Engineer rejects it in writing. Include in the plan the sampling, testing, inspection and the anticipated frequencies of each to maintain process control. A recommended series of sampling, testing and inspecting activities are shown in Table 331-4.

<table>
<thead>
<tr>
<th>Table 331-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECOMMENDATIONS FOR A CONTRACTOR QUALITY CONTROL PLAN</td>
</tr>
</tbody>
</table>

A. All Types of Plants

1. Stockpiles
   a. Place materials in the correct stockpile.
   b. Use good stockpiling techniques.
   c. Inspect stockpiles for separation, contamination, segregation, etc.

2. Incoming Aggregate
   a. Obtain gradations and bulk specific gravity (BSG) values from the aggregate supplier.
   b. Determine gradation of all component materials.
   c. Compare gradations and BSG to mix design.

3. Cold Bins
   a. Calibrate the cold gate/feeder belt settings.
   b. Observe operation of cold feed for uniformity.

4. Dryer
   a. Observe pyrometer for aggregate temperature control.
   b. Observe efficiency of the burner.

5. Hot Bins
   a. Determine gradation of aggregates in each bin.
   b. Determine theoretical combined grading.

6. Bituminous Mixture
   a. Determine asphalt content.
   b. Determine mix gradation.
   c. Check mix temperature.
   d. Verify modifier addition.

B. Batch Plants

1. For batch weights, determine percent used and weight to be pulled from each bin to ensure compliance with the mix design.
2. Check mixing time.
3. Check operations of weigh bucket and scales.

C. Continuous Mix Plant

1. Determine gate calibration chart for each bin.
2. Determine gate settings for each bin to ensure compliance with the mix design.
3. Determine gallons [cubic meters] per revolution or gallons [cubic meters] per minute to ensure compliance with the mix design.
D. Drum Mixer Plant
1. Calibrate the cold feed and prepare a calibration chart for each cold gate.
2. Develop information for the synchronization of the aggregate feed, reclaimed asphalt pavement (RAP) feed and the bituminous material feed.
3. Calibrate the weigh bridge on the changing conveyor.

The activities shown in Table 331-4 are the normal activities necessary to control the production of bituminous concrete at an acceptable quality level. The Department recognizes, however, that depending on the type of process or materials, some of the activities listed may not be necessary and, in other cases, additional activities may be required. The frequency of these activities will also vary with the process and the materials. When the process varies from the defined process average and variability targets, increase the frequency of these activities until the proper conditions are restored. Take one sample and test for every 1,000 tons [900 metric tons] of incoming aggregate (including RAP) as it is stockpiled. Test RAP material for extracted gradation and asphalt content.

Plot and keep up-to-date control charts for all quality control sampling and testing.
Provide control charts for the following:
- gradation of incoming aggregates
- gradation and asphalt content of RAP
- combined gradations of hot bins
- extracted asphalt content
- mix gradation
- gradation of cold feed (drum mixers)

Post all current control charts in the asphalt lab where they can be seen.

III. QUALITY CONTROL SYSTEM:
1. General Requirements. Furnish and maintain a quality control system that provides reasonable assurance that all materials and products submitted to the Engineer for acceptance meet the Contract requirements. Perform, or have performed, the inspection and tests required to substantiate product conformance to Contract requirements, and also perform, or have performed, all inspections and tests otherwise required by the Contract. Keep a quality control technician, who has been certified by the Department as a Qualified Asphalt Plant Technician (Plant Level II), available at the asphalt plant at all times when producing asphalt mix for the Department. Place a person in responsible charge of the paving operations who is qualified by the Department as a Qualified Asphalt Paving Technician (Paving Level II). Document the quality control procedures, inspection and tests, and make that information available for review by the Engineer throughout the life of the Contract.
2. Documentation. Maintain adequate records of all inspections and tests. Record the nature and number of tests made, the number and type of deficiencies found, the quantities approved and rejected, and the nature of corrective action taken, as appropriate. The Department may review and approve all documentation procedures prior to the start of the work. The Department will take ownership of all charts and records documenting the Contractor’s quality control tests and inspections upon completion of the work.
3. Charts and Forms. Record all conforming and nonconforming inspections and test results on approved forms and charts, and keep them up to date and complete and make them available at all times to the Engineer during the performance of the work. Prepare charts of test properties
for the various materials and mixtures on forms that are in accordance with the applicable requirements of the Department. The Engineer will furnish a copy of each applicable chart and form. Provide a supply of the charts and forms from the copy furnished. Obtain the Engineer’s approval of non-standard forms and charts prior to using them.

4. Corrective Actions. Take prompt action to correct any errors, equipment malfunctions, process changes or other problems that result or could result in the submission of materials, products or completed construction that do not meet the requirements of these Specifications. When it becomes evident to the Department that the Contractor is not controlling his process and is making no effort to take corrective actions, the Department will require the Contractor to cease plant operations until such time as the Contractor can demonstrate that he can and is willing to control the process.

5. Laboratories with Measuring and Testing Equipment. Furnish a fully equipped asphalt laboratory (permanent or portable) at the production site, and meeting the following requirements:
   a. Area - Provide an effective working area for the laboratory that is a minimum of 180 ft² [17 m²]. This area does not include the space for desks, chairs and file cabinets.
   b. Lighting - Provide lighting in the lab adequate to illuminate all areas of work.
   c. Temperature Control - Equip the lab with heating and air conditioning units that provide a satisfactory working environment.
   d. Ventilation - Equip the lab with fume hoods and exhaust fans that will remove all hazardous fumes from within the laboratory in accordance with OSHA requirements.
   e. Equipment and Supplies - Furnish the lab with the necessary sampling and testing equipment, and supplies, for performing Contractor quality control and Department acceptance sampling and testing. A detailed list of equipment and supplies required for each test is included in the Field Sampling and Testing Manual.

When running plants at a high production rate, furnish additional testing equipment as necessary to allow the completion of the Contractor’s quality control tests and the Department’s Acceptance tests within the specified time frame.

6. Sampling and Testing. Use the sampling and testing methods and procedures that the Department provides to determine quality conformance of the materials and products. The Department will use these same methods and procedures for its acceptance tests. Include the sampling for other material characteristics on a random basis and the plotting of the test results on control charts in the Quality Control Plan.

7. Alternative Procedures. The Contractor may use alternative sampling methods, procedures and inspection equipment when such procedures and equipment provide, as a minimum, the quality assurance required by the Contract Documents. Prior to applying such alternative procedures, describe them in a written proposal and demonstrate for the Engineer’s approval that their effectiveness is equal to or better than the Contract requirements. In case of dispute as to whether certain proposed procedures provide equal assurance, use the procedures stipulated by the Contract Documents.

8. Nonconforming Materials. Establish and maintain an effective and positive system for controlling nonconforming materials, including procedures for identification, isolation and disposition. Reclaim or rework nonconforming materials in accordance with procedures acceptable to the Engineer. Discuss the details of this system at the preconstruction conference, and make these details a part of the record of the conference.

9. Department Inspection at Subcontractor or Supplier Facilities. The Department reserves the right to inspect materials not manufactured within the Contractor’s facility. The Department’s
inspection does not constitute acceptance and does not, in any way, replace the Contractor’s inspection or otherwise relieve the Contractor of his responsibility to furnish an acceptable material or product. When the Department inspects the subcontractor’s or supplier’s product, such inspection does not replace the Contractor’s responsibility to inspect such subcontractor’s or supplier’s product.

Inspect subcontracted or purchased materials when received, as necessary, to ensure conformance to Contract requirements. Report to the Engineer any nonconformance found on Department source-inspected material, and require the supplier to take necessary corrective action.

331-5.3 Defective Materials:

331-5.3.1 Acceptance or Rejection: Following the application of the appropriate acceptance plan, the Engineer will make the final decision as to the acceptance, rejection or acceptance at an adjusted payment of the LOTs.

331-5.3.2 Disposition of LOTs: For nonconforming LOTs of materials, products, items of construction or complete construction that are not adaptable to correction by reworking, either remove and replace the nonconforming work, or accept no payment or an adjusted payment as stated in these Specifications, or, if not stated, as directed by the Engineer.

331-5.4 General Basis of Adjusted Payment For Deficiencies: When the Engineer determines that a deficiency exists, the Engineer will apply the applicable payment factor as shown in these Specifications to the entire LOT. When the Engineer determines that multiple deficiencies exist, the Engineer will apply an adjustment to the LOT of material that is identified by each deficiency. The Engineer will apply the adjustment for each deficiency separately as it occurs. The Engineer will not allow an adjustment to be affected by any other adjustment occurring for the same LOT. As an exception to the foregoing requirements, when there are two or more deficiencies in the gradation acceptance tests (% pass No. 4 [4.75 mm] sieve, % pass No. 10 [2.0 mm] sieve, % pass No. 40 [425 μm sieve], % pass No. 200 [75 μm] sieve) the Engineer will only apply the greater adjustment. The Engineer will express all reductions in payment in terms of equivalent pay items at no pay. When the item is measured by the ton [metric ton], the Engineer will convert the LOT in the field, which is measured in feet [meters], to equivalent tons [metric tons] and by using the average calculated spread for that LOT. When the pay item is measured by the square yard [square meter], the Engineer will convert the LOT at the production point, which is measured in tons [metric tons], to equivalent square yards [square meters] at the design thickness and by using the laboratory density as a conversion factor.

331-6 Acceptance of the Mixture at the Plant.

331-6.1 General: The Engineer will accept the bituminous mixture at the plant, with respect to gradation and asphalt content, on a LOT to LOT basis. The material will be tested for acceptance in accordance with the provisions of 331-5 and the following requirements. However, the Engineer will reject any load or loads of mixture which are unacceptable for reason of being excessively segregated, aggregates improperly coated, or of excessively high or low temperature for use in the work.

For initial use of a Type S or FC-3 mix design with a Florida limestone source north of the 28th parallel at a particular plant, limit the first day’s production to a maximum of 300 tons [275 metric tons]. Resume production upon notification of acceptable Marshall properties as determined in accordance with 331-6.4

A standard size LOT at the asphalt plant will consist of 4,000 tons [3,600 metric tons] with four equal sublots of 1,000 tons [900 metric tons] each. As an exception, the first LOT for
the initial use of a Type S or FC-3 mix design with a particular plant will consist of four sublots, the first sublot of 500 tons [450 metric tons] or the first day's production (300 tons [275 metric tons] maximum for mix design with a Florida limestone source north of the 28th parallel), the second sublot of 500 tons [450 metric tons], and the remaining two sublots of 1,000 tons [900 metric tons] each.

A partial LOT may occur due to the following:

(1) the completion of a given mix type on a project.
(2) an approved LOT termination by the Engineer due to a change in process, extended delay in production, or change in mix design.

If the partial LOT contains one or two sublots with their appropriate test results, then the previous full-size LOT will be redefined to include this partial LOT and the evaluation of the LOT will be based on either five or six sublot determinations. If the partial LOT contains three sublots with their appropriate test results, this partial LOT will be redefined to be a whole LOT and the evaluation of it will be based on three sublot determinations.

When the total quantity of any mix is less than 3,000 tons [2,700 metric tons], the partial LOT will be evaluated for the appropriate number of sublots from n=1 to n=3. When the total quantity of any mix type is less than 500 tons [450 metric tons], the Department will accept the mix on the basis of visual inspection. The Department may run extraction and gradation analysis for information purposes; however, the provisions for partial payment will not apply.

On multiple project contracts, the LOT(s) at the asphalt plant will carry over from project to project.

331-6.2 Acceptance Procedures: Control all operations in the handling, preparation, and mixing of the asphalt mix so that the percent bitumen and the percents passing the No. 4, No. 10, No. 40 and No. 200 [4.75 mm, 2.00 mm, 425 μm and 75 μm+] sieves will meet the approved job mix formula within the tolerance shown in Table 331-6.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Tolerance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt Content (Extraction)</td>
<td>±0.55%</td>
</tr>
<tr>
<td>Asphalt Content (Printout)</td>
<td>±0.15%</td>
</tr>
<tr>
<td>Passing No. 4 [4.75 mm] sieve</td>
<td>±7.00%</td>
</tr>
<tr>
<td>Passing No. 10 [2.00 mm] sieve</td>
<td>±5.50%</td>
</tr>
<tr>
<td>Passing No. 40 [425 μm] sieve**</td>
<td>±4.50%</td>
</tr>
<tr>
<td>Passing No. 200 [75 μm] sieve</td>
<td>±2.00%</td>
</tr>
</tbody>
</table>

*Tolerances for sample size of n=1. See Table 331-7 for other sample sizes n=2 through n=6.

**Applies only to Types S-I, S-II, S-III, and FC-3.

Acceptance of the mixture will be on the basis of test results on consecutive random samples from each LOT. One random sample will be taken from each sublot. The bituminous mixture will be sampled and tested at the plant as specified in 331-4.4.2.

Calculations for the acceptance test results for bitumen content and gradation (percentages passing No. 4, No. 10, No. 40 and No. 200 [4.75 mm, 2.00 mm, 425 μm and 75 μm+] sieves) will be shown to the nearest 0.01. Calculations for arithmetic averages will be carried to the nearest 0.001 and rounded to the nearest 0.01 in accordance with the Department’s rules of rounding.
Payment will be made on the basis of Table 331-7, “Acceptance Schedule of Payment”. The process will be considered out of control when the deviation of any individual test result from the mix design falls in the 80% pay factor for the “one test” column of Table 331-7. When this happens, the LOT will be automatically terminated and production stopped. The approval of the Engineer will be required prior to resuming production of the mix. Acceptance of the LOT will then be determined in accordance with Table 331-7.

All acceptance tests will be completed on the same day the sample was taken, when possible, and on no occasion will they be completed later than the following work day.

<table>
<thead>
<tr>
<th>Table 331-7</th>
<th>Average of Accumulated Deviations of the Acceptance Tests from the Mix Design.</th>
<th>Pay Factor</th>
<th>1-Test</th>
<th>2-Tests</th>
<th>3-Tests</th>
<th>4-Tests</th>
<th>5-Tests</th>
<th>6-Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asphalt Cement Content (Extraction - FM 5-544 or 5-563)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>0.00-0.55</td>
<td>0.00-0.43</td>
<td>0.00-0.38</td>
<td>0.00-0.35</td>
<td>0.00-0.33</td>
<td>0.00-0.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.95</td>
<td>0.56-0.65</td>
<td>0.44-0.50</td>
<td>0.39-0.44</td>
<td>0.36-0.40</td>
<td>0.34-0.37</td>
<td>0.32-0.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.90</td>
<td>0.66-0.75</td>
<td>0.51-0.57</td>
<td>0.45-0.50</td>
<td>0.41-0.45</td>
<td>0.38-0.42</td>
<td>0.36-0.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.80*</td>
<td>over 0.75</td>
<td>over 0.57</td>
<td>over 0.50</td>
<td>over 0.45</td>
<td>over 0.42</td>
<td>over 0.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Asphalt Cement Content (Printout)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>0.00-0.15</td>
<td>0.00-0.15</td>
<td>0.00-0.15</td>
<td>0.00-0.15</td>
<td>0.00-0.15</td>
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<tr>
<td>0.95</td>
<td>0.16-0.25</td>
<td>0.16-0.25</td>
<td>0.16-0.25</td>
<td>0.16-0.25</td>
<td>0.16-0.25</td>
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<td></td>
</tr>
<tr>
<td>0.90</td>
<td>0.26-0.35</td>
<td>0.26-0.35</td>
<td>0.26-0.35</td>
<td>0.26-0.35</td>
<td>0.26-0.35</td>
<td>0.26-0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.80*</td>
<td>over 0.35</td>
<td>over 0.35</td>
<td>over 0.35</td>
<td>over 0.35</td>
<td>over 0.35</td>
<td>over 0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No. 4 [4.75 mm] sieve</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>0.00-7.00</td>
<td>0.00-5.24</td>
<td>0.00-4.46</td>
<td>0.00-4.00</td>
<td>0.00-3.68</td>
<td>0.00-3.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.98</td>
<td>7.01-8.00</td>
<td>5.25-5.95</td>
<td>4.47-5.04</td>
<td>4.01-4.50</td>
<td>3.69-4.13</td>
<td>3.46-3.86</td>
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<td></td>
</tr>
<tr>
<td>0.95</td>
<td>8.01-9.00</td>
<td>5.96-6.66</td>
<td>5.05-5.62</td>
<td>4.51-5.00</td>
<td>4.14-4.58</td>
<td>3.87-4.27</td>
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<td></td>
</tr>
<tr>
<td>0.90</td>
<td>9.01-10.00</td>
<td>6.67-7.36</td>
<td>5.63-6.20</td>
<td>5.01-5.50</td>
<td>4.59-5.02</td>
<td>4.28-4.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.80*</td>
<td>over 10.00</td>
<td>over 7.36</td>
<td>over 6.20</td>
<td>over 5.50</td>
<td>over 5.02</td>
<td>over 4.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No. 10 [2.00 mm] sieve</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1.00</td>
<td>0.00-5.50</td>
<td>0.00-4.33</td>
<td>0.00-3.81</td>
<td>0.00-3.50</td>
<td>0.00-3.29</td>
<td>0.00-3.13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.98</td>
<td>5.51-6.50</td>
<td>4.34-5.04</td>
<td>3.82-4.39</td>
<td>3.51-4.00</td>
<td>3.30-3.74</td>
<td>3.14-3.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.95</td>
<td>6.51-7.50</td>
<td>5.05-5.74</td>
<td>4.40-4.96</td>
<td>4.01-4.50</td>
<td>3.75-4.18</td>
<td>3.55-3.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.90</td>
<td>7.51-8.50</td>
<td>5.75-6.45</td>
<td>4.97-5.54</td>
<td>4.51-5.00</td>
<td>4.19-4.63</td>
<td>3.96-4.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.80*</td>
<td>over 8.50</td>
<td>over 6.45</td>
<td>over 5.54</td>
<td>over 5.00</td>
<td>over 4.63</td>
<td>over 4.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No. 40 [425 μm] sieve</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1.00</td>
<td>0.00-4.50</td>
<td>0.00-3.91</td>
<td>0.00-3.65</td>
<td>0.00-3.50</td>
<td>0.00-3.39</td>
<td>0.00-3.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.98</td>
<td>4.51-5.50</td>
<td>3.92-4.62</td>
<td>3.66-4.23</td>
<td>3.51-4.00</td>
<td>3.40-3.84</td>
<td>3.33-3.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.95</td>
<td>5.51-6.50</td>
<td>4.63-5.33</td>
<td>4.24-4.81</td>
<td>4.01-4.50</td>
<td>3.85-4.29</td>
<td>3.73-4.13</td>
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</tr>
<tr>
<td>0.90</td>
<td>6.51-7.50</td>
<td>5.34-6.04</td>
<td>4.82-5.39</td>
<td>4.51-5.00</td>
<td>4.30-4.74</td>
<td>4.14-4.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.80*</td>
<td>over 7.50</td>
<td>over 6.04</td>
<td>over 5.39</td>
<td>over 5.00</td>
<td>over 4.74</td>
<td>over 4.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No. 200 [75μm] sieve</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>0.00-2.00</td>
<td>0.00-1.71</td>
<td>0.00-1.58</td>
<td>0.00-1.50</td>
<td>0.00-1.45</td>
<td>0.00-1.41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.95</td>
<td>2.01-2.40</td>
<td>1.72-1.99</td>
<td>1.59-1.81</td>
<td>1.51-1.70</td>
<td>1.46-1.63</td>
<td>1.42-1.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.90</td>
<td>2.41-2.80</td>
<td>2.00-2.27</td>
<td>1.82-2.04</td>
<td>1.71-1.90</td>
<td>1.64-1.80</td>
<td>1.58-1.73</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 331-7
Acceptance Schedule of Payment (Asphalt Plant Mix Characteristics)

| Average of Accumulated Deviations of the Acceptance Tests from the Mix Design. |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Pay Factor | 1-Test | 2-Tests | 3-Tests | 4-Tests | 5-Tests | 6-Tests |
| 0.80* | over 2.80 | over 2.27 | over 2.04 | over 1.90 | over 1.80 | over 1.73 |

*If approved by the Engineer based on an engineering determination that the material is acceptable to remain in place, the Contractor may accept the indicated partial pay. Otherwise, remove and replace the material at no cost to the Department at any item.

**When there are two or more reduced payments for these items in one LOT of material, only the greatest reduction in payment will be applied. CAUTION: This rule applies only to these four gradation test results.

NOTES:
(1) The No. 40 [425 μm] sieve applies to Type S-I, S-II, S-III and FC-3.
(2) Deviations are absolute values with no plus or minus signs.

331-6.3 Automatic Batch Plant With Printout: Acceptance determinations for asphalt content for mixtures produced by automatic batch plants with printout will be based on the calculated bitumen content using the printout of the weights of asphalt actually used. Acceptance determinations for gradations (No. 4, No. 10, No. 40 and No. 200 [4.75 mm, 2.00 mm, 425 μm and 75 μm] sieves) will be based on the actual test results from extraction gradation analyses. Payment will be made based on the provisions of Table 331-7.

331-6.4 Additional Tests: The Engineer reserves the right to run any test at any time for informational purposes and for determining the effectiveness of the Contractor’s quality control.

331-6.4.1 Determination of Marshall and Volumetric Properties: The Engineer will determine the Marshall and Volumetric Properties of the mix at a minimum frequency of one set per LOT, to determine whether or not the produced mix is meeting the specification requirements. The Department will sample and prepare test specimens and test them in accordance with FM 5-511 for Marshall stability and flow, FM 1-T 209 for maximum specific gravity, and FM 1-T 166 for density. Volumetric properties will be determined for Type S and FC-3 mixes only.

331-6.4.2 Failing Marshall Properties: When the average value of the specimens fails to meet specification requirements for stability or flow, the Engineer may stop the plant operations until all specification requirements can be met or until another verified mix design has been approved. Make revisions to a mix design in accordance with 331-4.3.2. If the Lab Density of the mix during production differs from the value shown on the verified mix design by more than 2 lbs/ft³ [32 kg/m³] for two consecutive tests, the Engineer will revise the target value.

331-6.4.3 Failing Volumetric Properties (Type S and FC-3 mixes only): When the Engineer determines the air void content to be less than 3.0%, or greater than 6.5%, make appropriate adjustments to the mix. When the air void content is determined to be less than 2.5% or greater than 7.0% on any one test, or less than 3.0% on two consecutive tests, cease operations until the problem has been resolved.

331-6.4.4 Resuming Production: In the event that plant operations are stopped due to a failure to meet specification requirements, obtain the Engineer’s approval before resuming production of the mix. Limit production to a maximum of 300 tons [270 metric tons]. At this
time, the Marshall and volumetric properties of the mix will be verified. After the Marshall and volumetric properties are verified, full scale production of the mix may be resumed.

**331-6.5.5 Disposition of In-Place Material:** Any material in-place that is represented by the failing test results (low stability, high flow, or less than 2.5% air voids) will be evaluated by the Engineer to determine if removal and replacement is necessary. Remove and replace any in-place material, if required, at no cost to the Department.

### 331-7 Acceptance of the Mixture at the Roadway

**331-7.1 Density Control Nuclear Method:** Determine the in-place density of each course of asphalt mix construction using the Nuclear Density Backscatter Method as specified by FM 1-T 238 (Method B). For a completed course, obtain an average in-place LOT density of at least 98% of the valid control strip density.

Do not perform density testing on patching courses, leveling and intermediate courses less than 1 inch [25 mm] thick (or a specified spread rate less than 100 lb/yd$^2$ [55kg/m$^2$]), overbuild courses where the minimum thickness is less than 1 inch [25 mm], projects less than 1,000 feet [300 m], sections with variable width, or open-graded friction courses. Compact these courses, with the exception of open-graded friction courses in accordance with 330-10.1.2.

**331-7.2 Control Strips:** In order to determine the density of compacted asphalt mixtures for the purpose of acceptance, first establish a control strip. Construct one or more control strips for the purpose of determining the control strip density. Construct a control strip at the beginning of asphalt construction and one thereafter for each successive course. Construct a new control strip for any change in the composition of the mix design, underlying pavement structure, compaction equipment, or procedures. The Engineer may require an additional control strip when the Engineer deems it necessary to establish a new control strip density or confirm the validity of the control strip density being used at that time. The Contractor may also request a confirmation of the control strip density. Construct the control strip as a part of a normal day’s run.

Construct a control strip 300 feet [100 m] in length and of an adequately uniform width to maintain a consistent compactive effort throughout the section. When constructing the control strip, start it between 300 and 1,000 feet [100 and 300 m] from the beginning of the paving operation. Construct a control strip of a thickness that is the same as that specified for the course of which it is a part. Construct the control strip using the same mix, the same paving and rolling equipment, and the same procedures as those used in laying the asphalt course of which the control strip is to become a part. Leave every control strip in place to become a portion of the completed roadway.

In order to determine the acceptability of the control strip, make ten nuclear density determinations at random locations within the control strip after completing the compaction of the control strip. Do not make any determinations within 12 inches [300 mm] of any unsupported edge. Use the average of these ten determinations for the Control Strip Density. For purposes of determining the percent of laboratory density, as required in Table 331-8, the Engineer will develop a correction factor at four nuclear density locations from 6 inch [150 mm] diameter cores or by direct transmission nuclear determination where applicable. Cut the cores prior to opening the roadway to traffic. The Engineer will calculate the percent of lab density to the nearest 0.01% and round it to the nearest 0.1%. Should the percent of lab density in a control strip exceed 99.0%, notify the Engineer immediately.

In the event that a control strip does not meet the minimum density requirements specified in Table 331-8, take appropriate corrective actions and construct a new control strip. If three consecutive control strips fail to meet specification requirements, the Engineer will limit
production and placement of the mix to 800 to 1,000 feet [250 to 300 m], regardless of the thickness and width the Contractor is placing, until the Contractor obtains a passing control strip.

Once the Contractor has obtained a passing control strip after a failing control strip (for the same mix, layer, and project), the Department will use the passing control strip to accept all previously laid mix. In the event the Contractor does not obtain a passing control strip, and this particular mix, layer, etc., is completed on the project, the Engineer will evaluate density in accordance with FM 5-543.

<table>
<thead>
<tr>
<th>Mix Type</th>
<th>Density</th>
<th>Minimum Control Strip Density* (% of Lab Density)</th>
<th>Surface Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-I, S-II, S-III, Type II, Type III, SAHM</td>
<td>per 331-7</td>
<td>96</td>
<td>per 330-12</td>
</tr>
<tr>
<td>ABC-1, ABC-2, ABC-3</td>
<td>per 280-8.6</td>
<td>96</td>
<td>per 200-7</td>
</tr>
<tr>
<td>FC-2</td>
<td>No density required</td>
<td>N/A</td>
<td>per 330-12</td>
</tr>
<tr>
<td>FC-3</td>
<td>per 331-7</td>
<td>96</td>
<td>per 330-12</td>
</tr>
</tbody>
</table>

* The minimum control strip density requirement for shoulders is 95% of lab density.

**331-7.3 LOTs:** For the purpose of acceptance and partial payment, the Engineer will divide each day’s production into LOTs. The Engineer will close out all LOTs at the end of the day. The standard size of a LOT is 5,000 feet [1,500 m] of any pass made by the paving train regardless of the width of the pass or the thickness of the course. A sublot will be 1,000 feet [300 m] or less. The Engineer will consider pavers traveling in echelon as two separate passes. When at the end of a production day, the completion of a given course, layer, or mix, or at the completion of the project, and a LOT size is determined to be less than 5,000 feet [1,500 m], it will be considered a partial LOT. Handle partial LOTs as follows:

If the length of the partial LOT is 2,000 feet [600 m] or less, and a previous full-size LOT from the same day, mix, layer, and project is available, then the previous full-size LOT will be redefined to include this partial LOT and the number of tests required for the combined LOT will be as shown in Table 331-9.

If the partial LOT is 2,000 feet [600 m] or less, and a previous full-size LOT from the same day, mix, layer, and project is not available, the Engineer will evaluate the partial LOT separately and perform the number of tests required for the partial LOT as shown in Table 331-9.

If the partial LOT is greater than 2,000 feet [600 m] long, the Engineer will evaluate the partial LOT separately and perform the number of tests required for the partial LOT as shown in Table 331-9.
Table 331-9

Testing Requirements for Partial LOTs

<table>
<thead>
<tr>
<th>LOT Size</th>
<th>Number of Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 3,000 feet [900 m]</td>
<td>3</td>
</tr>
<tr>
<td>3,001 to 4,000 feet [901 to 1,200 m]</td>
<td>4</td>
</tr>
<tr>
<td>4,001 to 5,000 feet [1,201 to 1,500 m]</td>
<td>5</td>
</tr>
<tr>
<td>5,001 to 6,000 feet [1,501 to 1,800 m]</td>
<td>6</td>
</tr>
<tr>
<td>6,001 to 7,000 feet [1,801 to 2,100 m]</td>
<td>7</td>
</tr>
<tr>
<td>Greater than 7,000 feet [2,100 m]</td>
<td>2 LOTs</td>
</tr>
</tbody>
</table>

For each LOT and partial LOT, the Engineer will make density determinations at a frequency shown in Table 331-9 at random locations within the LOT, but will not take them within 12 inches [300 mm] of any unsupported edge. The Engineer will determine the random locations by the use of statistically derived stratified random number tables. For the Contractor to receive full payment for density, the average density of a LOT shall be a minimum of 98.0% of the control strip density. Once the Engineer determines the average density of a LOT, do not provide additional compaction to raise the average. Notify the Engineer should the average density for two consecutive LOTs be greater than 102% of control strip density.

**331-7.4 Acceptance:** The Engineer will accept the completed pavement with respect to density on a LOT basis. The Department will make partial payment for those LOTs that have an average density less than 98.0% of the Control Strip Density based on Table 331-10:

Table 331-10

<table>
<thead>
<tr>
<th>Percent of Control Strip Density*</th>
<th>Percent of Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>98.0 and above</td>
<td>100</td>
</tr>
<tr>
<td>97.0 to less than 98.0</td>
<td>95</td>
</tr>
<tr>
<td>96.0 to less than 97.0</td>
<td>90</td>
</tr>
<tr>
<td>Less than 96.0**</td>
<td>75</td>
</tr>
</tbody>
</table>

* In calculating the percent of control strip density, do not round off the final percentage.

** If approved by the Engineer, based on an engineering determination that the material is acceptable to remain in place, the Contractor may accept the indicated partial pay; otherwise, remove and replace the material at no expense to the Department. The Contractor may remove and replace the material at no expense to the Department at any time.

**331-7.5 Density Requirements for Small Projects and Other Non-mainline Roadway Areas:** For projects less than 1,000 feet [300 m] in length and bridge projects with approaches less than 1,000 feet [300 m] each side, do not apply the requirements for control strips and nuclear density determination. Use the standard rolling procedures as specified in 330-10.1.2. Do not apply the provisions for partial payment to these small projects.

In other non-mainline roadway areas where it is not practical to establish a control strip, such as parking areas, toll plazas, turn lanes, and acceleration/deceleration lanes, the Contractor may use the standard rolling procedure to determine density requirements if so authorized in writing by the Engineer.
331-7.6 **Surface Tolerance:** The bituminous mixture will be accepted on the roadway with respect to surface tolerance in accordance with 330-12.

331-8 **Method of Measurement.**
The quantity to be paid for will be the weight of the mixture, in tons [metric tons], completed and accepted. The weight will be determined as provided in 320-2 (including the provisions for the automatic recordation system).

The bid price for the asphalt mix will include the cost of the liquid asphalt or the asphalt recycling agent. There will be no separate payment or unit price adjustment for the bituminous material in the asphalt mix.

331-9 **Basis of Payment:**
Price and payment will be full compensation for all the work specified under this Section, including the applicable requirements of Sections 320 and 330.

Payment will be made under:
- Item No. 331-2 Type S Asphaltic Concrete - per ton.
- Item No. 2331-2 Type S Asphaltic Concrete - per metric ton.