

715.01

volume of concrete occupied by the drain pipe in a cast-in-place structure or structure extension.

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No additional payment will be made for the repair or replacement of existing concrete damaged by Contractor operations.

**SECTION 715 – PIPE CULVERTS, AND STORM AND SANITARY SEWERS**

**715.01 Description**

This work shall consist of the construction or reconstruction of pipe culverts, storm or sanitary sewers, slotted drain pipe, or slotted vane drain pipe in accordance with 105.03.

**MATERIALS**

10 **715.02 Materials**

Pipe materials, minimum thickness or strength classification, and protective treatments for pipes except underdrains and drain tile will be determined based on height of cover, required service life, site abrasiveness, and structure pH criteria shown on the plans. Pipe with material thickness, strength classification, or protective coatings in excess of the minimum required by the above noted criteria may be used. When metal pipe is selected, the same base metal and coating shall be used for the structure or a pipe extension.

20 Concrete used for anchors, collars, **grated box end sections, encasements, and sealing existing pipes shall be class A. Corrugated polyethylene pipe, type S has a smooth interior liner with a corrugated outer wall. Type SP pipe is a type S pipe with perforations.**

Materials shall be in accordance with the following:

	B Borrow .....	211
	Concrete .....	702
	Flowable Backfill .....	213
	Geotextiles.....	918.02
30	Pipe Joint Sealant .....	907.11
	Reinforcing Bars.....	910.01
	Rubber Type Gaskets .....	907.13
	Straps, Hook Bolts, and Nuts.....	908.12
	Structure Backfill .....	904

The maximum particle size of backfill material for corrugated pipe shall be less than 1/2 the corrugation depth.

**(a) Type 1 Pipe**

40 Type 1 pipe shall be used for culverts under mainline pavement and public road approaches and shall be in accordance with the following:

	Clay Pipe, Extra Strength .....	907.08
	Corrugated Aluminum Alloy Pipe and Pipe-Arches .....	908.04
	Corrugated Polyethylene Pipe, Type S .....	*
	Corrugated Steel Pipe and Pipe-Arches.....	908.02
	Non-Reinforced Concrete Pipe, Class 3 .....	907.01
	Polymer Precoated Galvanized Corrugated Steel Pipe and Pipe-Arches.....	908.08
50	Profile Wall PVC Pipe.....	*
	Reinforced Concrete Horizontal Elliptical Pipe .....	907.03
	Reinforced Concrete Pipe.....	907.02
	Ribbed Polyethylene Pipe.....	*
	Smooth Wall Polyethylene Pipe .....	*
	Smooth Wall PVC Pipe .....	*
	Structural Plate Pipe and Pipe-Arches.....	908.09
	* All thermoplastic pipes shall be from the Department's list of approved thermoplastic pipe and liner pipe in accordance with 907.16	

**(b) Type 2 Pipe**

60 Type 2 pipe shall be used for storm sewers and shall be in accordance with the following:

	Clay Pipe, Extra Strength .....	907.08
	Corrugated Polyethylene Pipe, Type S .....	*
	Fully Bituminous Coated and Lined Corrugated Steel Pipe and Pipe-Arches.....	908.07
	Non-Reinforced Concrete Pipe, Class 3 .....	907.01
	Polymer Precoated Galvanized Corrugated Steel Pipe and Pipe-Arches.....	908.08
70	Profile Wall PVC Pipe.....	*
	Reinforced Concrete Horizontal Elliptical Pipe .....	907.03
	Reinforced Concrete Pipe.....	907.02
	Ribbed Polyethylene Pipe.....	*
	Smooth Wall Polyethylene Pipe .....	*
	Smooth Wall PVC Pipe .....	*
	* All thermoplastic pipes shall be from the Department's list of approved thermoplastic pipe and liner pipe in accordance with 907.16	

**(c) Type 3 Pipe**

80 Type 3 pipe shall be used for culverts under all drives and field entrances. All Type 1 pipe materials are acceptable.

**(d) Type 4 Pipe**

Type 4 pipe shall be used for drain tile and longitudinal underdrains and shall be in accordance with the following:

	Clay Pipe** .....	907.08
90	Corrugated Polyethylene Drainage Tubing .....	*
	Corrugated Polyethylene Pipe, Type S** .....	*
	Corrugated Polyethylene Pipe, Type SP .....	*
	Drain Tile** .....	907.10
	Non-Reinforced Concrete Pipe.....	907.01
	Perforated Clay Pipe** .....	907.09
	Perforated PVC Semicircular Pipe .....	*
	Profile Wall PVC Pipe.....	*
	* All thermoplastic pipes shall be from the Department's list of approved thermoplastic pipe and liner pipe in accordance with 907.16	
	** These materials shall be used for drain tiles only.	

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**(e) Type 5 Pipe**

Type 5 pipe shall be used for broken-back pipe runs where coupled or jointed pipe is desirable and shall be in accordance with the following:

	Corrugated Aluminum Alloy Pipe and Pipe-Arches .....	908.04
	Corrugated Polyethylene Pipe, Type S .....	*
	Corrugated Steel Pipe and Pipe-Arches.....	908.02
	Fully Bituminous Coated and Lined Corrugated Steel Pipe and Pipe-Arches.....	908.07
110	Polymer Precoated Galvanized Corrugated Steel Pipe and Pipe-Arches.....	908.08
	Profile Wall PVC Pipe.....	*
	Ribbed Polyethylene Pipe.....	*
	Smooth Wall Polyethylene Pipe .....	*
	Smooth Wall PVC Pipe .....	*
	* All thermoplastic pipes shall be from the Department's list of approved thermoplastic pipe and liner pipe in accordance with 907.16	

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**(f) Slotted Drain Pipe**

Slotted drain pipe shall be used to drain paved median and concrete gutter areas. Slotted drain pipe shall be in accordance with 908.14.

**(g) Slotted Vane Drain Pipe**

Slotted vane drain pipe shall be used to drain driveway areas. Slotted vane drain pipe shall be in accordance with 908.14.

**(h) End Bent Drain Pipe**

130 End bent drain pipe shall be perforated profile wall PVC pipe, perforated smooth wall PVC pipe, or corrugated polyethylene drainage tubing Type SP from the Department's list of approved thermoplastic liner pipe in accordance with 907.16.

**(i) Underdrain Outlet Pipe**

Pipe shall be smooth wall pipe for outlets in accordance with 907.24.

**(j) Grated Box End Sections**

140 Grating for box end sections shall be in accordance with 910.22. Threaded inserts for type II grated box end sections shall have a minimum pull-out capacity of 6,000 lbs. The 1/2 in. round bolts shall have hex heads, cut washers, and where necessary, shall be furnished with the grating. The aggregate leveling bed required for precast units shall be coarse aggregate No. 8 in accordance with 904.03. The hardware cloth used to cover the weep holes, may be plastic with 1/4 in. mesh or galvanized steel wire No. 4 mesh with a minimum wire diameter of 1/32 in. It shall be firmly anchored to the outside of the structure and shall be centered on the holes.

Unless otherwise specified, materials furnished as described herein shall be covered by a type C certification in accordance with 916.

**(k) Pipe End Sections**

150 Metal pipe end sections shall be in accordance with 908.06. Precast concrete pipe end sections shall be in accordance with 905.06.

**(l) Roadway Drain Casting Extensions**

Pipe used for extending roadway drain castings located in a bridge deck shall be in accordance with 907.23, 907.28, or 908.10. Pipe support brackets and all hardware shall be galvanized in accordance with ASTM A 153, class D or ASTM B 695, class 40, type I. A type C certification in accordance with 916 shall be provided for the pipe brackets.

**(m) Drainage Pipe through Concrete Masonry**

160 Pipe used as drainage pipe through concrete masonry as described in 702.16 shall be either profile wall or smooth wall PVC from the Department's list of approved thermoplastic pipe and liner pipe in accordance with 907.16, or steel in accordance with 908.11.

**(n) Bridge Deck Drain System**

170 Pipe and fittings used in an enclosed bridge deck drainage system shall be cast iron soil pipe in accordance with 908.10 or reinforced thermosetting resin pipe in accordance with 907.28. All mounting hardware shall be installed in accordance with the pipe manufacturer's recommendations. All mounting hardware shall be galvanized in accordance with ASTM B 695, class 40, type I. A type C certification in accordance with 916 shall be provided for the pipe brackets.

## CONSTRUCTION REQUIREMENTS

**715.03 General Requirements**

The construction requirements, method of measurement, basis of payment, and

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pay items described herein shall apply, except for the following, which are described in their respective sections.

180	Drain Tile .....	719
	Structural Plate Pipe and Pipe-Arches .....	717
	<b>Underdrains</b> .....	718

A pipe order shall be prepared and submitted prior to delivery of pipe to the project site. The order shall include the following:

- (a) structure number and location;
- (b) manhole, inlet, or catch basin type, if applicable;
- (c) pipe length, as determined by construction engineering;
- (d) pipe size, as shown on the plans;
- (e) pipe material including all information required to verify conformance with cover and service life criteria; and
- (f) number and type of end sections or quantity of concrete, A, structures.

When riprap is specified, geotextile shall first be placed on the in-situ soil in accordance with 616.11. Riprap shall then be placed in accordance with 616.

**715.04 Excavation**

Unless otherwise directed, the trench cross sectional dimensions shall be as shown on the plans. The trench bottom shall give full support to the pipe as shown on the plans. Recesses shall be cut to receive any projecting hubs or bells.

Where pipe is to be placed in fill sections, a portion of the fill shall be constructed prior to installation of the pipe as shown on the plans.

Where rock or boulder formation is encountered at or above the proposed trench bottom elevation, the trench shall be excavated at least 8 in. below the proposed grade, backfilled with structure backfill, and compacted in accordance with 211.04.

In case a firm foundation is not encountered at the required grade, the unstable material shall be removed to such depth that when replaced with suitable material, usually B borrow, compacted, and properly shaped, it will produce a uniform and stable foundation along the entire length of the pipe. A timber mat shall be placed to hold the pipe to line and grade if it is necessary.

All trenches shall be kept free from water until any joint filling material has hardened sufficiently not to be harmed.

### 715.05 Laying Pipe

Each section of pipe shall have a full firm bearing throughout its length, true to the line and grade given. All pipes which settle or which are not in alignment shall be taken up and re-laid. Pipe shall not be laid on a frozen trench bottom. Fully bituminous coated and lined corrugated steel pipe and pipe-arches shall only be placed when the ambient temperature is 35°F or above.

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Concrete and clay pipe shall be laid with hub upgrade, with the spigot end fully extended into the adjacent hub, and with all ends fitted together tightly.

Concrete pipe shall not be laid in muck or sulphate soils.

Except for circular concrete pipe, pipe joints designed to accommodate seals or pipe joints requiring seals shall be sealed with approved rubber type gaskets, caulking, pipe joint sealant, elastomeric material, or sealing compound. Circular concrete pipe joints shall utilize rubber type gaskets.

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If the infiltration of water is a factor, each joint, regardless of the type used, shall be sealed with an approved compression type joint sealer in accordance with ASTM C 425 or ASTM C 443, whichever is applicable.

Joints and stub-tee connections for plastic pipe shall be in accordance with the requirements of the respective material specifications for each type of pipe.

Connections of plastic pipe to manholes, catch basins, and inlets shall be in accordance with the manufacturer's recommendations.

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Prior to being lowered into the trench, corrugated metal pipe sections shall be examined closely and so fitted that they will form a true line of pipe when in place. Sections which do not fit together properly shall not be used.

At the time of acceptance, all pipe shall have been cleaned and be free from silt and other foreign matter.

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Prior to constructing a pipe extension, the existing structure shall be cleaned of all foreign materials. Existing anchors, end sections, or headwalls shall be removed as shown on the plans or as directed. All existing pipes which are damaged by the removal operation shall be replaced. Removed materials shall be disposed of in accordance with 202.

### 715.06 Joining Pipe

Band couplers for AASHTO M 36 type I and type II corrugated steel pipe and pipe-arches shall have corrugations that mesh with the corrugations of the pipe sections being joined or the annular rerolled ends of those pipe sections. Band couplers with projections or dimples may be used with pipe having either annular or

715.07

270 helical corrugations only when corrugated band couplers will not provide a matching connection to both pipes. Band couplers for AASHTO M 36 type IA and IIA corrugated steel pipe and pipe-arches shall have corrugations that mesh with the corrugations of the pipe or shall be gasketed flat bands.

280 At the connection of a pipe extension to an existing structure where the joint system of the pipe extension differs from that in place, or if a satisfactory joint cannot be obtained between the two structures, a concrete collar shall be constructed. Portions of the existing structure shall be removed as shown on the plans, or as necessary, to ensure proper fit of the extension to the existing pipe. If not shown on the plans, the collar shall have a width of at least 18 in. and a thickness of at least 6 in. around the entire joint.

If rigid pipe connections are of lesser strength than that of the main barrel of a pipe structure, these connections shall be encased with concrete at least 6 in. thick.

Any pipe which is damaged during installation shall be repaired or replaced as directed.

290 Slotted drain pipe or slotted vane drain pipe shall be constructed in 20 ft sections with shop fabricated elbows. The upgrade end of slotted drain pipe shall be plugged with a metal cap before backfilling. The upgrade end of slotted vane drain pipe shall be plugged with class A concrete. Such concrete shall extend 6 in. inside the upgrade end of the pipe.

#### **715.07 Tee and Stub-Tee Connections**

At locations shown on the plans, or where directed, a stub-tee connection of the size specified shall be furnished and placed as a tee connection to corrugated metal pipe, corrugated metal pipe-arch, concrete pipe, reinforced concrete pipe, or reinforced concrete horizontal elliptical pipe.

300 The stub-tee connection to a corrugated metal pipe or pipe-arch shall be constructed of corrugated metal and the length of the stub shall be no less than that which readily accommodates the connecting band. It shall be made by shop welding a stub of corrugated metal pipe to the corrugated metal pipe or pipe-arch at the time of fabrication. Where field conditions warrant, stub-tee or other connections may be field connected by using shop fabricated saddle connectors. Welds, flame cut edges, and damaged spelter coating shall be regalvanized or painted with zinc dust-zinc oxide paint in accordance with Federal Specification TT-P-641, type II or MIL-P-21035. Where applicable, damaged bituminous coating shall be repaired with asphalt mastic in accordance with AASHTO M 243. The pipe connection to the stub  
310 shall be made by means of connecting bands of required size or by means of concrete collars as directed.

The stub-tee connection to concrete pipe, reinforced concrete pipe, or reinforced concrete horizontal elliptical pipe may be field constructed or factory constructed.

The concrete used in the stub shall be of the same proportions as that used in the construction of such pipe. The length of the concrete stub shall be no less than 6 in. and no more than 12 in. The pipe connection to the concrete stub shall be made by means of a cement mortar bead or concrete collar or as directed.

320 **715.08 Blank**

**715.09 Backfilling**

All pipes shall be backfilled with structure backfill or flowable backfill. Structure backfill shall be placed in accordance with 211. Flowable backfill shall be placed in accordance with 213.07 as shown on the plans or as directed.

330 Prior to placing flowable backfill, all standing water shall be removed from the trench. If the water cannot be removed from the trench, structure backfill shall be used in lieu of flowable backfill to an elevation 2 ft above the groundwater. The remainder of the trench shall be backfilled as shown on the plans.

All pipes, except underdrains, will be visually inspected for acceptance a minimum of 30 days after the completion of backfill operations. Pipes that cannot be visually inspected shall be video inspected for acceptance using equipment in accordance with 718.07. The Engineer will determine the sections of pipe to be video inspected.

340 For pipes that were video inspected, a copy of the video inspection shall be provided in a format acceptable to the Engineer. The video inspection shall be provided prior to performing the mandrel testing or if mandrel testing is not required, prior to acceptance of the pipe.

For pipe not requiring mandrel testing that is determined to be unacceptable by the Engineer, the unacceptable pipe shall be replaced between the nearest pipe joints or to the nearest structure, or a remediation plan shall be prepared by a professional engineer and submitted to the Engineer for final determination.

350 After the visual or video inspection, the Contractor shall check pipe deflection by performing a mandrel test for all pipes manufactured from materials listed in the following table or as otherwise directed.

PIPES REQUIRED TO BE MANDREL TESTED			
Pipe Material	Standard Specifications	AASHTO	ASTM
Corrugated Polyethylene Pipe	907.17(b)	M 294	
Ribbed Polyethylene Pipe	907.20		F 894
Smooth Wall Polyethylene Pipe	907.21		F 714
Profile Wall PVC Pipe*	907.22	M 304	
Smooth Wall PVC Pipe	907.23	M 278	F 679



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\* Mandrel testing will not be required for profile wall PVC pipe in accordance with 907.22 that also is in accordance with ASTM F 949.

The mandrel shall have a minimum of nine arms or prongs and a diameter that is 95% of the nominal pipe diameter. The Contractor shall provide a proving ring that is 95% of the nominal pipe diameter for each mandrel.

360 The Contractor shall pull the mandrel through the pipe by hand. If the mandrel does not pass through the pipe, the Contractor shall measure and report the minimum diameter of the deficient pipe to the Engineer.

370 If the minimum diameter of the deficient pipe is between 92.5% and 95.0% of the nominal pipe diameter, the Contractor shall provide an evaluation of the deficient pipe prepared by a professional engineer. The evaluation shall consider the severity of the deflection and its effects on structural integrity, environmental conditions, and the design service life of the pipe. A report summarizing the evaluation and including the professional engineer's recommendation for acceptance, remediation, or replacement of the pipe shall be submitted to the Engineer for final determination.

If the minimum diameter of the deficient pipe is equal to or less than 92.5% of the nominal pipe diameter, the deficient pipe shall either be replaced or a remediation plan shall be prepared by a professional engineer and submitted to the Engineer for final determination.

The deficient pipe shall be replaced if the professional engineer's remediation plan recommends replacement of the pipe or if the pipe has been damaged.

380 Deficient pipe shall at a minimum be replaced between the nearest pipe joints or to the nearest structure. Replaced or remediated pipe sections shall be mandrel tested a minimum of 30 days after the completion of backfill operations.

Commercial and private drive pipes are excluded from the mandrel testing and video inspection requirements.

390 Where material other than structure backfill or flowable backfill is allowed and used for backfilling, it shall be of such nature that compacts readily. That portion around and for 6 in. above the top of the pipe shall be free from large stones. This material shall be placed in layers not to exceed 6 in., loose measurement, and each layer compacted thoroughly by means of mechanical tamps. Where coarse aggregate is used for structure backfill, geotextile shall be installed.

An adequate earth cover, as shown on the plans, shall be placed over the structure before heavy equipment is operated over it.

Backfill for slotted drain pipe and slotted vane drain pipe shall consist of class A concrete on both sides of the pipe. During the backfilling and paving operations, the slot shall be covered to prevent infiltration of material into the pipe.

400        **715.10 Pipe End Sections, Anchors, Grated Box End Sections, and Safety Metal End Sections**

Pipe end sections, anchors, grated box end sections, and safety metal end sections shall be constructed as shown on the plans or as directed.

410        Straps or hook bolts required for anchors shall be as shown on the plans. Anchor straps shall be placed at both the upstream and downstream end of each corrugated aluminum alloy, corrugated steel, or structural plate pipe or pipe-arch with a diameter or span of 42 in. or greater. Hook bolts and anchor straps shall be placed at both the upstream and downstream end of each corrugated aluminum alloy, corrugated steel, or structural plate pipe or pipe-arch with a diameter or span of 84 in. or greater.

A dimpled connection band shall be used for connecting pipe end sections and safety metal end sections to ends of corrugated metal pipe whose end corrugations are not perpendicular to the centerline of the pipe.

420        Grated box end sections shall be constructed according to the required pipe size and surface slope of the grated box end section specified at each location. Precast units shall be cast as a single complete unit except for the toewall which shall be cast in place. They shall be set and leveled on a 6 in. thick bed of coarse aggregate. If precast units are used and the adjoining pipe is to be field connected directly to the precast unit, the connection shall be made using a class A concrete collar of 6 in. minimum longitudinal and radial thickness. Inserts for approved lifting devices may be cast in the bottom slab of the precast sections. The number and location of lifting devices needed for handling shall be determined by the fabricator. All reinforcement shall have a minimum cover of 1 1/2 in. and shall have a minimum lap of 21 in. The type A construction joint between the floor and the wall is optional for cast in place units.

430        **715.11 Re-Laid Pipe**

Where shown on the plans or as directed, existing pipe shall be taken up, re-laid, and if necessary, extended. Removal of the pipe shall be in accordance with 202.04 and the operations involved in its relaying shall be in accordance with similar operations contained herein for laying new pipe.

**715.12 Pavement Replacement**

Where a structure is to be placed under an existing pavement, the pavement removal and replacement shall be as shown on the plans.

440        The pavement replacement areas in asphalt pavements shall be filled with HMA for Structure Installation of the mixture type specified in the pay item in accordance with 402 except OG mixtures shall be in accordance with 401.05. A MAF in accordance with 402.05 will not apply. Mixtures will be accepted in accordance with

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402.09. Each course shall be compacted by approved mechanical equipment in accordance with 409.03(d).

The pavement replacement areas in Portland Cement Concrete pavements shall be filled with PCCP in accordance with 502 except utilization of the Department provided spreadsheet is not required for the CMDS.

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Partial loads of HMA or PCCP left over from structure installation processes shall not be incorporated into other work.

### **715.13 Method of Measurement**

The accepted quantities of circular pipe, deformed pipe, slotted drain pipe, slotted vane drain pipe, end bent drain pipe, sanitary sewer pipe, and pipe extensions will be measured by the linear foot, complete in place. The length of pipe to be measured for payment will be based on the net length of pipe used, which will be obtained by multiplying the nominal length of each pipe section by the number of sections used. If the pipe connects to manholes, inlets, or catch basins, the terminal sections will be field measured to the outside face of the structure. The length of beveled or skewed terminal sections of circular corrugated metal pipe to be measured for payment will be the average of the top and bottom centerline lengths for beveled ends or of the sides for skewed ends. Measurement of deformed pipe will be made along the bottom centerline of the pipe.

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Where used other than as a roadway drain extension pipe or as a bridge deck drain system, cast iron soil pipe will be measured by the pound based on the theoretical weight shown on the plans.

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Roadway drain extension pipe will be measured per each drain extended.

Pipe used as drainage pipe through concrete masonry or pipe used for bridge deck drainage system will not be measured for payment.

Reinforcing bars, straps, and hook bolts used in anchors will not be measured for payment. Concrete used for backfill of slotted drain pipe and slotted vane drain pipe will not be measured for payment.

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Excavation above the trench bottom elevation shown on the plans will not be measured for payment. Additional excavation below the proposed trench bottom elevation required to install the pipe at a lower elevation or to remove rock or unsuitable material will be measured in accordance with 203.27(b).

Pipe end sections, concrete anchors, and safety metal end sections will be measured by the number of units of each size installed. The size of the end section, concrete anchor, and safety metal end section will be considered as the nominal diameter of the pipe to which they are attached. A concrete anchor attached at one

490 end of twin pipes will be measured as two concrete anchors. A concrete anchor attached at one end of triple pipes will be measured as three concrete anchors.

Tee, stub-tee, and wye branch connections will be measured along the centerline of the barrel. An additional 5 lft of the smaller diameter pipe will be included for making such connection.

Elbow connections will be measured along the centerline of such connection. An additional 2 lft of pipe of the same diameter as that of the elbow will be included for each such connection.

500 If increaser or reducer connections are made, measurement will be made on the basis of the larger diameter pipe for the full length of the section forming such connections.

Structure backfill will be measured in accordance with 211.09. Flowable backfill will be measured in accordance with 213.08.

Pavement replacement and subbase necessary due to structure placement under an existing pavement will be measured to the neat lines shown on the plans.

510 For structures for which the plans show pipes of differing sizes for either smooth or corrugated interiors, and the corrugated interior alternate is installed, measurement of structure backfill or flowable backfill will be based on the neat line dimensions shown on the plans for the smooth interior alternate.

Grated box end sections will be measured per each for the specified type, surface slope, and pipe size.

Video inspection for pipe will be measured by the linear foot as determined by the electronic equipment.

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Geotextile used to wrap backfill material will not be measured for payment.

#### **715.14 Basis of Payment**

The accepted quantities of pipe and pipe extensions will be paid for at the contract unit price per linear foot for pipe of the type, shape, and size specified, complete in place. Where used other than as a roadway drain casting extension pipe or as a bridge deck drain system, cast iron soil pipe will be paid for at the contract unit price per pound for the diameter specified.

530 Pipe end sections, concrete anchors, and safety metal end sections will be paid for at the contract unit price per each for the size specified, complete in place. A concrete anchor attached at one end of twin pipes will be paid for as two concrete anchors. A concrete anchor attached at one end of triple pipes will be paid for as





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bridge deck drain system. The cost of concrete backfill for slotted drain pipe and slotted vane drain pipe shall be included in the cost of the pay items.

B borrow obtained from planned excavation may be used to backfill culverts. No deduction will be made from the excavation or borrow quantities.

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If existing concrete building foundations, concrete walls, concrete columns, or concrete steps not visible and not shown on the plans are encountered within the limits of the trench, the removal of such items, as required, will be paid for in accordance with 203.28.

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The cost of sawing of pavement, excavation above the trench bottom elevation shown on plans, backfilling with material other than structure backfill or flowable backfill, dewatering, shoring, timber mats, class A concrete required for collar construction or sealing existing pipe, joint materials, replacing pipe which is damaged during installation or re-laying operations, sanitary sewer testing required by the local utility, and all other necessary incidentals shall be included in the cost of the pay items in this section. The cost of removal of pavement, existing pipe, end sections, anchors, or headwalls, concrete collars, encasements, and the disposal of surplus materials shall be included in the cost of the pay items.

The cost of concrete, grating, pipe tubing, reinforcing bars, aggregate leveling bed, hardware cloth, and necessary incidentals, for construction of grated box end sections will be included in the cost of the grated box end section.

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Geotextile required for coarse aggregate structure backfill material will not be paid for separately. The cost of the geotextile shall be included in the cost of structure backfill.

The cost of providing video inspection equipment, technician, and a copy of the video inspection shall be included in the cost of video inspection for pipe.

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No additional payment will be made for repair, remediation, or replacement of pipes, backfill, video inspection of the repaired, remediated, or replaced pipe, and all other work associated with the repair, remediation, or replacement of unacceptable pipes.

The cost of mandrel testing shall be included in the cost of the pipe.