

DIVISION 3 PIPE CULVERTS

SECTION 300 PIPE INSTALLATION

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300-1 GENERAL

Excavate, undercut, provide material, condition foundation, lay pipe, joint and couple pipe sections and furnish and place all backfill material as necessary to install the various types of pipe culverts and fittings required to complete the project.

Install pipe in accordance with the details in the plans.

Do not waste excavation unless permitted. Use suitable excavated material as backfill; or in the formation of embankments, subgrades and shoulders; or as otherwise directed. Furnish disposal areas for the unsuitable material. The Engineer will identify excavated materials that are unsuitable.

Where traffic is to be maintained, install pipe in sections so half the roadway width is available to traffic.

300-2 MATERIALS

Refer to Division 10.

Item	Section
Flowable Fill, Excavatable	1000-6
Grout, Type 2	1003
Geotextiles, Type 4	1056
Joint Materials	1032-6(F)
Select Materials	1016

Provide foundation conditioning material in accordance with Article 1016-3 for Class V or VI select material as shown in the contract.

Provide bedding material in accordance with Article 1016-3 for Class II (Type 1 only) or Class III select material as shown in contract.

Provide backfill material in accordance with Article 1016-3 for Class II (Type 1 for flexible pipe) or Class III select material as shown in the contract.

Provide filtration geotextile in accordance with Section 1056 for any type of geotextile.

Provide foundation conditioning geotextile and geotextile to wrap pipe joints in accordance with Article 1056 for Type 4 geotextile.

Do not use corrugated steel pipe in counties listed in Article 310-2.

300-3 UNLOADING AND HANDLING

Unload and handle pipe with reasonable care. Do not roll or drag metal pipe or plates over gravel or rock during handling. Take necessary precautions to ensure the method used in lifting or placing the pipe does not induce stress fatigue in the pipe. Use a lifting device that uniformly distributes the weight of the pipe along its axis or circumference. Repair minor damage to pipe when permitted. Remove pipe from the project that is severely damaged or is rejected as being unfit for use. Undamaged portions of a joint or section may be used where partial lengths are required.

Section 300

1 300-4 PREPARATION OF PIPE FOUNDATION

2 Prepare the pipe foundation in accordance with the applicable method as shown in the
3 contract documents, true to line and grade and uniformly firm.

4 Where material is found to be of poor supporting value or of rock and when the Engineer
5 cannot make adjustment in the location of the pipe, undercut existing foundation material
6 within the limits established in the plans. Backfill the undercut with foundation conditioning
7 material. Encapsulate the foundation conditioning material with foundation conditioning
8 geotextile before placing bedding material. Overlap all transverse and longitudinal joints in
9 the geotextile at least 18 inches.

10 Maintain the pipe foundation in a dry condition.

11 300-5 INVERT ELEVATIONS

12 The proposed pipe culvert invert elevations shown on the Drainage Summary Sheets are
13 based upon information available when the plans were prepared. If proposed invert elevations
14 are adjusted during construction based upon actual conditions encountered, no claim for an
15 extension of time for any reason resulting from this information will be allowed.

16 When a pipe culvert is to be installed in a trench and the average actual elevation of the pipe
17 between drainage structures deviates from the average proposed elevation shown on the
18 Drainage Summary Sheets by more than one foot, a pay adjustment will be made as follows:

$$\text{Pay Adjustment (per linear foot)} = [(APE - AAE) \pm 1](0.15 \times CUP)$$

Where:

$$APE = \text{Average Plan Elev.} = \frac{(\text{Plan Inlet Elev.} + \text{Plan Outlet Elev.})}{2}$$

$$AAE = \text{Average Actual Elev.} = \frac{(\text{Actual Inlet Elev.} + \text{Actual Outlet Elev.})}{2}$$

$$CUP = \text{Contract Unit Price of Pipe Culvert}$$

19 When the actual location of a pipe culvert is changed from the location shown in the plans,
20 the Engineer will make a pay adjustment deemed warranted based upon the relation of the
21 pipe culvert as shown in the plans to the finished roadway and the relation of the pipe culvert
22 as constructed to the finished roadway.

23 The top elevation column on the drainage summary sheet indicates the flow elevation at the
24 top of structures intended to collect surface water.

25 The top elevation column on drainage structures not intended to collect surface water
26 indicates the elevation at the top of the cover.

27 300-6 LAYING PIPE

28 The Department reserves the right to perform forensic testing on any installed pipe.

29 (A) Rigid Pipe

30 Concrete and welded steel pipe will be considered rigid pipe. Lay pipe on prepared
31 foundation, bell or groove end upgrade with the spigot or tongue fully inserted. Check
32 each joint for alignment and grade as the work proceeds.

33 Use flexible plastic joint material except when material of another type is specified in the
34 contract documents. Joint material of another type may be used when permitted.

1 Repair lift holes in concrete pipe, if present. Thoroughly clean and soak the lift hole and
2 completely fill the void with grout. Submit alternate details for repairing lift holes to the
3 Engineer for review and approval.

4 For all pipes 42 inches in diameter and larger, wrap geotextile around all pipe joints.
5 Extend geotextile at least 12 inches beyond each side of the joint. Secure geotextile
6 against the outside of the pipe by methods approved by the Engineer.

7 **(B) Flexible Pipe**

8 Corrugated steel, corrugated aluminum, corrugated HDPE and PVC pipe will be
9 considered flexible pipe. Place flexible pipe carefully on the prepared foundation starting
10 at the downstream end with the inside circumferential laps pointing downstream and with
11 the longitudinal laps at the side or quarter points.

12 Handle coated corrugated steel pipe with special care to avoid damage to coatings.

13 Join pipe sections with coupling band, fully bolted and properly sealed. Provide coupling
14 bands for annular and helical corrugated metal pipe with circumferential and longitudinal
15 strength sufficient to preserve the alignment, prevent separation of the sections and
16 prevent backfill infiltration. Match-mark all pipe 60 inches or larger in diameter at the
17 plant for proper installation on the project.

18 At locations indicated in the plans, join corrugated steel pipe sections together with rod
19 and lug coupling bands, fully bolted. Use sleeve gaskets in conjunction with rod and lug
20 couplings and seal the joints properly. Provide coupling bands with circumferential and
21 longitudinal strength sufficient to preserve the alignment, prevent separation of the
22 sections and prevent infiltration of backfill material.

23 **300-7 BACKFILLING**

24 Loosely place bedding material, in a uniform layer, a depth equal to the inside diameter of the
25 pipe divided by 6 or 6 inches, whichever is greater. Leave bedding material directly beneath
26 the pipe uncompacted and allow pipe seating and backfill to accomplish compaction.
27 Excavate recesses to receive the bells where bells and spigot type pipe is used.

28 Place fill around the pipe in accordance with the applicable method shown in the plans in
29 layers not to exceed 6 inches loose unless otherwise permitted. Compact to the density
30 required by Subarticle 235-3(C). Approval of the backfill material is required before its use.
31 Use select material as shown in the contract documents.

32 Take care during backfill and compaction operations to maintain alignment and prevent
33 damage to the joints. Keep backfill free from stones, frozen lumps, chunks of highly plastic
34 clay or other objectionable material.

35 Grade and maintain all pipe backfill areas in such a condition that erosion or saturation will
36 not damage the pipe foundation or backfill.

37 Flowable fill may be used for backfill when approved by the Engineer. When using flowable
38 fill, ensure that the pipe is not displaced and does not float during backfill. Submit methods
39 for supporting the pipe and material placement to the Engineer for review and approval.

40 Do not operate heavy equipment over any pipe until it has been properly backfilled with at
41 least 3 feet of cover. Place, maintain and finally remove the required cover that is above the
42 proposed finished grade. Remove and replace pipe that becomes misaligned, shows excessive
43 settlement or has been otherwise damaged by the Contractor's operations.

Section 300

1 300-8 INSPECTION AND MAINTENANCE

2 Before final acceptance, the Engineer will perform random video camera and or mandrel
3 inspections to ensure proper jointing and that deformations do not exceed allowable limits.
4 Replace pipes having cracks greater than 0.1 inch or deflections greater than 7.5%. Repair or
5 replace pipes with cracks greater than 0.01 inch, exhibiting displacement across a crack,
6 exhibiting bulges, creases, tears, spalls or delamination. Maintain all pipe installations in
7 a condition such that they will function continuously from the time the pipe is installed until
8 the project is accepted.

9 300-9 MEASUREMENT AND PAYMENT

10 No measurement will be made of any work covered by this section except as listed below.
11 Removal and disposal of existing pavement and unsuitable material above the pipe invert are
12 a part of the excavation for the new pipe culvert installation. Repair of the pavement will be
13 made in accordance with Section 654. Placing, maintaining and removing the required cover
14 is incidental to the work of this section. Removing and replacing pipe that becomes
15 misaligned, shows excessive settlement or has been otherwise damaged by the Contractor's
16 operations is incidental to the work of this section.

17 (A) Using Local Material

18 *Undercut Excavation* is all excavation removed by undercutting below the bottom of the
19 trench as staked. *Undercut Excavation* will be measured as the actual number of cubic
20 yards of undercut excavation, measured in its original position and computed by the
21 average end area method, that has been removed as called for in the contract and will be
22 paid at double the contract unit price for *Unclassified Excavation* in accordance with
23 Article 225-7.

24 Local material used for conditioning the foundation will be measured and paid in
25 accordance with Article 225-7 for *Unclassified Excavation* or in accordance with
26 Article 230-5 for *Borrow Excavation* depending on the source of the material.

27 Local material used to replace pipe undercut excavation will be measured and paid in
28 accordance with Article 225-7 or Article 230-5.

29 (B) Using Other than Local Material

30 No measurement and payment will be made for *Undercut Excavation*. The material used
31 to replace pipe undercut excavation will be classified as foundation conditioning material.

32 *Foundation Conditioning Material, Minor Structures* will be measured and paid as the
33 actual number of tons of this material weighed in trucks on certified platform scales or
34 other certified weighing devices.

35 No direct payment will be paid for *Undercut Excavation*. Payment at the contract unit
36 price for *Foundation Conditioning Material, Minor Structures* will be full compensation
37 for all work of pipe undercut excavation.

38 (C) Foundation Conditioning Geotextile

39 *Foundation Conditioning Geotextile* will be measured and paid in square yards. The
40 measurement will be based on the theoretical calculation using length of pipe installed
41 and two times the standard trench width. No separate measurement will be made for
42 overlapping geotextile or the vertical geotextile dimensions required to encapsulate the
43 foundation conditioning material.

(D) Bedding and Backfill with Select Material

No measurement will be made for select bedding and backfill material required in the contract documents. The select bedding and backfill material will be included in the cost of the installed pipe.

Where unclassified excavation or borrow material meets the requirements for select bedding and backfill and is approved for use by the Engineer, no deductions will be made to these pay items to account for use in the pipe installation.

Payment will be made under:

Pay Item	Pay Unit
Foundation Conditioning Material, Minor Structures	Ton
Foundation Conditioning Geotextile	Square Yard

SECTION 305 DRAINAGE PIPE

305-1 DESCRIPTION

Where shown in the plans, the Contractor may use reinforced concrete pipe, aluminum alloy pipe, aluminized corrugated steel pipe, HDPE pipe or PVC pipe in accordance with the following requirements.

305-2 MATERIALS

Refer to Division 10.

Item	Section
Aluminized Corrugated Steel Pipe	1032-3(A)(7)
Corrugated Aluminum Alloy Pipe	1032-2(A)
Corrugated HDPE Pipe	1032-7
Elbows	1032
PVC Pipe	1032-8
Reinforced Concrete Pipe, Class II or III	1032-6(B)

Corrugated steel pipe will not be permitted in counties listed in Article 310-2.

Only pipe with smooth inside walls will be allowed for storm drain systems. Define "storm drain systems" as pipe under curb and gutter, expressway gutter and shoulder berm gutter that connects drainage structures and is not open ended.

305-3 CONSTRUCTION METHODS

Install pipe culverts in accordance with Section 300. Where allowed by the plans, use any of the several alternate pipes shown herein, but only one type of pipe and elbow will be permitted between drainage structures or for the entire length of a cross line pipe.

305-4 MEASUREMENT AND PAYMENT

___" *Drainage Pipe* will be measured and paid as the actual number of linear feet of pipe that has been incorporated into the completed and accepted work. Measurement of pipe will be made by counting the number of joints used and multiplying by the length of the joint to obtain the number of linear feet of pipe installed and accepted. Measurements of partial joints will be made along the longest length of the partial joint to the nearest 0.1 foot. Select bedding and backfill material will be included in the cost of the installed pipe.

___" *Drainage Pipe Elbow* will be measured and paid in units of each.