1028-4 BOND BREAKER

Install silicone sealant over a bond breaker to prevent the sealant from bonding to the bottom of the joint. Use bond breakers that do not stain or adhere to the sealant and are chemically inert and resistant to oils. Furnish a Type 3 material certification in accordance with Article 106-3 for each lot of bond breaker material supplied to each project.

(A) Type L

Type L backer rod is a closed-cell expanded polyethylene foam backer rod. Use this backer rod in roadway and bridge joints and with Type NS silicone only. Use Type L backer rod that complies with Table 1028-2.

(B) Type M

Type M backer rod is a closed-cell polyolefin foam backer rod which has a closed-cell skin over an open cell core. Use this backer rod in roadway and bridge joints with both silicone sealant types. Use Type M backer rod that complies with Table 1028-2.

TABLE 1028-2
PHYSICAL PROPERTIES OF TYPE L AND TYPE M BACKER ROD

Property	Requirement	Test Method
Min. Density	2.0 lb/cf	ASTM D1622
Min. Tensile Strength	25 psi	ASTM D1623
Max. Water Absorbtion	0.5% by volume	ASTM C509

(C) Type N

Provide bond breaking tape made from extruded polyethylene that has a pressure sensitive adhesive on one side. Bond breaking tape may be used with both types of silicone but is suitable for bridge joints only. Bond breaking tapes shall be at least 0.005" in thickness.

SECTION 1032
CULVERT PIPE

1032-1 CORRUGATED METAL CULVERT PIPE

Use corrugated metal culvert pipe from sources on the Department's approved list and that participate in the Department's Brand Registration program for metal culvert pipe available from the website or the Materials and Tests Unit's Central Laboratory. The Department will remove a manufacturer of metal culvert pipe from this program if the monitoring efforts indicated that non-specification material is being provided or test procedures are not being followed.

The following types of steel and aluminum alloy pipe and all associated accessories may be accepted under this program.

(A) Coated corrugated metal culvert pipe and pipe arches,

(B) Coated corrugated metal end sections, coupling band and other accessories,

(C) Corrugated aluminum alloy structural plate pipe and pipe arches,

(D) Corrugated aluminum alloy end sections, coupling band and other accessories, and

(E) Welded steel pipe.

1032-2 CORRUGATED ALUMINUM ALLOY CULVERT PIPE

(A) Corrugated Aluminum Alloy Culvert Pipe

Corrugated aluminum alloy culvert pipe shall meet AASHTO M 196, except that Type IA pipe will not be permitted.

When elongated pipe is called for by the contract, use pipe that is shop formed to provide for a 5% vertical elongation.

Coupling bands with projections may be used for circumferential pipe, helical pipe, or a combination of both.

(B) Corrugated Aluminum Alloy Pipe Tees and Elbows

Corrugated aluminum alloy pipe tees and elbows shall meet all applicable requirements of AASHTO M 196.

(C) Acceptance

Acceptance of corrugated aluminum alloy culvert pipe and its accessories will be based on, but not limited to, visual inspections, classification requirements and check samples taken from material delivered to the project and conformance to the annual Brand Registration.

Culvert pipe materials not meeting the above requirements will be rejected, unless written approval is obtained from the State Materials Engineer.

1032-3 CORRUGATED STEEL CULVERT PIPE

(A) Corrugated Steel Culvert Pipe and Pipe Arch

Corrugated steel culvert pipe and pipe arch shall meet AASHTO M 36 with the following exceptions:

(1) Coupling Bands

(a) Use corrugated coupling bands except as otherwise provided below.

(b) A hugger type corrugated band having one annular corrugation at each outside edge of the band will be acceptable.

(c) Coupling bands with projections may be used where it is necessary to join new pipe to existing pipe having helical corrugations at the joint locations. Use an approved sealer with this type of coupling band.

(d) Fasten coupling bands on the ends with at least two 1/2" bolts.

(e) Annular corrugated bands shall have a minimum width of 10 1/2" where 2 2/3" x 1/2" corrugations are used.

(2) Corrugations

Where 1/4" deep corrugations are permitted by AASHTO M 36, the maximum pitch of the corrugations shall be 1 7/8".

Where 3" x 1" corrugations are required, the Contractor will be permitted to use 5" x 1" corrugations.

Pipe with helical corrugations shall have rerolled ends with at least 2 annual corrugations at each end.

(3) Elongated Pipe

When elongated pipe is called for by the contract, use pipe that is shop formed to provide for a 5% vertical elongation.

(4) Lifting Straps

The pipe may be furnished either with or without lifting straps for handling. Attach the lifting straps by bolting or by welding. Bolt holes for attaching the straps shall be a smooth hole that is either punched or drilled. No burning of holes will be permitted. Design the lifting straps so the holes can be plugged to prevent infiltration of backfill material.

Design the placement of lifting straps to ensure the pipe is equally supported along its axis.

(5) Coating Repair

Repair shall be in accordance with Section 1076-7.

(6) Type IA Pipe

Type IA pipe will not be permitted.

(7) Aluminized Pipe

Aluminized pipe shall meet all requirements herein except that the pipe and coupling bands shall be fabricated from aluminum coated steel sheet meeting AASHTO M 274.

(8) Marking Requirements

Pipe sections and special attachments for pipe 60" or larger diameter pipe shall be alphanumerically match-marked at the plant site before shipping. There may be additional markings as required by the Department's Brand Certification Program.

(B) Prefabricated Corrugated Steel Pipe End Sections

Corrugated steel end sections shall be in accordance with the details shown in the plans and Subarticle 1032-3(A). Repair end sections on which the spelter coating has been bruised or broken either in the shop or in shipping in accordance with AASHTO M 36.

(C) Corrugated Steel Pipe Tees and Elbows

Corrugated steel tees and elbows shall be in accordance with Subarticle 1032-3(A).

(D) Corrugated Steel Eccentric Reducers

Corrugated steel eccentric reducers shall be in accordance with Subarticle 1032-3(A) and the additional requirements shown below.

Construct the eccentric reducer so the invert or flow line from the large pipe through the reducer and into the small pipe is a continuous straight line.

Make the reducer from the same thickness corrugated metals as the large diameter pipe. The reducing section may be riveted or welded.

(E) Acceptance

Acceptance of corrugated steel culvert pipe and its accessories will be based on, but not limited to, visual inspections, classification requirements and check samples taken from material delivered to the project and conformance to the annual Brand Registration.

Culvert pipe materials not meeting the above requirements will be rejected, unless written approval is obtained from the State Materials Engineer.

The reducing section shall reduce in diameter no more than 3" in 24" of length. Rivet or weld a 24" long constant diameter stub to each end of the reducing section to form the complete reducer.

Have the completed reducer show careful, finished workmanship in all particulars. Repair reducers on which the spelter coating has been bruised or broken either in the shop or in shipping in accordance with AASHTO M 36. Reducers that show defective workmanship will be rejected. The following defects are evidence of poor workmanship, and the presence of any of them in any individual reducer will constitute sufficient cause for rejection:

(1) Not meeting required dimensions,
(2) Not of the specified shape,
(3) Uneven laps,
(4) Ragged or diagonal sheared edges,
(5) Loose, unevenly lined or spaced rivets,
(6) Poorly formed rivet heads,
(7) Lack of rigidity,
(8) Dents or bends in the metal itself,
(9) Uneven welds, or
(10) Gaps in welds.

1032-4 COATED, PAVED AND LINED CORRUGATED STEEL CULVERT PIPE

(A) Coatings for Steel Culvert Pipe or Pipe Arch

The below coating requirements apply for steel culvert pipe, pipe arch, end sections, tees, elbows and eccentric reducers.

(1) Steel Culvert pipe shall have an aluminized coating, meeting the requirement of AASHTO M 274.

(2) When shown in the plans or as approved by the Engineer, a polymeric coating meeting AASHTO M 246 for Type B coating may be substituted for aluminized coating.

(B) Acceptance

Acceptance of coated steel culvert pipe and its accessories will be based on, but not limited to, visual inspections, classification requirements and check samples taken from material delivered to the project and conformance to the annual Brand Registration.

1032-5 WELDED STEEL PIPE FOR DRAINAGE

Welded steel pipe shall meet ASTM A139 for the grade of pipe called for in the plans.

Acceptance of welded steel culvert pipe and its accessories will be based on, but not limited to, visual inspections, classification requirements and check samples taken from material delivered to the project and conformance to the Department's welded steel pipe program.

Culvert pipe materials not meeting the above requirements will be rejected, unless written approval is obtained from the State Materials Engineer.

1032-6 CONCRETE CULVERT PIPE

(A) General

Use concrete pipe from sources participating in the Department's Concrete Pipe QC/QA Program. A list of participating sources is available from the Materials and Tests Unit's Central Laboratory. The Department will remove a manufacturer of concrete pipe from this program if the monitoring efforts indicated that non-specification material is being provided or testing procedures are not being followed.

(B) Reinforced Concrete Culvert Pipe

Reinforced concrete culvert pipe shall meet AASHTO M 170 for the class of pipe called for in the plans except as follows:

(1) The permissible wall thickness outside of the joint configuration shall not be more than that shown in the design by more than 5% or 3/16", whichever is greater.

(2) The maximum weighted average loss for both fine and coarse aggregates shall be 15% when subjected to 5 cycles of the soundness test.

(3) The maximum percentage of wear for coarse aggregates is 55%.

The design wall thickness shall be either the wall thickness shown in AASHTO M 170 for the applicable class and wall or the wall thickness shown in a modified design that has been approved by the Engineer. A wall thickness greater than permitted by the above tolerance will be cause for rejection of the pipe. The circumferential steel in single cage pipe shall not be more than 3" from either end of the pipe section excluding the tongue and groove. On double cage pipe, extend one cage into the tongue or groove. Place the other cage so a circumferential wire shall be not less than 2" from the other end of the barrel of the pipe.

(C) Precast Concrete Pipe End Sections

Precast concrete pipe end sections shall meet AASHTO M 170 and Section 1077 except those requirements pertaining to design.

Design concrete pipe end sections in accordance with the plans or with plans prepared by the manufacturer which have been approved by the Engineer. Reinforce all concrete pipe end sections. Use air entrained concrete in pipe end sections with a strength of 3,500 psi when tested in accordance with AASHTO T 22.

(D) Concrete Pipe Tees and Elbows

Concrete pipe tees and elbows shall meet AASHTO M 170 for the class of pipe tee or elbow called for in the plans.

(E) Marking

(1) Clearly etchmark the following information on the outside of each section of pipe, pipe end section, tee and elbow:

(a) Pipe class and type of wall if reinforced,

(b) The date of manufacture, and

(c) Name or trademark of the manufacturer.

(2) Clearly stamp, stencil, sticker or paint the following information on each section of pipe, pipe end section, tee and elbow:

(a) The State assigned plant number,

(b) The inside diameter of the pipe product, and

(c) The year of manufacture. This marking shall be in the following format: State plant number - diameter - year (CP99-24-06).

When concrete pipe, pipe end sections, tees and elbows have been inspected and accepted they will be stamped with the Department seal of approval. Do not use pipe sections, pipe end sections, tees, or elbows which do not have this seal of approval. Failure of as much as 20% of any lot of pipe due to cracks, fractures, variation in alignment or other manufacturing defects will be cause for the rejection of the entire lot. The lots shall be as designated by the manufacturer before inspection.

Individual lengths of pipe within the lot which were not specifically rejected but which are considered acceptable by the manufacturer may be removed from the rejected lot and resubmitted for inspection as a separate lot.

(F) Joint Materials

Cement shall meet Article 1024-1. Sand shall meet Article 1014-1 for fine aggregate or Article 1040-7 for mortar sand. Hydrated lime shall meet Article 1040-6.

Flexible plastic joint material shall meet AASHTO M 198 for Type B flexible plastic gaskets, except as follows:

(1) The flash point, Cleveland Open Cup (C.O.C.) shall be at least 325°F.

(2) The fire point, C.O.C. shall be at least 350°F.

1032-7 CORRUGATED POLYETHYLENE (HDPE) CULVERT PIPE

(A) General

Use corrugated polyethylene pipe from sources participating in the Department's HDPE Pipe QC/QA Program. A list of participating sources is available from the Materials and Tests Unit. The Department will remove a manufacturer of polyethylene pipe from this program if the monitoring efforts indicated that non-specification material is being provided or test procedures are not being followed.

Use corrugated polyethylene culvert pipe that meets AASHTO M 294 for Type S or Type D and has been evaluated by NTPEP.

(B) End Treatments, Pipe Tees and Elbows

End treatments, pipe tees and elbows shall meet AASHTO M 294, Section 7.8.

(C) Marking

Clearly mark each section of pipe, end section, tee and elbow and other accessories according to the Department's HDPE Pipe QC/QA Program:

(1) AASHTO Designation

(2) The date of manufacture

(3) Name or trademark of the manufacturer

When polyethylene pipe, end sections, tees and elbows have been inspected and accepted they will be stamped with the Department seal of approval. Do not use pipe sections, flared end sections, tees or elbows which do not have this seal of approval.

1032-8 PVC PROFILE WALL DRAIN PIPE

PVC pipe shall conform to AASHTO M 304. When rubber gaskets are to be installed in the pipe joint, the gasket shall be the sole element relied on to maintain a tight joint. Watertight joints shall be watertight in accordance with AASHTO M 304, unless a higher pressure rating is specified in the plans.

SECTION 1034
SANITARY SEWER PIPE AND FITTINGS

1034-1 CLAY PIPE

Use extra strength vitrified clay sewer pipe conforming to ASTM C700. Manufacture all joints and seals in accordance with ASTM C425.