ENGINEERING DIRECTIVES AND STANDARDS

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Directive : 1

Effective Date :
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Subject : **PIPE MATERIAL SELECTION POLICY FOR CROSS DRAINS, SIDE DRAINS, AND STORM DRAINS**

1. PURPOSE:

The purpose of this directive is to establish a policy for the design life and determination of the allowable types of pipe for cross drains, side drains, and storm drains.

2. POLICY:

It will be the policy of the Department to allow alternate materials and options in the construction of drains. The determination of alternates or options to be allowed will be based on the performance evaluation data currently available to the Department. The design life given in Table 1 and the policy described in the following paragraphs will be used in the process, along with the criteria given for materials selection.

A. EXCEPTIONS TO THE REQUIREMENTS GIVEN IN TABLE 1

1. For highways and local roads which ordinarily require a 50 year design service life (see Table 1), a 70 year design service life shall be used if the fill height on the cross drain is greater than 10 feet (3 m), measured from top of culvert, or if the surfacing is to be portland cement concrete.

2. For highways which ordinarily require a 50 year design service life (See Table 1), a 30 year design life may be used for interim alignments such as a tie-in from two to four lanes, where new alignments are planned, or similar applications.

3. Extensions of existing pipe installations will be of the same type of material as that of the pipe being extended.

B. METAL PIPE

The gage (thickness) and coating requirement for metal pipe will be determined as outlined in EDSM II.2.1.6.

C. PLASTIC PIPE

EDSM II.2.1.13 describes quality assurance and installation requirements for plastic pipe.

D. MATERIAL TYPE ABBREVIATIONS AND DEFINITIONS

RCP – Reinforced Concrete Pipe
RCPA – Reinforced Concrete Pipe Arch
CMP – Corrugated Metal Pipe
CMPA – Corrugated Metal Pipe Arch
CAP – Corrugated Aluminum Pipe
CAPA – Corrugated Aluminum Pipe Arch
CSP – Corrugated Steel Pipe
CSPA – Corrugated Steel Pipe Arch
BCCSP – Bituminous Coated Corrugated Steel Pipe
BCCSPA – Bituminous Coated Corrugated Steel Pipe Arch
PP – Plastic Pipe
RPVCP – Ribbed Polyvinyl Chloride Pipe: (ASTM F794 or ASTM F949)
CPEPDW – Corrugated Polyethylene Pipe Double Wall: (AASHTO M294 - Type S)

E. JOINT TYPES

1. (T1) Type 1 Joints.
   The combination of gasket material and joint configuration are to prevent infiltration. See specifications for more detailed information. Type 2 or 3 joints may be used as an alternative to type 1 joint.

2. (T2) Type 2 Joints.
   The combination of gasket material and joint configuration meets the 5 psi hydrostatic pressure test. See specifications for more detailed information.

3. (T3) Type 3 Joints.
   The combination of gasket material and joint configuration meets the 10 psi hydrostatic pressure test. See specifications for more detailed information.

APPLICATION	DESIGN SERVICE LIFE	JOINT TYPE	MATERIALS
Storm Drain Pipes Flumes Other Watertight Systems	70 years	T3	RCP(A), RPVCP
Storm Drain Pipe (Outfall) {See Section F.1}	50 years	T3	BCCSP(A), CAP(A), CSP(A), RPVCP
Cross Drain Pipes for: Freeways: F-1, F-2, F-3 Urban Arterial: UA-1, UA-2, UA-3 Rural Arterial: RA-1, RA-2, RA-3 Urban Collector (4 lanes): UC-1, UC-2 Rural Collector (4 lanes): RC-3 Suburban Arterial: SA-1, SA-2	70 years	T3	RCP(A), RPVCP
Cross Drain Pipes for: Urban Collector (2 lanes): UC-1, UC-2 Rural Collector (2 lanes): RC-1, RC-2, RC-3 Urban Local: UL-1, UL-2 Rural Local: RL-1, RL-2, RL-3 Suburban Collector: SC-1, SC-2, SC-3	50 years	T2	RCP(A), BCCSP(A), CAP(A), RPVCP, CPEPDW (see Note1 below)
Side Drain	30 years	T1	RCP(A), BCCSP(A), CAP(A), CSP(A), RPVCP, CPEPDW
Side Drain (Erosion) {See Section F.2}	30 years	T1	BCCSP(A), CAP(A), CSP(A), RPVCP, CPEPDW
Side Drain (Bridge Drains) {See Section F.3}	50 years	T1	BCCSP(A), CAP(A), CSP(A), RPVCP, CPEPDW

TABLE 1 - Design Service Life and Material Selection for Culverts and Storm Drains

Note1 – CPEPDW applicable on roadways where traffic volume does not exceed 3000 ADT.

F. SPECIAL INSTALLATIONS

Special installation conditions are generally defined as conditions which may restrict the use of some culvert materials.

Some examples of special installation conditions are discussed below.
The allowable material types are listed in Table 1.

1. Storm Drain Pipe (Outfall)
   Outfall into a Perpendicular or Nearly Perpendicular Waterway: When an outfall pipe line, usually from a storm drain system, discharges into a rapidly moving stream, at or near a right angle to flow, a potentially erosive condition is present.

2. Side Drain (Erosion)
   Roadside Ditch Erosion Control at Crossing Waterways: It is sometimes desirable to "drop" roadside ditch discharges sharply at larger crossing waterways. Blocking the roadside ditch and discharging the water through a pipe is one solution to this problem.

3. Side Drain (Bridge Drains)
   Down Drains at Bridge Ends: It is sometimes desirable to drain water from the roadway with catch basins and drain pipes through the embankment into roadside drainage.

There are other possible special installation conditions which might require deviation from the material choices outlined in Table 1. The types of structures chosen for these conditions should be based on engineering justification.

3. OTHER ISSUANCES AFFECTED:

This memorandum supersedes EDSM 11.2.1.1, dated 02/04/2005. All directives, memoranda or instructions issued heretofore in conflict with this directive are hereby rescinded.

4. EFFECTIVE DATE:

This policy will be implemented on all projects except those where use of this EDSM would result in scheduling delays.

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