



Chris Cooper &lt;ccooper@azdot.gov&gt;

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## Plastic Pipe Selection Guidelines

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**Chris Cooper** <ccooper@azdot.gov>

Tue, Mar 22, 2022 at 9:26 AM

Draft To: Andrew Roth <aroth@azdot.gov>, Audra Merrick <amerrick@azdot.gov>, Barry Crockett <bcrockett@azdot.gov>, Bill Fay <bfay@azdot.gov>, Brent Cain <BCain@azdot.gov>, Brian Jervas <bjevas@azdot.gov>, David Eberhart <DEberhart@azdot.gov>, "Deitering, Thomas (FHWA)" <thomas.deitering@dot.gov>, Doug Smith <dsmith2@azdot.gov>, Gregory Byres <GByres@azdot.gov>, Gregory Wristen <gwristen@azdot.gov>, Hiren Shah <hshah@azdot.gov>, James Wilson <jwilson@azdot.gov>, James Windsor <jwindsor@azdot.gov>, Jerry James <JJJames@azdot.gov>, Jesus Sandoval-Gil <jsandoval-gil@azdot.gov>, Kurt Harris <kharris@azdot.gov>, Lisa Pounds <LPounds@azdot.gov>, Matt Moul <MMoul@azdot.gov>, Maysa Hanna <mhanna@azdot.gov>, Md Iqbal Hossain <ihossain@azdot.gov>, Michael DenBleyker <mdenbleyker@azdot.gov>, Paul O'Brien <PO'Brien@azdot.gov>, Paul Patane <PPatane@azdot.gov>, Randy Everett <reverett@azdot.gov>, Raul Amavisca <RAMavisca@azdot.gov>, "Roderick F. Lane" <RLane@azdot.gov>, Steve Boschen <SBoschen@azdot.gov>, Steve O'Brien <SO'Brien@azdot.gov>, Syed Alam <salam2@azdot.gov>, "Todd A. Emery" <TEmery@azdot.gov>, Brenden Foley <BFoley@azdot.gov>, Chad Auker <cauker@azdot.gov>

**SENT ON BEHALF OF MICHAEL DENBLEYKER, STATE ROADWAY ENGINEER**

**TO ALL ADOT AND CONSULTANT DESIGN PERSONNEL**

**RE: REVISED PLASTIC PIPE SELECTION GUIDELINES**

Updated plastic pipe selection guidelines are now available in the attached, and on the Roadway Engineering webpage at <https://azdot.gov/business/engineering-and-construction/roadway-engineering/roadway-design-standards-and-guidelines>. This guidance supersedes the plastic pipe information provided in the ADOT Pipe Selection Guidelines and Procedures, and should be used to determine the viability of plastic pipe for all new pipe locations. The metal and concrete pipe guidance contained in the Pipe Selection Guidelines and Procedures is still valid, and should continue to be used for assessing those alternatives.

Pipe summary sheets have also been revised to accommodate the updated plastic pipe options, and are available for Connect at <https://azdot.gov/business/engineering-and-construction/cadd> and for V8i at <https://azdot.gov/business/engineering-and-construction/roadway-engineering/roadway-design/roadway-cadd-resources>.

Project Managers should ensure the updated guidance and summary sheets are used on applicable projects that have not reached Stage III by March 30, 2022.

Please distribute this memorandum to all design and development personnel, including consultants, within your District, Group, or Section. Thank you for your attention to this updated guidance. For further assistance, please contact Chris Cooper, Roadway Standards Engineer at 602-712-8365.

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## MEMORANDUM

TO: All ADOT Design Personnel and Consultants

FROM: Michael DenBleyker, Assistant State Engineer, Roadway Engineering Group

CC: Gregory Byres, State Engineer

DATE: March 22, 2022

RE: Plastic Pipe Selection Guidelines

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The attached guidelines provide updated plastic pipe information to aid designers in the process of selecting suitable materials for pipe culverts and storm drains. This guidance supersedes the plastic pipe information provided in the ADOT Pipe Selection Guidelines and Procedures, and should be used by the designer in determining the viability of plastic pipe for all new pipe locations. Other information contained in the Pipe Selection Guidelines and Procedures is still valid, and should continue to be used for determining metal and concrete pipe alternates.

Project Managers should ensure this updated guidance is followed.

Please distribute this memorandum to all design and development personnel, including consultants, within your District, Group, or Section.

Thank you for your attention to this updated guidance. For further assistance, please contact Chris Cooper, Roadway Standards Engineer at 602-712-8365.

### Attachment

C: Roadway Engineering Group  
Materials Group  
Districts  
Traffic Engineering Group  
PRO and LPA Section  
Engineering Consultants Section  
Federal Highway Administration

Project Management Group  
Contracts & Specifications  
Bridge Group  
State Engineer's Office  
Regional Traffic Engineers  
TSMO  
Construction Group

## PLASTIC PIPE SELECTION GUIDELINES

For each new pipe culvert installation, the designer should assess the suitability of metal, concrete, and plastic pipes for that location, and all viable options should be included in the project plans pipe summary sheets. The ADOT Pipe Selection Guidelines and Procedures describe processes for determining material suitability, and should continue to be used for metal and concrete pipe selection. This memo redefines viability parameters for plastic pipe, and should be used in place of the plastic pipe guidance provided in the Pipe Selection Guidelines and Procedures.

There are two types of plastic pipe that may be used for culvert and storm drain applications. Both are formed into a dual wall Type 'S' profile, which has a corrugated exterior wall and smooth inner wall with a Manning's n value of .012. One is made from high density polyethylene (HDPE), the other is made from polypropylene (PP). Material requirements for both are as specified in Section 1010 of the ADOT Standard Specifications. Pipe products made from each material are listed in the ADOT Approved Products List.

Plastic pipes are highly resistant to pH and to chemically and electrochemically induced corrosion, suitable for use in soils with pH ranging from 1.25 to 14, and any value of resistivity. They are also highly resistant to fine aggregate abrasive bed loads. Service life is generally expected to be 75 years.

Additives contained in plastic pipe and fittings provide a degree of protection from UV degradation. However, components subjected to long term sunlight exposure such as end treatments should be metal or concrete. For pipes up to 42 inches, the designer may specify standard metal end sections per Standard Drawing C-13.25, or safety metal end sections per Roadway Detail X1971. Plastic pipes 48 inches or larger shall include concrete headwalls per the SD 6.30 series standard drawings.

Since plastic pipes are more susceptible to fire damage than concrete or metal pipes, the designer should engage district in an assessment of the fire risks associated with the proposed pipe location. Where high fire potential conditions exist for cross culverts, the designer may consider limiting the allowable pipe materials indicated on the pipe summary sheets to metal and concrete, or require that the outer section on both ends of plastic pipe culverts be replaced with a section of metal or concrete pipe.

When installed in accordance with the requirements of Standard Specification 501, and Standard Drawings C-13.10 and C-13.15 plastic pipe can be used for locations where fill heights fall within the ranges listed in the table below. Minimum heights in the table are from top of pipe to top of rigid pavement section or from top of pipe to bottom of flexible pavement section. The flexible pavement section should be a minimum of 4 inches thick to accommodate H-25 or HS-25 loading on the pipe.

**PLASTIC PIPE FILL HEIGHTS**

PIPE DIAMETER	HIGH DENSITY POLYETHYLENE AASHTO M 294 TYPE S		POLYPROPYLENE AASHTO M330 TYPE S	
	MINIMUM (FT)	MAXIMUM (FT)	MINIMUM (FT)	MAXIMUM (FT)
18	1	17	1	22
24	1	14	1	19
30	1	14	1	19
36	1	13	1	14
42	1	11	1	15
48	1	12	1	14
54	2	11	n/a	n/a
60	2	12	2	14