Engineered Drainage For Railway Applications

*The Most **Advanced** Name in Drainage Systems®*

THE NEW STANDARD IN DRAINAGE PIPE

N-12® PIPE

For more than 40 years, Advanced Drainage Systems' corrugated high density polyethylene (HDPE) pipe has been building its reputation for economy, durability, and superior performance in gravity-flow drainage applications. During the 1970's and 1980's, ADS singlewall pipe became the preferred product for agricultural, mining, turf/recreation, and residential drainage markets.

In 1987, ADS introduced the first HDPE drainage pipe to combine an annular corrugated exterior for strength with a smooth interior wall for maximum flow capacity. Named for its excellent Manning's "n" rating of 0.012, 4" - 60" (100 - 1500 mm) N-12 pipe was designed specifically for storm sewers, highways, airports, railroad and other engineered construction. Its performance and economy have led to rapid acceptance by contractors, engineers, municipalities and state agencies.

ADS N-12 WT Pipe

REVOLUTIONARY JOINING TECHNOLOGY

Years of research and testing have produced a fast-coupling, watertight bell-and-spigot joint that incorporates patented technology developed in the aerospace industry. The sealing area of the bell is reinforced with a proprietary 2" (50 mm) polymer composite collar, which improves the joint's integrity and dimensional control. A proprietary gasket design maximizes sealing, which meets ASTM F477 standards. The gasket is factory installed into the spigot to speed installation. The result is a design that meets or exceeds ASTM D3212 lab test and ASTM F2487 watertight field test requirements. The design also fills an essential role in complying with the stricter demands of new EPA water quality guidelines.

ADS ST Split Coupler

APPLICATIONS

N-12 pipe meets the requirements of ASTM F2306, AASHTO M252 or M294 Type S. This product can be specified under railroads as well as other applications, including culverts, cross drains, storm sewers, landfills and other public and private construction.

Contact your local ADS representative for more information

TECHNOLOGY CREATES A SUPERIOR PIPE MATERIAL

Advances in polymer science and structural design have created a product that has ***outperformed and outlasted traditional pipe products, while maintaining its cost advantage.***

STRUCTURAL STRENGTH

As a flexible conduit, HDPE pipe withstands vertical pressure by transferring most of the load to the surrounding soil. N-12 pipe will support Cooper E-80 live loads with as little as 2' (600 mm) of cover for 24" (600 mm) diameter pipe and smaller, 3' (900 mm) of cover for 30" (750 mm) and 36" (900 mm) diameter pipe and 4' (1200 mm) of cover for 48" (1200 mm) diameter pipe and larger. Field research done in Ohio and Pennsylvania has placed HDPE pipe under more than 40 feet of fill. Even under harsh conditions, N-12 pipe has continued to give outstanding performance. Testing at Transportation Technology Center, Inc. (TTCI) in Pueblo, Colorado supports engineered loading conditions.

DURABILITY

High density polyethylene is an extremely tough material that can easily withstand the normal impacts involved in shipping and installation. It is highly resistant to corrosion and chemical attack and is unaffected by soils or effluents with pH ranges from 1.5 to 14. Also, since HDPE material is not conductive, N-12 remains unaffected by electrochemical corrosion or stray electrical currents that may otherwise adversely affect other pipe materials.

HDPE's ductility and molecular structure result in excellent resistance to abrasion. Polyethylene pipe shows less than 20% of the material loss of concrete pipe in abrasive environments, and is often specified for harsh mine slurries and as a slip liner for deteriorated culverts.

HYDRAULIC EFFICIENCY

The smooth interior of N-12 pipe provides superior flow characteristics often allowing pipes to be reduced by one full pipe size when compared to corrugated interior products. Laboratory tests show the Manning's roughness coefficient of 0.012 is appropriate for design.

LIGHTWEIGHT

HDPE pipe is lighter than concrete pipe, making it far easier to transport and handle. On-site labor and equipment requirements are reduced, with a corresponding reduction in the potential risk of injury.

FAST INSTALLATION

Long 20' (6 m) lengths mean fewer joints. N-12 pipe is also available in 13 ft. lengths for smaller trench boxes. Watertight connections are quick and easy with integral gasketed bell and spigot joints. The pipe cuts easily and does not need to be beveled for joining.

Proper installation is necessary for the long-term performance of any drainage pipe. The basic procedures and precautions for corrugated polyethylene pipe are in fact quite similar to those for concrete and metal pipe.

N-12 pipe is a flexible conduit. As is the nature of flexible conduits, live and dead loads are transferred to the surrounding soil. It is important to properly place and use backfill material that will produce a pipe-soil interaction system capable of withstanding the applied loads.

Instructions for underground installation of plastic drainage pipe are contained in ASTM D2321. Specific instructions for N-12 pipe in railroad applications may be found in Standard Detail STD-111 and the ADS N-12 Pipe (per ASTM F2306) specification for railroad applications, contained in this brochure.

ADS N-12® PIPE (per AASHTO) SPECIFICATION

SCOPE

This specification describes 4”-60” (100 to 1500 mm) ADS N-12 pipe for use in gravity-flow drainage applications under E-80 Loading Railroad Applications.

PIPE REQUIREMENTS

N-12 ST or WT 4- through 60-inch (100 to 1500 mm)

- 4”-10” (100 to 250 mm) per AASHTO M252, Type S pipe.
- 12”-60” (300 to 1500 mm) per ASTM F2306 and AASHTO M294, Type S pipe.
- Manning’s roughness coefficient “n” value in design shall be 0.012.

JOINT PERFORMANCE

Soil-tight (ST IB) pipe shall be joined using a bell and spigot joint. The bell and spigot joint shall meet the soil-tight requirements of ASTM F2306 and gaskets shall meet the requirements of ASTM F477.

Plain End pipe and fittings connections shall be joined with coupling bands covering at least two full corrugations on each end of the pipe. Gasketed soil-tight coupling band connections shall incorporate a closed-cell synthetic expanded rubber gasket meeting the requirements of ASTM D1056 Grade 2A2. Gaskets, when applicable, shall be installed by the pipe manufacturer.

Watertight (WT IB) pipe shall be joined using a bell and spigot joint. The joint shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. 12”-60” (200 to 1500 mm) diameters shall have a bell reinforced with a polymer composite band. The bell tolerance device shall be installed by the manufacturer.

Fitting connections shall be with a bell and spigot connection utilizing a welded bell and valley gasket. The joint shall meet the watertight requirements of ASTM D3212, and gaskets shall meet the requirements of ASTM F477. If jointing a fitting to standard inline bell/spigot (IB) pipe, the bell or spigot may need to be cut off to enable proper connection.

All joints under track shall be wrapped with a minimum 12 ounce non-woven geotextile to prevent migration of fines through the joint in the event of improper joint connection, unless the pipe is backfilled with a fabric-wrapped, open-graded stone backfill.

FITTINGS

Fittings shall conform to ASTM F2306 and meet joint performance indicated above for fitting connections. Custom fittings are available and may require special installation criterion. Please consult an ADS Engineering Representative (800-821-6710) when using fittings under track to ensure the installation is correct.

INSTALLATION

Installation shall be in accordance with ASTM D2321 and ADS recommended installation guidelines, with the following exceptions.

Minimum cover from bottom of tie to top of pipe for 4”-24” (100 to 600 mm) diameters shall be 2’ (0.6 m) for 30”-36” (750-900 mm) diameters shall be 3’ (0.9 m) and for 42”-60” (1050 to 1500 mm) diameters, the minimum cover shall be 4’ (1.2 m) in single run applications. When multiple pipes are laid, consult ADS’ Engineering Department for design recommendations.

Backfill and compaction for under track applications shall consist of ASTM D2321 standard backfill materials as follows: Class I backfill compacted, and Class II (minimum 95% SPD). Material must be adequately “knifed” into haunch and in between corrugations. Where migration of fines is possible with an open graded backfill a minimum 8 ounce non-woven filter fabric should be wrapped around the backfill to act as a separator. Project soil particle size and durability requirements may require a change in filter fabric properties.

Maximum cover from bottom of tie to top of pipe for 4”-24” (100 to 600 mm) shall be 25’ when pipe is installed with Class I compacted backfill as pipe embedment material, and 20’ if Class II (minimum 95% SPD) backfill is used as pipe embedment material. Maximum cover from bottom of tie to top of pipe for 30”-60” (750 to 1500 mm) shall be 25’ when pipe is installed with Class I compacted backfill as pipe embedment material, and 15’ if Class II (minimum 95% SPD) backfill is used as pipe embedment (120 lbs/f^3 [1926 kg/m^3]) for overburden material.

For projects where cover exceeds the maximum values listed above, or where alternative backfill material is required, contact ADS for specific design considerations.

PIPE DIMENSIONS

	Nominal Diameter, in (mm)													
Pipe I.D. in (mm)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	15 (375)	18 (450)	24 (600)	30 (750)	36 (900)	42 (1050)	48 (1200)	54* (1350)	60 (1500)
Pipe O.D. ** in (mm)	4.8 (122)	6.9 (175)	9.1 (231)	11.4 (290)	14.5 (368)	18 (457)	22 (559)	28 (711)	36 (914)	42 (1067)	48 (1219)	54 (1372)	61 (1549)	67 (1702)

*Check with sales representative for availability by region.

**Pipe O.D. values are provided for reference purposes only, values stated for 12”-60” are ± 1 inch. Contact a sales representative for exact values.

CHEMICAL RESISTANCE

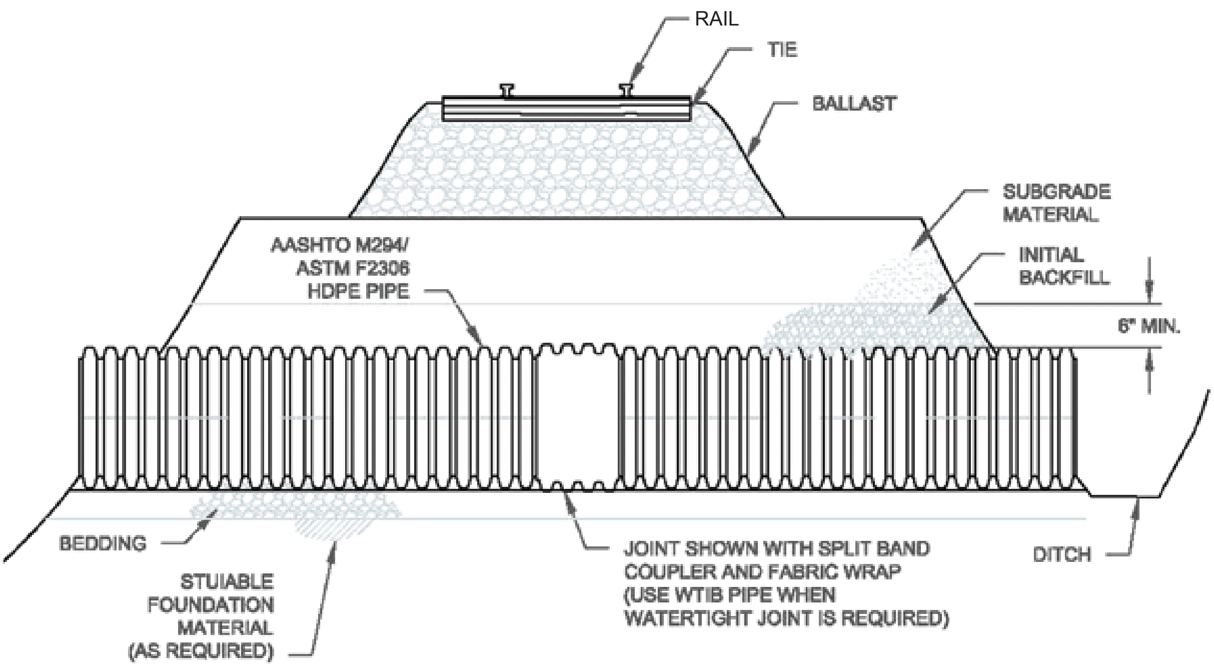
HDPE pipe is extremely resistant to chemicals; refer to Technical Note 4.01 “Chemical Resistance of Polyethylene and Elastomers” on the ADS website at www.ads-pipe.com in the Technical Notes under the Drainage Handbook menu.

END TREATMENTS

Based on the application, end treatments may be required. For recommendations on how to connect HDPE pipe to structures, refer to Technical note 5.04 “HDPE Connections to Manholes and Structures” on the ADS website at www.ads-pipe.com, in the Technical Notes, under the Drainage Handbook menu.

ADDITIONAL DESIGN CONSIDERATIONS

For applications outside of normal gravity flow design conditions such as steep slopes, pressure flow, ground water, etc. contact an ADS Engineering representative (800-821-6710) for specific design guidelines.



NOTES:

1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION

2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.

3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE UNSUITABLE MATERIAL TO THE REQUIRED DEPTH AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE DESIGN ENGINEER. DEPTH OF FOUNDATION IMPROVEMENT MAY BE REDUCED BY USE OF GEOTEXTILE FABRIC AND GRID. REQUIRED TRENCH WIDTH MAY INCREASE WHEN FOUNDATION MATERIAL IS MODIFIED.

4. BEDDING: SUITABLE MATERIAL SHALL BE ASTM D2321 CLASS I OR II. MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 12"-24" (300mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm). THE MIDDLE THIRD OF THE BEDDING SHALL BE LOOSE AND UNIFORM IN DEPTH AND CONSISTENCY. AFTER PIPE IS IN PLACE, COMPACT BEDDING TO INITIAL BACKFILL STANDARDS.

5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE ASTM D2321 CLASS I OR II UNLESS STATED OTHERWISE BY THE DESIGN ENGINEER. MINIMUM COMPACTION SHALL BE:

   CLASS 1, COMPACT IN PLACE, 8" LOOSE LIFTS WITH JUMPING JACK OR SMALL VIBRATORY COMPACTOR
   CLASS 2, COMPACT IN PLACE, 8" LOOSE LIFTS TO MIN. 95% STANDARD PROCTOR DENSITY

6. THE CONTRACTOR SHOULD PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATIONS TO DESIGN ENGINEER, WHERE BACKFILL VERIFICATION IS NOT PROVIDED OR WHERE BACKFILL MAY BECOME SATURATED AFTER PLACEMENT, ONLY ASTM CLASS I OR II (CLEAN) BEDDING AND BACKFILL SHOULD BE USED.

7. PRIOR TO FINAL COMPACTION EFFORT, WORK BACKFILL INTO HAUNCH ZONE BY SHOVELING IN PLACE AND DIAGONALLY WALKING (STOMPING) THE SOIL INTO THE HAUNCH ZONE. THIS EFFORT WILL MAKE VERTICAL COMPACTION MORE EFFECTIVE.

Trench Detail STD.111

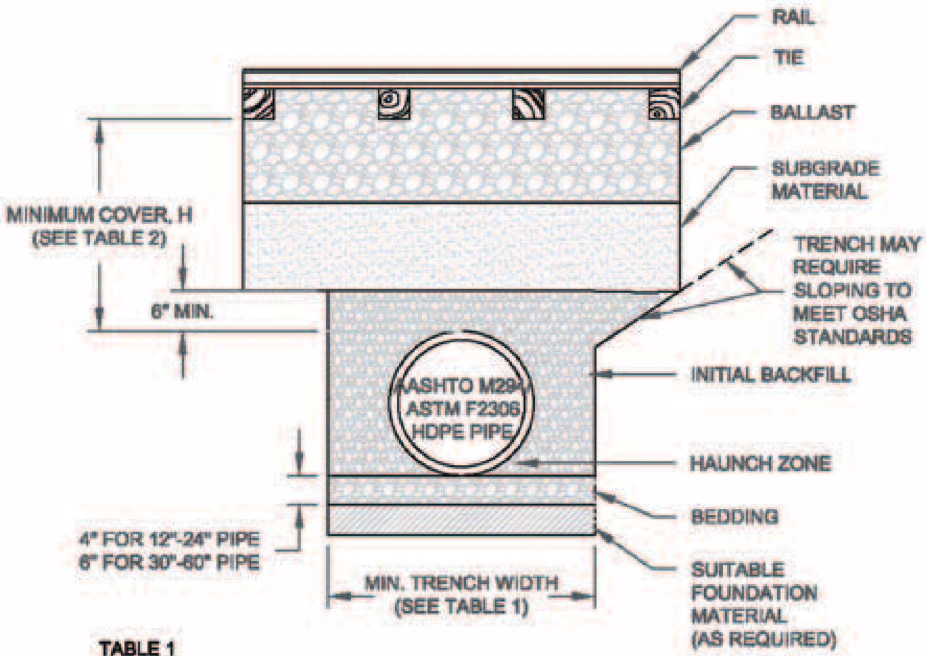


TABLE 1
RECOMMENDED MINIMUM TRENCH WIDTHS

PIPE DIAM.	MIN. TRENCH WIDTH
4"	21"
6"	23"
8"	26"
10"	28"
12"	30"
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"
42"	72"
48"	80"
54"	88"
60"	96"

TABLE 2
MINIMUM RECOMMENDED COVER[1,3] BASED ON RAILWAY LOADING CONDITIONS

PIPE DIAM.	COOPER E-80[2]
UP TO 24"	24"
30"-36"	36"
42"-60"	48"

1. COVER IS MEASURED FROM TOP OF PIPE TO BOTTOM OF RAILWAY TIE.
2. LOADS GREATER THAN E-80 LOAD MAY REQUIRE ADDITIONAL COVER.
3. MINIMUM COVER MAY BE INCREASED TO PREVENT PIPE DAMAGE DUE TO ROUTINE TRACK MAINTENANCE.

REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D
3	NOTE CHANGES	JAB	06.07.10	

RAILWAY INSTALLATION
TYPICAL TRENCH DETAIL

DRAWING NUMBER: STD-111

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OHIO 43026

DRAWN BY	CKM
DATE	10/1/09
DATE BY	
SCALE	NTS
SHEET	1 OF 1

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www.ads-pipe.com

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