ALT. SANITITE HP STORM SEWER NOTE:

(TO BE APPROVED BY OWNER, CONTRACTOR AND GEOTECH)

CONTRACTOR SHALL READ AND FOLLOW SPECIFIC INSTALLATION REQUIREMENTS OF H.D.P.E. PIPE MANUFACTURER BASED UPON PIPE TYPE UTILIZED AND FOLLOW ASTM D-2321 INSTALLATION PROCEDURES AS DIRECTED BY THE ON SITE SUPERVISING GEOTECHNICAL ENGINEER
GEOTECHNICAL ENGINEER SHALL INSPECT INSTALLATIONS TO CONFIRM PROPER INSTALLATION (BEDDING, BACKFILL, COVER, etc) AND CONFIRM SAID INSTALLATION PROCEDURE BASED UPON ON-SITE SOIL TYPE AT PIPE INSTALLATION LOCATIONS ON PROJECT.
IT IS THE CONTRACTOR'S RESPONSIBILITY TO FOLLOW ALL SAID RECOMMENDATIONS FOR PROPER INSTALLATION OF H.D.P.E. PIPE SYSTEM INSTALLED.

SANITITE® HP TRENCH INSTALLATION DETAIL

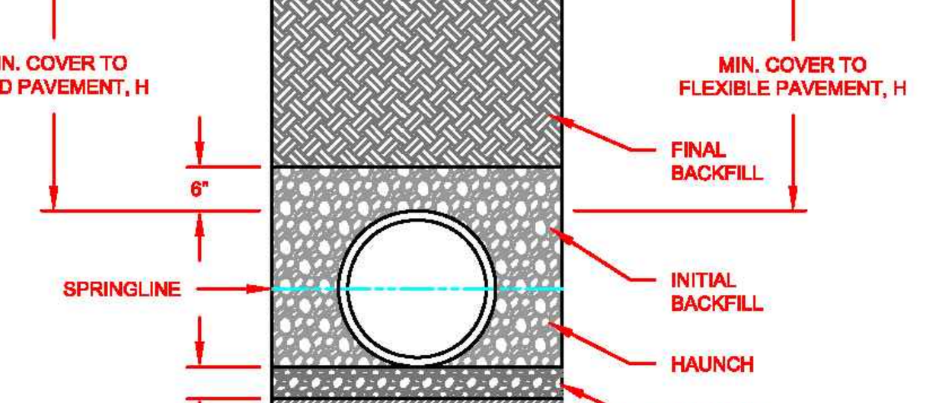


TABLE 1, RECOMMENDED MINIMUM TRENCH WIDTHS

PIPE DIAM.	MIN. TRENCH WIDTH
12" (300mm)	30" (762mm)
15" (375mm)	34" (864mm)
18" (450mm)	39" (991mm)
24" (600mm)	48" (1219mm)
21" (525mm)	43" (1092mm)
30" (750mm)	56" (1422mm)
36" (900mm)	64" (1626mm)
42" (1050mm)	72" (1829mm)
48" (1200mm)	80" (2032mm)
60" (1500mm)	96" (2438mm)

TABLE 2, MINIMUM RECOMMENDED COVER BASED ON VEHICLE LOADING CONDITIONS

PIPE DIAM.	SURFACE LIVE LOADING CONDITION	
	H-25	HEAVY CONSTRUCTION (75T AXLE LAOD) *
12" - 48" (300mm - 1200mm)	12" (305mm)	48" (1219mm)
60" (1500mm)	24" (610mm)	60" (1524mm)

* VEHICLES IN EXCESS OF 75T MAY REQUIRE ADDITIONAL COVER

TABLE 3, MAXIMUM COVER FOR ADS SANITITE HP PIPE, ft (m)

PIPE DIAM.	CLASS I	CLASS II	
	COMPACTED	95%	90%
12" (300mm)	40 (12.2m)	28 (8.5m)	20 (6.1m)
15" (375mm)	41 (12.5m)	29 (8.8m)	20 (6.1m)
18" (450mm)	43 (13.1m)	29 (8.8m)	21 (6.4m)
21" (525mm)	45 (13.7m)	30 (9.1m)	22 (6.7m)
24" (600mm)	37 (11.3m)	25 (7.6m)	18 (5.5m)
30" (750mm)	30 (9.1m)	21 (6.4m)	15 (4.6m)
36" (900mm)	29 (8.8m)	21 (6.4m)	15 (4.6m)
42" (1050mm)	32 (9.8m)	22 (6.7m)	16 (4.9m)
48" (1200mm)	33 (10.1m)	23 (7.0m)	16 (4.9m)
60" (1500mm)	31 (9.4m)	21 (6.4m)	15 (4.6m)

FILL HEIGHT TABLE GENERATED USING AASHTO SECTION 12, LOAD RESISTANCE FACTOR DESIGN (LRFD) PROCEDURE WITH THE FOLLOWING ASSUMPTIONS:
NO HYDROSTATIC PRESSURE, UNIT WEIGHT OF SOIL (γ_s) = 120 PCF

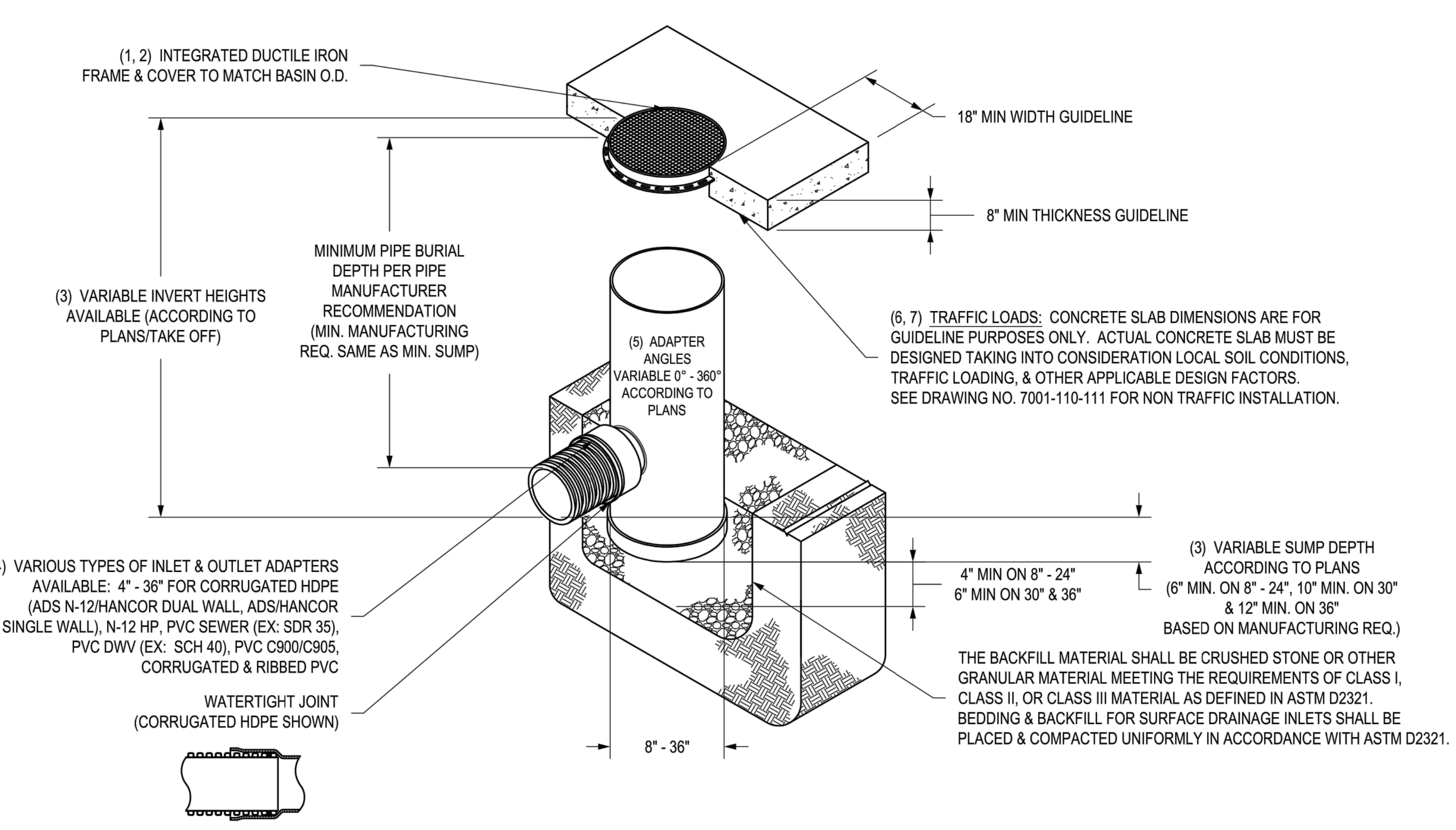
NOTES:

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 TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I OR II. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. COMPACTION SHALL BE SPECIFIED BY THE ENGINEER IN ACCORDANCE WITH TABLE 3 FOR THE APPLICABLE FILL HEIGHTS LISTED. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 12"-24" DIAMETER PIPE (300mm-600mm); 6" (150mm) FOR 30"-60" (750mm-1500mm) DIAMETER PIPE. THE MIDDLE 1/3 BENEATH THE PIPE INVERT SHALL BE LOOSELY PLACED.
5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I OR II IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION. COMPACTION SHALL BE SPECIFIED BY THE ENGINEER IN ACCORDANCE WITH TABLE 3 FOR THE APPLICABLE FILL HEIGHTS LISTED.
6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" (300mm) FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOTATION. FOR TRAFFIC APPLICATIONS; CLASS I OR II MATERIAL COMPACTED TO 90% SPD IS REQUIRED. MINIMUM COVER, H, IS 12" (300mm) UP TO 48" (1200mm) DIAMETER PIPE AND 24" (600mm) OF COVER FOR 60" (1500mm) DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D
8	REV. MAXIMUM COVER HEIGHTS	RWD	01/12/17	

TRENCH INSTALLATION DETAIL (SANITITE HP)
DRAWING NUMBER: STD-101F
ADVANCED DRAINAGE SYSTEMS, INC. 4640 TRUEMAN BLVD HILLIARD, OHIO 43026
JAB 01/29/09 NTS 1 OF 1

NYLOPLAST DRAIN BASIN WITH SOLID COVER



1 - 8" - 30" SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2 - 12" - 30" FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05. 8" & 10" SOLID COVERS FIT DIRECTLY ONTO DRAIN BASINS WITH THE USE OF A PVC BODY TOP. SEE DRAWING NO. 7001-110-045.
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065.
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER (4" - 36").
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.
6 - 12" - 30" SOLID COVERS SHALL MEET H-20 LOAD RATING.
7 - 8" & 10" SOLID COVERS ARE RATED FOR LIGHT DUTY APPLICATIONS ONLY; NO CONCRETE COLLAR NEEDED FOR LIGHT DUTY RATING.

DRAWN BY EBC DATE 09-14-07 REVISED BY NMH DATE 06-12-18 DWG SIZE A
MATERIAL
PROJECT NO./NAME
SCALE 1:40 SHEET 1 OF 1
Nyloplast 3130 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2490 www.nyloplast-us.com
TITLE DRAIN BASIN WITH SOLID COVER QUICK SPEC INSTALLATION DETAIL
DWG NO. 7001-110-298 REV E

ROOF DRAIN SYSTEM - DRAIN BASIN DETAIL

(SEE PLAN FOR LOCATIONS)

1. CONTRACTOR SHALL READ AND FOLLOW SPECIFIC INSTALLATION REQUIREMENTS OF DRAIN BASIN MANUFACTURER.
2. DRAIN BASINS TO INCLUDE SOLID COVER.
3. CONTRACTOR TO PROVIDE SHOP DRAWINGS OF EACH DRAIN BASIN STRUCTURE.

TECHNICAL NOTE

Minimum and Maximum Cover Heights for SaniTite® HP Pipe for Sanitary Sewer

TN 2.05
December 2016

Introduction

The information in this document is designed to provide answers to general cover height questions; the data provided is not intended to be used for project design. The design procedure described in the *Structures* section (Section 2) of the Drainage Handbook provides detailed information for analyzing most common installation conditions. This procedure should be utilized for project specific designs.

The two common cover height concerns are minimum cover in areas exposed to vehicular traffic and maximum cover heights. Either may be considered "worst case" scenario from a loading perspective, depending on the project conditions.

Minimum Cover in Traffic Applications

Pipe diameters from 12- through 48-inch (300-1200 mm) installed in traffic areas (AASHTO H-20, H-25, or HL-93 loads) must have at least one foot (0.3m) of cover over the pipe crown, while 60-inch (1500 mm) pipes must have at least 24 inches (0.6m) of cover. The backfill envelope must be constructed in accordance with the *Installation* section (Section 5) of the Drainage Handbook and the requirements of ASTM D2321. The backfill envelope must be of the type and compaction listed in the *Installation* section of the Drainage Handbook, Appendix A-5, Table A-5-2. In Table 1 below, this condition is represented by a Class II material compacted to 90% standard Proctor density although other material can provide similar strength at slightly lower levels of compaction. Structural backfill material should extend six inches (0.15m) over the crown of the pipe; the remaining cover should be appropriate for the installation and as specified by the design engineer. If settlement or rutting is a concern, it may be appropriate to extend the structural backfill to grade. Where pavement is involved, sub-base material can be considered in the minimum burial depth. While rigid pavements can be included in the minimum cover, the thickness of flexible pavements should not be included in the minimum cover.

Additional information that may affect the cover requirements is included in the *Installation* section (Section 5) of the Drainage Handbook. Some examples of what may need to be considered are temporary heavy equipment, construction loading , paving equipment and similar loads that are less than the design load, the potential of pipe flotation, and the type of surface treatment which will be installed over the pipe zone. Please note Table 1 and 2 are based on the installation of SaniTite HP under pavement using a uniform backfill type and compaction level, as depicted in Figure 1.

Table 1
Minimum Cover Requirements for ADS SaniTite HP with AASHTO H-20, H-25, or HL-93 Load

Inside Diameter, ID, in.(mm)	Minimum Cover ft. (m)	Inside Diameter, ID, in.(mm)	Minimum Cover ft. (m)
12 (300)	1 (0.3)	36 (900)	1 (0.3)
15 (375)	1 (0.3)	42 (1050)	1 (0.3)
18 (450)	1 (0.3)	48 (1200)	1 (0.3)
24 (600)	1 (0.3)	60 (1500)	2 (0.6)
30 (750)	1 (0.3)		

Notes:

1. *Minimum covers presented here were calculated assuming Class II backfill material compacted to 90% standard Proctor density around the pipe and a minimum of 6-inches (0.15m) structural backfill over the pipe crown, as recommended in Section 5 of the Drainage Handbook, with an additional layer of compacted traffic lane sub-base for a total cover as required. In shallow traffic installations, especially where pavement is involved, a good quality compacted material to grade is required to prevent surface settlement and rutting.*
2. *The minimum covers specified do not include pavement thickness. A pavement section of 0.4' is typical.*
3. *Backfill materials and compaction levels not shown in the table may also be acceptable. Contact ADS for further detail.*
4. *Calculations assume no hydrostatic pressure and native soils that are as strong as the specified minimum backfill recommendations.*

Maximum Cover

Wall thrust generally governs the maximum cover a pipe can withstand and conservative maximum cover heights will result when using the information presented in the *Structures* section (Section 2) of the Drainage Handbook. Table 2 below shows the material properties consistent with the expected performance characteristics for SaniTite HP materials for a 100-year design life.

The maximum burial depth is highly influenced by the type of backfill and level of compaction around the pipe. General maximum cover limits for ADS SaniTite HP used in sanitary sewer applications are shown in Table 3 for a variety of backfill conditions.

Table 3 was developed assuming pipe is installed in accordance with ASTM D2321 and the *Installation* section (Section 5) of the Drainage Handbook. Additionally, the calculations assume no hydrostatic load around the pipe, incorporate the maximum safety factors represented in *Structures* section of the Drainage Handbook, use material properties consistent with the expected performance characteristics for SaniTite HP materials, and assume the native (in-situ) soil is of adequate strength and is suitable for installation. For applications requiring fill heights greater than those shown in Table 2 or where hydrostatic pressure due to groundwater is expected, contact an ADS Engineer.

Table 2
ADS SaniTite HP Mechanical Properties

Resin	ASTM Specification	Tension Strain %	Factored Compressive Strain %	Initial		100-Year*	
				Fu (psi)	E (psi)	Fu (psi)	E (psi)
Polypropylene, Impact-modified copolymer	ASTM F2764**	2.5	3.7	3,500	175,000	1,000	27,000

**Values extrapolated from AASHTO LRFD Section 12 minimum material requirements*
***ASTM F2736 has been incorporated into the latest version of ASTM F2764*

N-12® WT IB PIPE (PER ASTM F2648)

Our N-12 WT IB (per ASTM F2648) pipe offers significant performance advantages over reinforced concrete and corrugated metal pipe. Plus, it has the best watertight joint in the industry. Better yet, it's green. N-12 WT IB (per ASTM F2648) pipe is manufactured in diameters 4"-60" (100-1500 mm).

Today's N-12 WT IB pipe (per ASTM F2648) has a minimum recycled content of 40% using an engineered blend of virgin and recycled high-density polyethylene resins to provide impressive material properties. The performance you've come to expect from N-12, with the added benefit of helping promote responsible use of resources.

ADS N-12 WT IB (per ASTM F2648) pipe contains a superior built-in bell-and-spigot joint. An exterior bell wrap provides a quick visual indicator to customers and inspectors that a watertight product is being used. A patented gasket, that meets all requirements of ASTM F477, increases its sealing forces as temporary internal or external hydrostatic pressure increases. The flared bell and spigot significantly improve ease of installation. N-12 WT IB (per ASTM F2648) pipe is so advanced in its design that it is easy to put your confidence in for long-term reliability.

APPLICATIONS:

Storm Sewers
Retention/Detention
Ditch Enclosures
Roof Drainage
Culverts & Cross Drains
Slope/Edge Drains
Mining/Forestry/Industrial

FEATURES:

- 4"–60" (100 - 1500 mm) diameters available
- Nominal 20 ft. (6m) and 13 ft. (4m) lengths available
- Integral bell and factory-installed gasket
- Joint meets or exceeds ASTM D3212 lab test as well as ASTM F2487 and ASTM F1417 watertight field test
- Exceptional joint strength
- Excellent abrasion and corrosion resistance
- Light weight
- Fast installation times
- Structural strength that will support H-25 or HL-93 live loads with 1' (0.3 m) minimum cover; 60" (1500 mm) pipe requires 2' (0.6 m) cover for H-25 or HL-93 loads

BENEFITS:

- Variety of diameters and lengths fit any project
- Pipe requires no extra couplers, grout or other sealants for installation due to built-in bell and factory-installed gasket. This means fewer components to risk performance
- Installation cost savings from lower shipping costs, fewer people, and less heavy equipment required
- Hydraulic efficiency from smooth interior
- Long-term durability of HDPE

ADS Service: ADS representatives are committed to providing you with the answers to all your questions, including specifications, and installation and more.

THE MOST ADVANCED NAME IN WATER MANAGEMENT SOLUTIONS™

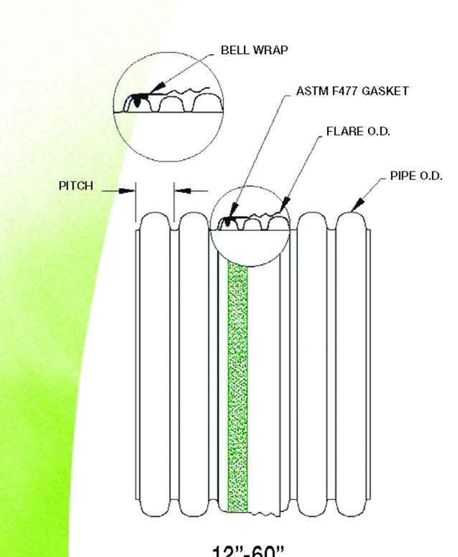
ADS N-12® WT IB PIPE (PER ASTM F2648) SPECIFICATION

SCOPE
This specification describes 4- through 60-inch (100 to 1500 mm) ADS N-12 WT IB pipe (per ASTM F2648) for use in gravity-flow drainage applications.

PIPE REQUIREMENTS
ADS N-12 WT IB pipe (per ASTM F2648) shall have a smooth interior and annular exterior corrugations.
- 4 - through 60-inch (100 to 1500 mm) shall meet ASTM F2648
- Manning's "n" value for use in design shall be 0.012.

JOINT PERFORMANCE
4 - through 60-inch (100 to 1500 mm) pipe shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

12- though 60-inch (300 to 1500 mm) diameters shall have an exterior bell wrap installed by the manufacturer.



12"-60"
(300-1500 mm)

FITTINGS
Fittings shall conform to ASTM F2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the watertight joint performance requirements of ASTM F2306.

FIELD PIPE AND JOINT PERFORMANCE
To assure watertightness, field performance verification may be accomplished by testing in accordance with ASTM F2487. Appropriate safety precautions must be used when field testing any pipe material. Contact the manufacturer for recommended leakage rates.

MATERIAL PROPERTIES
Material for pipe production shall be an engineered compound of virgin and recycled high-density polyethylene conforming with the minimum requirements of cell classification 424420C (ESCR Test Condition B) for 4- through 10-inch (100 to 250 mm) diameters, and 435420C (ESCR Test Condition B) for 12- through 60-inch (300 to 1500 mm) diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%. The design engineer shall verify compatibility with overall system including structural, hydraulic, material and installation requirements for a given application.

INSTALLATION
Installation shall be in accordance with ASTM D2321 and ADS published installation guidelines, with the exception that minimum cover in trafficked areas for 4- through 48-inch (100 to 1200 mm) diameters shall be one foot (0.3 m) and for 60-inch (1500 mm) diameters, the minimum cover shall be 2 foot (0.6 m) in single run applications. Backfill for minimum cover situations shall consist of Class 1 (compacted) or Class 2 (minimum 90% SPD). Maximum fill heights depend on embedment material and compaction level; please refer to Technical Note 2.02. Contact your local ADS representative or visit our website at www.ads-pipe.com for a copy of the latest installation guidelines.

PIPE DIMENSIONS

Nominal 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)
Nominal 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- through 60-inch are ±1 inch. Contact a sales representative for exact values.

Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

PREPARED BY:
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SITE IMPROVEMENT PLANS FOR:
WATERMARK APARTMENTS AT O'FALLON
CRUSHER ROAD & WELDON SPRING ROAD
CITY OF O'FALLON, ST. CHARLES COUNTY, MISSOURI 63366

STATE OF MISSOURI — GEORGE MICHAEL STOCK — NUMBER PE-25116 — PROFESSIONAL ENGINEER
04/17/2020
GEORGE M. STOCK E-25116
CIVIL ENGINEER
CERTIFICATE OF AUTHORITY
NUMBER: 000996

REVISIONS:

1	01/16/2020 - 60% PRINTING
2	02/14/2020 - PERMIT SET
3	03/25/2020 - REVISED PER OWNER / CITY / UTILITY COMMENTS
4	04/17/2020 - ADDENDUM 'A'

DRAWN BY: T.S./J.M.B. CHECKED BY: G.M.S.
DATE: 01/16/2019 JOB NO: 219-6494

SHEET TITLE: SEWER DETAILS
SHEET NO.: C8.4