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U.S. EPA REGION II
REMEDIAL ACTION
WORK PLAN

LAWRENCE AVIATION INDUSTRIES (LAI)
INSTALLATION OF FORCE MAIN
CAROLINE AND BARNUM AVENUE
VILLAGE OF PORT JEFFERSON, NY

Contract: EP-S2-05-01
Task Order 017

Submitted to:

U.S. EPA Region 2
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May 28, 2010

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1.0 PROPOSED ACTION

This document was prepared by NEIE, Inc. for the U.S. Environmental Protection Agency, Region II – Response & Prevention Branch (EPA-R), under its Emergency and Rapid Response Services (ERRS) contract, Contract No. EP-S2-05-01, Delivery Order No. 017, in partial fulfillment to the September, 2009, Action Memorandum authorizing a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Remedial Action at the Lawrence Aviation Industries, Inc. (LAI) - Old Mill Pond Site (Site) located in the Village of Port Jefferson, Suffolk County, New York.

In an effort to mitigate the threats to the public health, welfare and the environment posed by the contamination at the Site, the proposed remedial action will include the installation of a groundwater extraction and treatment system to reduce the concentrations of volatile organic compounds (VOCs) in areas adjacent to the Old Mill Pond. Ground water will be pumped from extraction wells located in the contamination plume and treated by air stripping and vapor and aqueous phase activated carbon. The treated water will be discharged to Old Mill Pond and at a discharge point located at the Barnum Avenue Bridge culvert. In order to support the proposed action a four inch diameter high density polyethylene (HDPE) force main and a one and one half inch polyvinylchloride (PVC) electrical conduit for water level monitoring control wiring will need to be installed along Caroline and Barnum Avenues. The pipes will terminate immediately upstream of the Barnum Avenue bridge at Old Mill Pond Creek.

The remainder of this document will address the methods, procedures and general guidelines to perform this action.

2.0 PROJECT OBJECTIVES

The objective of this project is to construct, as per the approved design, a groundwater extraction and treatment facility located near the Old Mill Pond, to remove trichloroethylene (TCE) and other VOCs from a contaminated groundwater plume. The system will contain provisions for the combination of influents from up to five extraction wells, treatment of the combined stream using air stripping and liquid and vapor phase carbon adsorption technologies with discharge of the final liquid effluent to Old Mill Pond Creek. The system will be described in a separate Work Plan that will be available for review in the repository at the Port Jefferson Public Library

This Work Plan addresses the installation of a four inch diameter high density polyethylene (HDPE) force main and a one and one half inch polyvinylchloride (PVC) electrical conduit for water level monitoring control wiring will be installed along Caroline and Barnum Avenues terminating immediately upstream of the Barnum Avenue bridge at Old Mill Pond Creek.

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The Plan provides a guideline for mobilization, staging, site preparation, pipe installation, and site restoration at LAI - Old Mill Pond Site located in the Village of Port Jefferson, Suffolk County, New York. Minor variations in scope and approach may be required as the project is implemented. Major variations, if any, in the scope of work, materials, quantities, or schedule that may be caused by unforeseeable field conditions will be addressed as amendments to this original Work Plan. With proper execution, this Work Plan will provide the methodology, means, and direction for the installation of the pipe.

3.0 BACKGROUND

The LAI Site (EPA ID# NYD002041531) encompasses approximately 126 acres and consists of the LAI Facility and the LAI outlying parcels. The LAI Facility, approximately 42 acres in size, is a former titanium sheeting manufacturer located in Port Jefferson Station, New York. The LAI Facility consists of 10 buildings which are located in the southern portion of the property. Currently the LAI Facility is operating at a small fraction of its capacity and many of the buildings are vacant and unused.

The Long Island Railroad and Sheep Pasture Road form the northern border of the site. To the east and west are various residential single family houses and to the south is a wooded area, beyond which is a residential area with single family houses. The Village of Port Jefferson and Port Jefferson Harbor, an embayment of Long Island Sound, lie approximately one mile to the north.

4.0 SITE HISTORY

The section of the property currently occupied by LAI Site was previously a turkey farm, which was owned by LAI's corporate predecessor, Ledkote Products Co. of New York. Ledkote produced items that included lead gutters and spouts for roof drains. In 1959, Ledkote Products Co. of New York changed names to Lawrence Aviation Industries, Inc. From approximately 1959 to the present, the LAI Facility manufactured products from titanium sheet metal, including golf clubs and products for the aeronautics industry.

Under a work assignment received by the EPA, a Remedial Investigation/Feasibility Study (RI/FS) of the Site soils and groundwater was performed by CDM from August 2003 to May 2005. The RI included soil and groundwater screening, surface water and sediment sampling, soil sampling, and multi-port monitoring well installation and sampling.

The RI documented a VOC contaminated plume originating at the LAI Site. The predominant VOCs, or contaminants of concern (COC), in the groundwater plume originating from the LAI site are trichloroethene (TCE) and tetrachloroethene (PCE). To a lesser extent, other VOCs such

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as: chloromethane (CM), 1,1-dichloroethene, methyl tert-butyl ether (MTBE), 1,1-dichloroethane (DCA), cis-dichlorothene (DCE), chloroform and 1,1,1-trichloroethane (TCA) are also known to be present.

The Record of Decision (ROD) was signed on September 29, 2006. CDM conducted a pre-design investigation from November 2007 to June 2008 to collect additional information required for the Remedial Design (RD). The pre-design investigation effort included:

- Monitoring well installation including groundwater screening samples at selected screening depths to further refine information on groundwater contamination;
- Collection of two rounds of groundwater samples and synoptic water level measurements from monitoring wells;
- Aquifer testing; and
- Subsurface soil sampling at the LAI facility.

5.0 SUMMARY OF GROUNDWATER CONTAMINATION

The TCE plume, based on the June 2008 groundwater sampling results, indicates the TCE plume emanates from the vicinity of MPW-02 and MPW-07 and migrates down gradient to the northwest. In the vicinity of multiport well MPW-10, approximately 1,000 feet from the western boundary of the LAI facility, groundwater flow and the TCE plume bend to the north toward Port Jefferson Harbor. There is an upward hydraulic gradient near MPW-09, indicating that contaminated groundwater is moving upward as it moves northward in the vicinity of well MPW-09 (near Old Mill Pond).

5.1 Site Location and Description

The LAI Old Mill Pond Site is located on Caroline Avenue between Barnum Avenue and Brook Road in the Village of Port Jefferson, Suffolk County, New York. The proposed cleaning site, which is a part of the overall project and described in this work plan, is located where Old Mill Creek passes under the Barnum Avenue Bridge (approximately 350 feet northwest of where Caroline Avenue intersects Barnum Avenue). The site is situated in a densely populated commercial and residential area.

6.0 FORC MAIN CONSTRUCTION PREPARATION

Force main construction preparation includes: mobilization of personnel, equipment, and supplies to the site; review of plan and profile drawings of utilities in the area; location and marking of existing utilities (i.e., water, gas, electrical, etc.); set-up of mobile project offices to manage the work; and notification of local residents and local officials that site work is scheduled.

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NEIE Inc., Health and Safety Department, has prepared a site-specific Health and Safety Plan (HASP) for this Project. NEIE Inc. will perform site operations in accordance with the HASP and will make amendments as necessary. The NEIE Inc. Health and Safety Department has also prepared a site specific Emergency Response Plan which is included in the HASP as section 12. The purpose of this Emergency Response Plan is to describe the necessary response during times of emergency; to minimize hazards to human health; and to protect against fire, explosion, flood, and chemical release to soil, surface water and air.

6.1 Mobilization

The response manager, field cost accountant, foreman, operators, and technicians will mobilize to the site with all the necessary materials and equipment to perform the Site Preparation Phase tasks. Mobilization will be scheduled at a mutually agreeable date and time with the EPA On-Scene Coordinator (OSC). Site support services such as office, portable restrooms, utility services, and decontamination supplies will be set up when mobilization occurs. A photo and video survey documenting existing conditions will be taken at this time.

6.2 Utilities

Prior to any activities, all buried utilities (i.e., potable water, sewer, phone, electric, natural gas services, etc.) will be located and prominently marked. The appropriate local utility departments will be contacted and notified of the work. This will be achieved through a combination of public (one-call/dig-safe) and private mark outs on the site area using, ground penetrating radar (GPR) and a survey of local utility maps, will be completed as appropriate.

Written proof of the mark-out (i.e. fax transmittal from one-call/dig-safe service) will also need to be provided prior to the start of Site activities.

6.3 Traffic control

Street and pedestrian traffic on Caroline and Barnum Avenues may be affected by the scope of work. If necessary, the closure is expected to be for limited time periods and will be controlled utilizing flag men.

6.4 Site layout

Office space has been secured through a local leasing arrangement and an office trailer will not be required. NEIE will prepare a staging area near the existing recovery wells that are located in the south western corner of the ball field near the intersection of Caroline Avenue and Brook Road.

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Sanitary facilities will be provided by portable toilets located as far from adjacent residences as possible. It is anticipated that the portable toilets will be placed in the staging area.

6.5 Notifications

Community notifications and updates on site activities will be available during major phases of on-site operations. The information will be in the form of Community Update publications and will be available in the site information repository located in the Port Jefferson Library.

Local residents, officials and highway and utility departments will be notified prior to mobilization and commencement of site activities. EPA representatives will be available during working hours to answer questions and explain the clean-up process. Information that will be available will include the work plan, fact sheets, and other pertinent information.

6.6 Force Main Installation Approach

The proposed force main will be installed on a public road right of way along Caroline Avenue and on a combination of public road right of way publicly owned lands, and private property along Barnum Avenue. Figure 1, presents a plan view of the proposed line location. Attachment A contains the General Specification for the Force Main installation.

As a result, special precautions, approaches, and procedures will be employed to minimize the amount of disturbance to lands, which will allow for property restoration activities to preconstruction conditions. The approach is also designed to control any soil loss and minimize noise and traffic in the neighborhood.

The force main will run north east parallel the western pavement edge along Caroline Avenue beginning near the proposed groundwater treatment plant and existing recovery wells. The line will continue to the intersection of Caroline and Barnum Avenue where the line will make a right angle turn and follow the south western edge of the sidewalk that parallels Barnum Avenue. The line will terminate at the edge of the existing storm drain at the Barnum Avenue Bridge at Old Mill Pond Creek. The line will be laid in a 12 inch wide and 24 inch deep trench. The force main shall consist of a single the 4-inch diameter DR11 high density polyethylene HDP pipe (see Attachment B for the piping specification) and a1 ½ inch PVC electrical conduit for water level monitoring control wiring. There will be an electrical pull box installed approximately every 300 feet along the line. The line will be backfilled and compacted in two 12 inch lifts as the work progresses to keep open trench to a minimum. All areas will be fully restored to their preconstruction conditions. Any damaged utilities will be repaired and disturbed asphalt or concrete will be either bored under or demolished and restored with new concrete to preconstruction lines and grades.

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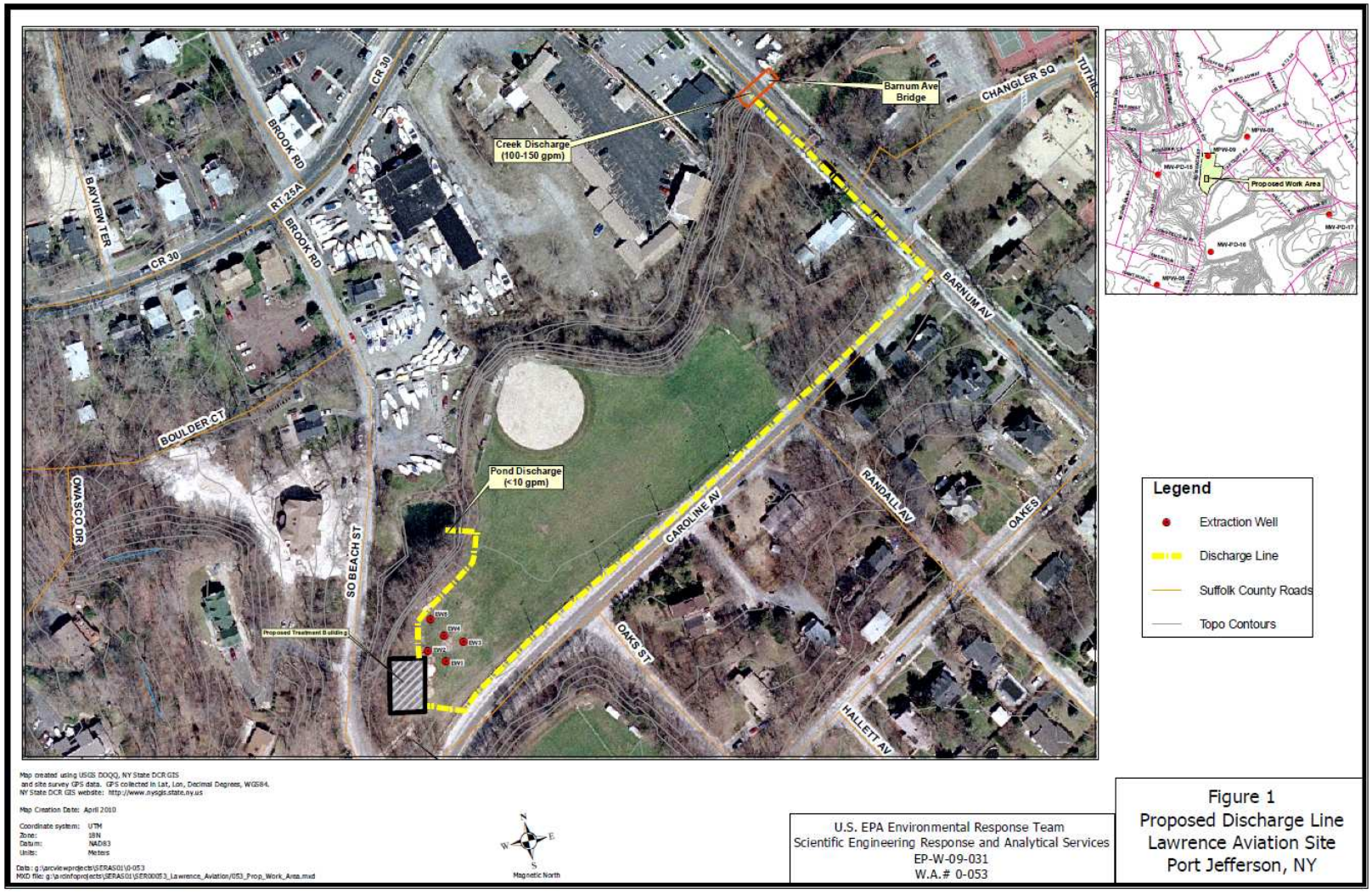

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6.7 Hours of Operation

Excavation activities that require large construction equipment such as min- track excavators, rubber tire skid steer loaders, trenchers, and trucks will be operated in accordance with local noise ordinances. This will limit any loud equipment to operate bewtween 7:30 AM to 6:00 PM Monday through Saturday. Site management, support activities and other work that will not create noise or traffic concerns will be conducted from 7:00 AM to 7:00 PM Monday through Saturday or as directed by the EPA OSC.

7.0 WORK SEQUENCING

Prior to any site construction activities NEIE will prepare a staging area near the existing recovery wells located in the south western corner of the ball field near the intersection of Caroline Avenue and Brook Road. The staging area will be used to store equipment, materials and supplies and will be the location of the temporary project office trailers. All piping, fittings and electrical junction boxes will be in storage onsite prior to starting work.

Trenching and line installation will start at the upper end of the line on Caroline Avenue near the treatment plant. A junction box will be set and trench excavation will proceed down Caroline towards Barnum. The HDPE force main and 1 ½ inch PVC electrical conduit will be laid parallel in the bottom of the 24 inch deep trench. The trench will be backfilled and compacted as the work progresses. A locator wire and plastic warning tape will be placed in the trench along with the pipes so they can be located and protected from damage from future construction. The work area limit any traffic control issues as much as possible and will minimize any impact to parking along Caroline Avenue during the use of the Ball Field.

When the line reaches the intersection of Caroline and Barnum Avenues a junction box will be installed. The line will turn 90 degrees to follow the south west edge of the sidewalk on Barnum Avenue. The line will be terminated at the Barnum Avenue Bridge over Old Mill Creek.

Site restoration will consist of repair and restoration of all impacted areas to their preconstruction condition.

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7.1 Equipment

The force main installation will require hand tools and heavy equipment. The following is a list of anticipated major equipment items.

HEAVY EQUIPMENT	HAND TOOLS
Mini- track excavator	Miscellaneous hand tools
Rubber tire skid steer loader	HDPE fusion pipe welder
Trencher	Masonry tools
Trencher compactor	Shovel, rakes, brooms

8.0 MANAGEMENT APPROACH

To ensure that communication continues successfully throughout the project, the following management activities will be performed:

Scoping meetings; Continuing Work Plan development; Daily NEIE and EPA OSC/RPM meetings; Project Status Meetings Daily cost tracking.

The remainder of this section describes each of these activities in detail.

8.1 Scoping Meetings

Scoping meetings will be held prior to and during mobilization to the site to ensure that each NEIE support department will be prepared to provide the necessary assistance to the response manager. The project response manager, site manager, and support division managers will attend these meetings to identify specific resource requirements and potential critical paths using the staff's collective experience. The response manager will remain the primary point of communication with the EPA OSC and RPM for all site-related issues.

Scoping meetings will also be held among the response manager, site manager, and appropriate technical support personnel to develop the scope of services for each major subcontract. The EPA OSC will be provided with a draft copy of any invitations for bids (IFBs) or request for proposals (RFPs), along with relevant bid documentation for comments and/or consent prior to vendor solicitation.

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8.2 Work Plan Development

Development of a site-specific Work Plan allows for a brainstorming of ideas from the response manager, site manager, and the OSC. The end product is NEIE's plan to accomplish the project in the most cost-effective, efficient, and safe manner. Minor variations in quantities and approach are expected based on the indefinite nature of the work to be performed. Major variations in the scope of work, quantities, or schedule will be addressed as amendments to the original work plan.

8.3 Daily NEIE and EPA OSC Meetings

While on site, daily and as-needed discussions between the response manager and EPA OSC will be conducted to facilitate a mutually beneficial flow of information. NEIE's standard procedure is to conclude each workday with a meeting to discuss past, present, and future tasks as well as any other pending issues. The assembled staff will be able to field any specific questions the EPA may have, enabling direct reports from each facet of the project. The goal is not only to inform but also to facilitate effective internal communication. All pertinent information discussed during the "close-of-business" meetings will be summarized by the site manager into a daily report that will include the following information:

- Primary health and safety concerns of project tasks;
- Subcontracting needs (if any);
- List of all site personnel and their role in each task;
- List of off-site personnel, hours worked, and comments (presented as a separate report if necessary);
- List of all equipment and its role in each task;
- General comments regarding the site; and
- Problems, issues, concerns, and resolutions.

8.4 Project Status Meetings

Throughout the project, regular project status meetings will be held with the EPA OSC and RPM. The response manager, site manager, OSC and RPM will attend these meetings. NEIE's engineering and health and safety staff will attend as needed to address specific issues or concerns. During the status meetings, NEIE and EPA representatives will discuss accomplishments to date, future plans, cost reports, and address any questions or concerns. The meetings will be scheduled at the convenience of EPA.

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8.5 Daily Cost Tracking

The field cost accountant will be responsible for maintaining and tracking daily costs. This will be achieved through the use of EPA's Removal Cost Management System (RCMS) system**.**

9.0 SITE COMMAND STRUCTURE

The project response manager will head NEIE's site command structure. The response manager is the main point of contact for EPA concerning on-site issues. The response manager will be responsible for direct supervision of cleanup personnel, development and execution of the Work Plan, and execution of subcontracts. NEIE's Transportation and Disposal (T&D) Department will be responsible for disposal of generated wastes through subcontracting and final disposal manifesting and shipping. The field cost accountant will provide the project response manager with daily cost accounting as well as records of communication with local vendors and the site crew. The site manager will be responsible for daily crew supervision and execution of daily tasks as assigned by the response manager. The operators and cleanup technicians will be responsible for completing tasks assigned by the site manager. Engineering and health and safety professionals will provide support as needed. Personnel designated to fulfill these duties are listed in Table 1.

Table 1: Personnel Responsibilities

TITLE	NAME
EPA On-Scene Coordinator	Keith Glenn/ Louis DiGuardia
EPA Remedial Project Manager	Maria Jon
Project Response Manager	Tom Williams
Senior Project Engineer	Harold (Urbie) Nash
Field Cost Accountant	Todd Jennings
Site Manager	Frank Mahalski
T&D Coordinator	To Be Determined
Health & Safety Professional	To Be Determined
Operator & Cleanup Technicians	To Be Determined

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Attachment A

Force Main
General Specification

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Lawrence Aviation Site
Groundwater Treatment Plant
Force Main – General Specifications

The force main shall consist of a single four (4) inch diameter DR 11 high density polyethylene HDP pipe (see Attachment B for the piping specification) and a 1 ½ inch diameter PVC electrical conduit. The line shall extend from the location of the groundwater treatment plant to the Barnum Avenue Bridge at Old Mill Creek.

The lines shall be buried in a twelve inch wide, twenty four (24) inch deep trench located along the north side of Caroline Avenue at the edge of the road pavement or asphalt curb and along the west edge of the sidewalk along Barnum Avenue.

The force main shall follow the slope of the road edge and shall at all times maintain a negative slope from the treatment plant discharge point to the outfall at the Barnum Avenue Bridge.

There shall be a minimum of twenty (20) inches of soil cover over the pipe along the entire length.

The HDPE force main and PVC electrical conduit shall be supplied in standard factory lengths. The HDPE pipe shall be butt fusion welded in the field. The PVC pipe shall be solvent welded in the field. The HDPE shall be pressure tested at 50 psig. The pressure shall not decrease more than 5 psi over a one hour period.

A location wire shall be laid in the trench with the force main and electrical conduit to facilitate the line location for future work or repairs. The wire shall be terminated in the ground water treatment plant and prominently marked for future use. In addition a plastic utility warning tape shall be buried in the trench twelve inches above the pipes to facilitate line location.

The trench shall be backfilled and compacted in two 12 inch lifts using mechanical compaction equipment.

Install electrical pull boxes along the length of force main to facilitate the installation of electrical control wires. One box shall be installed at the corner of Barnum and Caroline Avenues and three additional boxes are to be install along Caroline Avenue such that no box is spaced more than 300 feet apart. The boxes shall be sealed and of heavy duty construction, designed for vehicular traffic and deep enough to provide access to the electrical conduit. The boxes top dimensions shall not be less than 14”x18” inches.

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Attachment B

HDPE DR11
Specification

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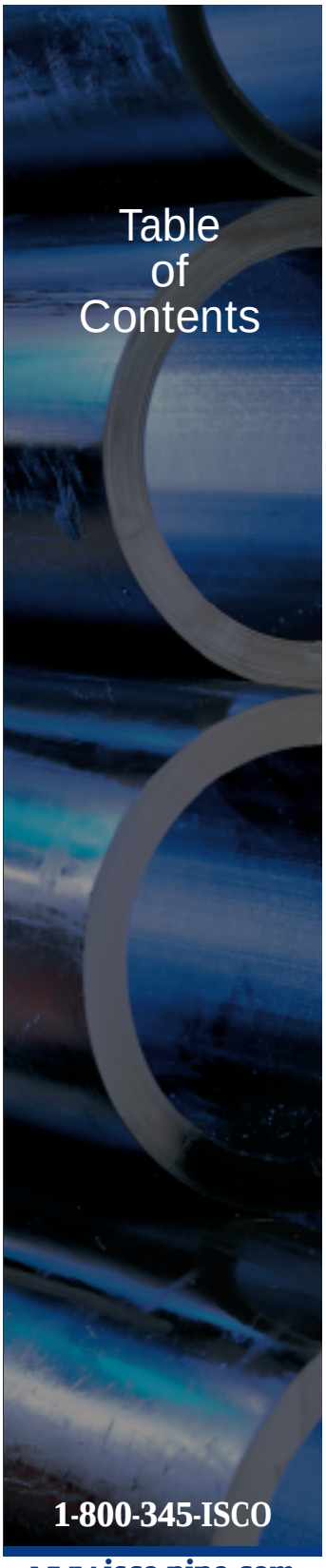

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HDPE Pipe Section

High-Density Polyethylene Pipe

Introduction

ISCO Industries, LLC is the largest high-density polyethylene pipe distributor in North America. ISCO can serve your needs anywhere in the USA and internationally. ISCO offers a complete package of HDPE piping products. Butt fusion machines are offered for sale or rental. Fusion technicians are available to provide on-site training or assistance to your project. Please call 1-800-345-ISCO for all your HDPE piping needs.

Some of The Characteristics of HDPE Pipe are:

- Economical
- Corrosion Resistant
- Zero Leak-Rate
- Hydraulically Smooth
- Fatigue and Surge Resistant
- Long Design Life
- Tappable
- Chemically Resistant
- Easily Installed
- Small to Large Diameters
- Non-Toxic, Non-Tasting
- Lightweight
- Reliable
- Flexible and Coilable
- Heat Fused
- Mechanically Joined (As Needed)
- Strong and Ductile
- Weather Resistant
- Impact Resistant
- Freeze Resistant
- Durable
- Abrasion Resistant
- Inert
- Self Restrained Pipe (Monolithic)
- Listed and Approved

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Markets and Standards for High-Density Polyethylene Pipe

User	Applications	Special Requirements
Landfills	Gas Collection Systems	ASTM D 2513
	Leachate Collection Systems	ASTM F 714
	Perforated Pipe	
	Dual Containment Piping	State requirements
		EPA listed chemicals
Industrial	Underground Fire Protection Piping	Factory Mutual
	Pulp & Paper/Wood Products	ASTM D 3350 & F 714
	Acid Sewers	ASTM D 3350 & F 714
	Slurry Piping	ASTM D 3350 & F 714
	Power Plant	ASTM D 3350 & F 714
	Caustic Sewers	ASTM D 3350 & F 714
	Potable Water	NSF 61, ASTM D 3350
	Raw Water	ASTM D 3350
	Dual Containment Piping	EPA & State requirements
Irrigation	Golf Course	ASTM D 3350
	Industrial	ASTM D 3350
Municipal	Drinking Water	NSF 61, AWWA C 906 & ASTM D 3350
	Sanitary Sewers	ASTM D 3350
	Reclaimed Water	ASTM D 3350
	Spray Fields	ASTM D 3350
	Gas Distribution Piping	ASTM D 2513 & DOT
	Ocean Outfalls	ASTM D 3350
Trenchless Installations		
	Pipe Bursting	ASTM D 3350
	Directional Drilling	ASTM F 1962
	Sliplining	ASTM F 585
Highway Drainage		
	Culvert Rehabilitation	ASTM D 3350, State DOT
Geothermal	Heating and Cooling Systems	IGSHPA
Oil & Gas Gathering		
	Gas Gathering	ASTM D 2513
	Salt Water	ASTM D 3350
Electrical/Telecommunications		
	Conduit	ASTM D 3350, UL
	Telecommunications	ASTM D 3350
Fittings	Molded	ASTM D 3261-97
	Fabricated	ASTM F 2206
	Electrofusion	ASTM F 1055

HDPE Pipe

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HDPE Pipe

Specifications for HDPE Pipe

The properties of high-density polyethylene pipe are described using ASTM D 3350-02, "Standard Specification for Polyethylene Plastic Pipe and Fittings Materials". This ASTM Standard provides cell classifications that define the physical properties of the resin used to make the HDPE pipe.

Most HDPE pipe is made with a cell classification of PE 345464C. The meaning of this cell classification is provided in the table below:

ISCO Standard HDPE Resin Specifications

PROPERTY VALUE		SPECIFICATION	UNIT	NOMINAL
Material Designation		PPI / ASTM		PE3408
Material Classification		ASTM D 1248		III C 5 P34
Cell Classification		ASTM D 3350-02		345464C
Density	(3)	ASTM D 1505	g/cm^3	.955 to .957
Melt Index	(4)	ASTM D 1238	gm/ 10 min	.10 to .15
Flexural Modulus	(5)	ASTM D 790	psi	110 to 140,000
Tensile Strength	(4)	ASTM D 638	psi	3,200 min.
Slow Crack Growth				
ESCR		ASTM D 1693	hours in 100% igepal	>5,000
PENT	(6)	ASTM F 1473	hours	>100
HDB @ 73 deg F	(4)	ASTM D 2837	psi	1,600
UV Stabilizer	C	ASTM D 1603	%C	2 to 2.5%

Types of Polyethylene Pipe

All polyethylene pipe is not the same. The Plastic Pipe Institute's "Engineering Properties of Polyethylene" shows that polyethylene with a density of greater than 0.941 (with no additives) is high-density. Materials with a density of 0.926 to .94 are medium density and those with a density of between .90 and .925 are low density.

Density influences key properties in polyethylene materials. As the density increases, the tensile strength increases. Also the chemical resistance increases.

Traditionally, medium density polyethylene resin has been used to make pipe for gas distribution. When medium density was selected for gas pipe, it had better stress crack resistance than other resins.

As new resins and manufacturing processes have been developed, high and medium density polyethylene resins have improved in their ability to handle stress and stress cracking agents.

The current test to determine stress crack resistance is the PENT test. The PENT Test is run in accordance with ASTM F 1473-97, " Standard Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins". This test requires that slow crack growth test be run on samples of extruded pipe.

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The first Environmental Stress Crack (ESCR) testing was conducted on compression molded tensile bars. As resin manufacturing techniques have improved, samples no longer failed using the ESCR test methods. ESCR testing uses strong detergents at elevated temperatures to evaluate resins.

The PENT test is a good test of resistance to slow crack growth and related failures induced by the presence of stressing agents. Since this test is conducted using HDPE pipe, it is a better test to determine the best resins to use for piping applications.

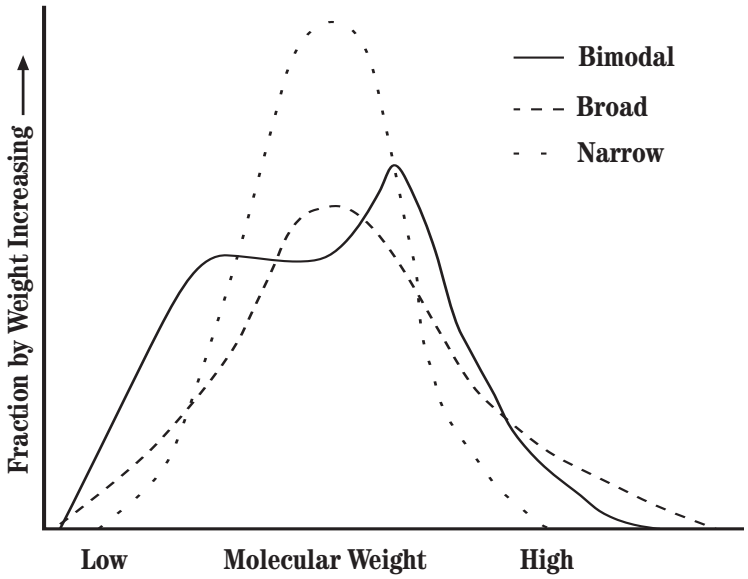
Traditional broad molecular weight resins are used to produce most high-density polyethylene pipe. Typical PENT Test values for these HDPE pipes are 100 to 600 hours.

The Chart below shows the modular weight distribution for Bimodal, Broad and Narrow molecular weight resins.

Molecular Weight Distribution

The dotted line shows a typical molecular weight distribution for a narrow molecular weight HDPE resin. The dashes show just the distribution for a broad molecular weight HDPE. The solid line shows the distribution of a bimodal HDPE resin.

The properties of the HDPE resin can be changed because of the molecular distribution. Density and melt index also are important in tailoring the properties of the HDPE resin.



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HDPE Pipe

***Blue Bold indicates standard/more readily available items.**

Typical IPS HDPE Pipe Sizes

Most high-density polyethylene pipe is made to the following dimensions. At present PE 3408 is the resin used for most applications

Pipe Size Nominal	Actual OD	Dimension Ratio	Pressure rating, psi @73°F	Minimum Wall	Average ID	Weight lbs./ft
3/4"	**1.050"**	**DR 11**	**160**	**0.095"**	**0.86"**	**0.12**
1"	**1.315"**	**DR 11**	**160**	**0.12"**	**1.075"**	**0.19**
1.25"	**1.660"**	**DR 11**	**160**	**0.151"**	**1.358"**	**0.31**
1.5"	**1.900"**	**DR 11**	**160**	**0.173"**	**1.55"**	**0.41**
2"	2.375"	DR 7	267	0.339"	1.670"	0.943
2"	2.375"	DR 9	200	0.264"	1.826"	0.762
2"	**2.375"**	**DR 11**	**160**	**0.216"**	**1.926"**	**0.639**
2"	2.375"	DR 13.5	128	0.176"	2.009"	0.531
2"	2.375"	DR 15.5	110	0.153"	2.057"	0.467
2"	2.375"	DR 17	100	0.140"	2.084"	0.429
3"	3.500"	DR 7	267	0.500"	2.460"	2.047
3"	3.500"	DR 9	200	0.389"	2.691"	1.656
3"	**3.500"**	**DR 11**	**160**	**0.318"**	**2.839"**	**1.387**
3"	3.500"	DR 13.5	128	0.259"	2.961"	1.153
3"	3.500"	DR 15.5	110	0.226"	3.048"	1.020
3"	**3.500"**	**DR 17**	**100**	**0.206"**	**3.088"**	**0.932**
4"	4.500"	DR 7	267	0.643"	3.163"	3.384
4"	4.500"	DR 9	200	0.500"	3.460"	2.737
4"	**4.500"**	**DR 11**	**160**	**0.409"**	**3.649"**	**2.294**
4"	4.500"	DR 13.5	128	0.333"	3.807"	1.906
4"	4.500"	DR 15.5	110	0.290"	3.897"	1.678
4"	**4.500"**	**DR 17**	**100**	**0.265"**	**3.949"**	**1.54**
4"	4.500"	DR 21	80	0.214"	4.055"	1.262
4"	4.500"	DR 26	64	0.173"	4.140"	1.03
4"	4.500"	DR 32.5	51	0.138"	4.213"	0.831
5"	5.375"	DR 11	160	0.489"	4.358"	3.272
5"	5.375"	DR 17	100	0.316"	4.718"	2.197
5"	5.375"	DR 21	80	0.256"	4.843"	1.801
5"	5.375"	DR 26	64	0.207"	4.944"	1.186

Pipe Lengths

Straight lengths: Pipe 2" to 24" stocked in 40 foot lengths. Sizes 28" to 63" in 50 ft. lengths.

Coil: Standard for 3/4" to 6". Coils for 8" available on special order.

1-800-345-ISCO

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Typical IPS HDPE Pipe Sizes

Pipe Size Nominal	Actual OD	Dimension Ratio	Pressure rating, psi @73°F	Minimum Wall	Average ID	Weight lbs,/ft
5"	5.563"	DR 7	267	0.795"	3.909"	5.172
5"	5.563"	DR 9	200	0.618"	4.278"	4.182
5"	5.563"	DR 11	160	0.506"	4.511"	3.505
5"	5.563"	DR 13.5	128	0.412"	4.706"	2.912
5"	5.563"	DR 15.5	110	0.359"	4.816"	2.564
5"	5.563"	DR 17	100	0.327"	4.883"	2.353
5"	5.563"	DR 21	80	0.265"	5.012"	1.929
5"	5.563"	DR 26	64	0.214"	5.118"	1.574
5"	5.563"	DR 32.5	51	0.171"	5.207”	1.27
6"	6.625"	DR 7	267	0.946"	4.657"	7.336
6"	6.625"	DR 9	200	0.736"	5.094"	5.932
6"	**6.625"**	**DR 11**	**160**	**0.602"**	**5.373"**	**4.971**
6"	6.625"	DR 13.5	128	0.491"	5.604"	4.13
6"	6.625"	DR 15.5	110	0.427"	5.737"	3.637
6"	**6.625"**	**DR 17**	**100**	**0.390"**	**5.814"**	**3.338**
6"	6.625"	DR 19	89	0.349"	5.900"	3.007
6"	6.625"	DR 21	80	0.315"	5.970"	2.736
6"	6.625"	DR 26	64	0.255"	6.095"	2.233
6"	6.625"	DR 32.5	51	0.204"	6.201"	1.801
7"	7.125"	DR 11	160	0.648"	5.777"	5.75
7"	7.125"	DR 17	100	0.419"	6.253"	3.86
7"	7.125"	DR 19	89	0.375"	6.350"	3.478
7"	7.125"	DR 21	80	0.339"	6.420"	3.165
7"	7.125"	DR 26	64	0.274"	6.555"	2.582
7"	7.125"	DR 32.5	51	0.219"	6.669"	2.083
8"	8.625"	DR 7	267	1.232"	6.062"	12.433
8"	8.625"	DR 9	200	0.958"	6.632"	10.054
8"	**8.625"**	**DR 11**	**160**	**0.784"**	**6.994"**	**8.425**
8"	8.625"	DR 13.5	128	0.639"	7.296"	7.001
8"	8.625"	DR 15.5	110	0.556"	7.469"	6.164
8"	**8.625"**	**DR 17**	**100**	**0.507"**	**7.570"**	**5.657**
8"	8.625"	DR 19	89	0.454"	7.680"	5.097
8"	8.625"	DR 21	80	0.411"	7.770"	4.637
8"	8.625"	DR 26	64	0.332"	7.934"	3.784
8"	8.625"	DR 32.5	51	0.265"	8.074"	3.053

HDPE Pipe

***Blue Bold indicates standard/more readily available items.**

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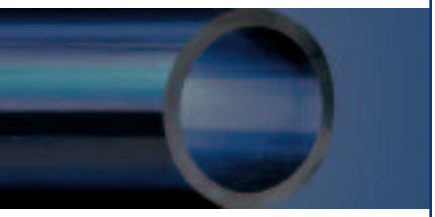

HDPE Pipe

***Blue Bold indicates standard/more readily available items.**

Typical IPS HDPE Pipe Sizes

Pipe Size Nominal	Actual OD	Dimension Ratio	Pressure rating, psi @73°F	Minimum Wall	Average ID	Weight Lbs./ft
10"	10.750"	DR 7	267	1.536"	7.555"	19.314
10"	10.750"	DR 9	200	1.194"	8.266"	15.618
10"	**10.750"**	**DR 11**	**160**	**0.977"**	**8.718"**	**13.089**
10"	10.750"	DR 13.5	128	0.796"	9.094"	10.875
10"	10.750"	DR 15.5	110	0.694"	9.306"	9.576
10"	**10.750"**	**DR 17**	**100**	**0.632"**	**9.435"**	**8.788**
10"	10.750"	DR 19	89	0.566"	9.570"	7.918
10"	10.750"	DR 21	80	0.512"	9.685"	7.204
10"	10.750"	DR 26	64	0.413"	9.891"	5.878
10"	10.750"	DR 32.5	51	0.331"	10.062"	4.742
12"	12.750"	DR 7	267	1.821"	8.962"	27.17
12"	12.750"	DR 9	200	1.417"	9.803"	21.97
12"	**12.750"**	**DR 11**	**160**	**1.150"**	**10.339"**	**18.412**
12"	12.750"	DR 13.5	128	0.944"	10.786"	15.298
12"	12.750"	DR 15.5	110	0.823"	11.038"	13.471
12"	**12.750"**	**DR 17**	**100**	**0.750"**	**11.190"**	**12.362**
12"	12.750"	DR 19	89	0.671"	11.350"	11.138
12"	12.750"	DR 21	80	0.607"	11.487"	10.134
12"	12.750"	DR 26	64	0.490"	11.731"	8.269
12"	12.750"	DR 32.5	51	0.392"	11.935"	6.671
14"	14.000"	DR 7	267	2.000"	9.840"	32.758
14"	14.000"	DR 9	200	1.556"	10.764"	26.489
14"	**14.000"**	**DR 11**	**160**	**1.273"**	**11.352"**	**22.199**
14"	14.000"	DR 13.5	128	1.037"	11.843"	18.445
14"	14.000"	DR 15.5	110	0.903"	12.122"	16.242
14"	**14.000"**	**DR 17**	**100**	**0.824"**	**12.286"**	**14.905**
14"	14.000"	DR 19	89	0.737"	12.470"	13.429
14"	14.000"	DR 21	80	0.667"	12.613"	12.218
14"	14.000"	DR 26	64	0.538"	12.881"	9.97
14"	**14.000"**	**DR 32.5**	**51**	**0.431"**	**13.104"**	**8.044**
16"	16.000"	DR 7	267	2.286"	11.245"	42.786
16"	16.000"	DR 9	200	1.778"	12.302"	34.598
16"	**16.000"**	**DR 11**	**160**	**1.455"**	**12.974"**	**28.994**
16"	16.000"	DR 13.5	128	1.185"	13.535"	24.092
16"	16.000"	DR 15.5	110	1.032"	13.853"	21.214
16"	**16.000"**	**DR 17**	**100**	**0.941"**	**14.043"**	**19.467**
16"	16.000"	DR 19	89	0.842"	14.250"	17.540
16"	16.000"	DR 21	80	0.762"	14.415"	15.959
16"	16.000"	DR 26	64	0.615"	14.721"	13.022
16"	**16.000"**	**DR 32.5**	**51**	**0.492"**	**14.977"**	**10.506**

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Typical IPS HDPE Pipe Sizes

Pipe Size Nominal	Actual OD	Dimension Ratio	Pressure rating, psi @73°F	Minimum Wall	Average ID	Weight lbs./ft
18"	18.000"	DR 7	267	2.571"	12.652"	54.151
18"	18.000"	DR 9	200	2.000"	13.840"	43.788
18"	**18.000"**	**DR 11**	**160**	**1.636"**	**14.597"**	**36.696**
18"	18.000"	DR 13.5	128	1.333"	15.227"	30.491
18"	18.000"	DR 15.5	110	1.161"	15.585"	26.849
18"	**18.000"**	**DR 17**	**100**	**1.059"**	**15.797"**	**24.638**
18"	18.000"	DR 19	89	0.947"	16.030"	22.199
18"	18.000"	DR 21	80	0.857"	16.217"	20.198
18"	18.000"	DR 26	64	0.692"	16.561"	16.48
18"	**18.000"**	**DR 32.5**	**51**	**0.544"**	**16.868"**	**13.296**
20"	20.000"	DR 7	267	2.857"	14.057"	66.853
20"	20.000"	DR 9	200	2.222"	15.378"	54.059
20"	**20.000"**	**DR 11**	**160**	**1.818"**	**16.219"**	**45.304**
20"	20.000"	DR 13.5	128	1.481"	16.920"	37.643
20"	20.000"	DR 15.5	110	1.290"	17.317"	33.146
20"	**20.000"**	**DR 17**	**100**	**1.176"**	**17.554"**	**30.418**
20"	20.000"	DR 21	80	0.952"	18.020"	24.936
20"	20.000"	DR 26	64	0.769"	18.400"	20.346
20"	**20.000"**	**DR 32.5**	**51**	**0.615"**	**18.721"**	**16.415**
22"	22.000"	DR 7	267	3.143"	15.337"	80.17
22"	22.000"	DR 9	200	2.444"	16.916"	65.412
22"	**22.000"**	**DR 11**	**160**	**2.000"**	**17.840"**	**54.818**
22"	22.000"	DR 13.5	128	1.630"	18.610"	45.458
22"	22.000"	DR 15.5	110	1.419"	19.048"	40.107
22"	**22.000"**	**DR 17**	**100**	**1.294"**	**19.308"**	**36.805**
22"	22.000"	DR 21	80	1.048"	19.820"	30.172
22"	22.000"	DR 26	64	0.846"	20.240"	24.619
22"	**22.000"**	**DR 32.5**	**51**	**0.677"**	**20.592"**	**19.863**
24"	24.000"	DR 7	267	3.429	16.731"	95.42"
24"	24.000"	DR 9	200	2.667"	18.453"	77.845
24"	**24.000"**	**DR 11**	**160**	**2.182"**	**19.461"**	**65.237**
24"	24.000"	DR 13.5	128	1.778"	20.302"	54.206
24"	24.000"	DR 15.5	110	1.548"	20.780"	47.731
24"	**24.000"**	**DR 17**	**100**	**1.412"**	**21.063"**	**43.801**
24"	24.000"	DR 21	80	1.143"	21.623"	35.907
24"	24.000"	DR 26	64	0.923"	22.080"	29.299
24"	**24.000"**	**DR 32.5**	**51**	**0.738"**	**22.465"**	**23.638**

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Typical IPS HDPE Pipe Sizes

Pipe Size Nominal	Actual OD	Dimension Ratio	Pressure rating, psi @73°F	Minimum Wall	Average ID	Weight lbs./ft
26"	26.000"	DR 9	200	2.889	19.876	92.05
26"	26.000"	DR 11	160	2.364"	21.083"	76.563
26"	26.000"	DR 13.5	128	1.926"	21.994"	63.617
26"	26.000"	DR 15.5	110	1.677"	22.512"	56.018
26"	26.000"	DR 17	100	1.529"	22.820"	51.406
26"	26.000"	DR 21	80	1.238"	23.425"	42.141
26"	26.000"	DR 26	64	1.000"	23.920"	34.385
26"	26.000"	DR 32.5	51	0.8000"	24.336"	27.742
28"	28.000"	DR 9	200	3.111	21.404	106.75
28"	**28.000"**	**DR 11**	**160**	**2.545"**	**22.706"**	**88.795**
28"	28.000"	DR 13.5	128	2.074"	23.686"	73.781
28"	28.000"	DR 15.5	110	1.806"	24.244"	64.967
28"	**28.000"**	**DR 17**	**100**	**1.647"**	**24.574"**	**59.618**
28"	28.000"	DR 21	80	1.333"	25.227"	48.874
28"	28.000"	DR 26	64	1.077"	25.760"	39.879
28"	**28.000"**	**DR 32.5**	**51**	**0.862"**	**26.207"**	**32.174**
30"	30.000"	DR 9	200	3.333	22.933	122.54
30"	**30.000"**	**DR 11**	**160**	**2.727"**	**24.328"**	**101.934**
30"	30.000"	DR 13.5	128	2.222"	25.378"	84.697
30"	30.000"	DR 15.5	110	1.935"	25.975"	74.58
30"	**30.000"**	**DR 17**	**100**	**1.765"**	**26.329"**	**68.439**
30"	30.000"	DR 21	80	1.429"	27.028"	56.105
30"	30.000"	DR 26	64	1.154"	27.600"	45.779
30"	**30.000"**	**DR 32.5**	**51**	**0.923"**	**28.080"**	**36.934**
32"	32.000"	DR 11	160	2.909"	25.833"	116.67
32"	32.000"	DR 13.5	128	2.370"	27.070"	96.367
32"	32.000"	DR 15.5	110	2.065"	27.705"	84.855
32"	32.000"	DR 17	100	1.882"	28.065"	77.869
32"	32.000"	DR 21	80	1.524"	28.830"	63.835
32"	32.000"	DR 26	64	1.231"	29.440"	52.086
32"	**32.000"**	**DR 32.5**	**51**	**0.985"**	**29.951"**	**42.023**
34"	34.000"	DR 11	160	3.091"	27.447"	131.72
34"	34.000"	DR 13.5	128	2.519"	28.661"	109.33
34"	34.000"	DR 15.5	110	2.194"	29.350"	96.21
34"	34.000"	DR 17	100	2.000"	29.760"	88.24
34"	34.000"	DR 21	80	1.619"	30.568"	72.28
34"	34.000"	DR 26	64	1.308"	31.281"	58.96
34"	34.000"	DR 32.5	51	1.046"	31.782"	47.52

Typical IPS HDPE Pipe Sizes

Pipe Size Nominal	Actual OD	Dimension Ratio	Pressure rating, psi @73°F	Minimum Wall	Average ID	Weight lbs./ft
36"	36.000"	DR 11	160	3.272"	29.194"	146.78
36"	36.000"	DR 13.5	128	2.667"	30.452"	121.96
36"	36.000"	DR 15.5	110	2.323"	31.168"	107.395
36"	**36.000"**	**DR 17**	**100**	**2.118"**	**31.595"**	**98.553**
36"	36.000"	DR 21	80	1.714"	32.434"	80.791
36"	36.000"	DR 26	64	1.385"	33.119"	65.922
36"	**36.000"**	**DR 32.5**	**51**	**1.108"**	**33.696"**	**53.186**
42"	42.000"	DR 11	160	3.818"	33.905"	201.00
42"	42.000"	DR 13.5	128	3.111"	35.404"	166.80
42"	42.000"	DR 15.5	110	2.710"	36.363"	146.176
42"	42.000"	DR 17	100	2.471"	36.860"	134.141
42"	42.000"	DR 21	80	2.000"	37.840"	109.966
42"	42.000"	DR 26	64	1.615"	38.641"	89.727
42"	**42.000"**	**DR 32.5**	**51**	**1.292"**	**39.313"**	**72.392**
48"	48.000"	DR 17	100	2.824"	42.126"	175.205
48"	48.000"	DR 21	80	2.286"	43.245"	143.629
48"	48.000"	DR 26	64	1.846"	44.160"	117.194
48"	**48.000"**	**DR 32.5**	**51**	**1.477"**	**44.928"**	**94.552**
54"	54.000"	DR 17	100	3.176"	47.266"	222.55
54"	54.000"	DR 21	80	2.571"	48.652"	181.781
54"	54.000"	DR 26	64	2.077"	49.680"	148.324
54"	**54.000"**	**DR 32.5**	**51**	**1.662"**	**50.543"**	**119.668**
63"	63.209"	DR 21	80	3.000"	56.849"	247.8
63"	63.209"	DR 26	64	2.421"	58.076"	202.0
63"	**63.209"**	**DR 32.5**	**51**	**1.937"**	**59.102"**	**162.98**

HDPE Pipe

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HDPE Pipe

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DIPS HDPE Pipe Sizes

Pipe Size Nominal	Actual O.D.	Dimension Ratio	Pressure rating, psi @73°F	Minimum Wall	Average ID	Weight lbs./ft
3"	3.96"	DR 9	200	0.440"	3.045"	2.119
3"	3.96"	DR 11	160	0.360"	3.211"	1.776
3"	3.96"	DR 13.5	128	0.294"	3.348"	1.476
3"	3.96"	DR 17	100	0.233"	3.475"	1.192
4"	4.80"	DR 9	200	0.533"	3.691"	3.114
4"	**4.80"**	**DR 11**	**160**	**0.437"**	**3.891"**	**2.609**
4"	4.80"	DR 13.5	128	0.356"	4.060"	2.168
4"	**4.80"**	**DR 17**	**100**	**0.283"**	**4.211"**	**1.752**
4"	4.80"	DR 26	64	0.189"	4.407"	1.172
6"	6.90"	DR 9	200	0.767"	5.305"	6.434
6"	**6.90"**	**DR 11**	**160**	**0.628"**	**5.594"**	**5.392**
6"	6.90"	DR 13.5	128	0.512"	5.835"	4.480
6"	**6.90"**	**DR 17**	**100**	**0.406"**	**6.056"**	**3.620**
6"	6.90"	DR 26	64	0.266"	6.347"	2.422
8"	9.05"	DR 9	200	1.006"	6.958"	11.069
8"	**9.05"**	**DR 11**	**160**	**0.823"**	**7.338"**	**9.276**
8"	9.05"	DR 13.5	128	0.670"	7.656"	7.708
8"	**9.05"**	**DR 17**	**100**	**0.533"**	**7.941"**	**6.228**
8"	9.05"	DR 19	89	0.476"	8.059"	5.611
8"	9.05"	DR 26	64	0.348"	8.326"	4.166
10"	11.10"	DR 9	200	1.233"	8.535"	16.652
10"	**11.10"**	**DR 11**	**160**	**1.009"**	**9.001"**	**13.955**
10"	11.10"	DR 13.5	128	0.823"	9.338"	11.595
10"	**11.10"**	**DR 17**	**100**	**0.653"**	**9.742"**	**9.369**
10"	11.10"	DR 19	89	0.584"	9.885"	8.441
10"	11.10"	DR 26	64	0.427"	10.212"	6.267
12"	13.20"	DR 9	200	1.467"	10.149"	23.548
12"	**13.20"**	**DR 11**	**160**	**1.200"**	**10.704"**	**19.734**
12"	13.20"	DR 13.5	128	0.978"	11.166"	16.397
12"	**13.20"**	**DR 17**	**100**	**0.777"**	**11.584"**	**13.250**
12"	13.20"	DR 19	89	0.695"	11.755"	11.938
12"	13.20"	DR 26	64	0.508"	12.143"	8.863
14"	15.30"	DR 9	200	1.700"	11.764"	31.637
14"	**15.30"**	**DR 11**	**160**	**1.391"**	**12.407"**	**26.513**
14"	15.30"	DR 13.5	128	1.134"	12.941"	22.030
14"	**15.30"**	**DR 17**	**100**	**0.900"**	**13.428"**	**17.801**
14"	15.30"	DR 26	64	0.589"	14.075"	11.907

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DIPS HDPE Pipe Sizes

Pipe Size Nominal	Actual O.D.	Dimension Ratio	Pressure rating, psi @73°F	Minimum Wall	Average ID	Weight lbs./ft
16"	17.40"	DR 9	200	1.933"	13.379"	40.917
16"	**17.40"**	**DR 11**	**160**	**1.582"**	**14.109"**	**34.290**
16"	17.40"	DR 13.5	128	1.289"	14.719"	28.492
16"	**17.40"**	**DR 17**	**100**	**1.024"**	**15.270"**	**23.023**
16"	17.40"	DR 21	80	.829"	15.742"	18.870"
16"	17.40"	DR 26	64	0.670"	16.006"	15.400
18"	19.50"	DR 9	200	2.167"	14.993"	51.390
18"	**19.50"**	**DR 11**	**160**	**1.773"**	**15.812"**	**43.067**
18"	19.50"	DR 13.5	128	1.445"	16.494"	35.785
18"	**19.50"**	**DR 17**	**100**	**1.147"**	**17.114"**	**28.916**
18"	19.50"	DR 21	80	0.929"	17.568"	23.700
18"	19.50"	DR 26	64	0.750"	17.940"	19.342
20"	21.60"	DR 9	200	2.400"	16.608"	63.055
20"	**21.60"**	**DR 11**	**160**	**1.964"**	**17.515"**	**52.842**
20"	21.60"	DR 13.5	128	1.600"	18.272"	43.907
20"	**21.60"**	**DR 17**	**100**	**1.271"**	**18.956"**	**35.479**
20"	21.60"	DR 21	80	1.029"	19.460"	29.090
20"	21.60"	DR 26	64	0.831"	19.872"	23.732
24"	**25.80"**	**DR 11**	**160**	**2.346"**	**20.920"**	**75.390**
24"	25.80"	DR 13.5	128	1.912"	21.823"	62.642
24"	**25.80"**	**DR 17**	**100**	**1.518"**	**22.643"**	**50.618**
24"	25.80"	DR 21	80	1.229"	23.244"	41.500
24"	25.80"	DR 26	64	0.993"	23.735"	33.858
30"	32.00"	DR 13.5	128	2.37"	27.070"	96.367
30"	32.00"	DR 17	100	1.883"	28.083"	77.869
30"	32.00"	DR 21	80	1.524"	28.830"	63.840
30"	32.00"	DR 26	64	1.231"	29.440"	52.086
36"	38.30"	DR 13.5	128	2.837"	32.286"	138.04
36"	38.30"	DR 17	100	2.253"	33.524"	111.55
36"	38.30"	DR 21	80	1.842"	34.506"	91.45
36"	38.30"	DR 26	64	1.473"	35.177"	74.61
42"	44.50"	DR 17	100	2.618"	33.524"	150.60
42"	44.50"	DR 21	80	2.119"	40.008"	123.44
42"	44.50"	DR 26	64	1.712"	40.871"	100.75
48"	50.80"	DR 17	100	2.989"	44.465"	196.23
48"	50.80"	DR 21	80	2.419"	45.672"	160.87
48"	50.80"	DR 26	64	1.954"	46.658"	131.28

HDPE Pipe

***Blue Bold indicates standard/more readily available items.**

Sizes above 30" DIPS are not standard products, large special orders will be required to get these sizes.

1-800-345-ISCO

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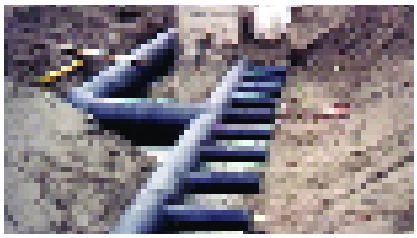
HDPE Pipe

Weholite: Lightweight Piping System

In addition to solid wall HDPE pipe, ISCO offers a profile wall system known as Weholite manufactured by KWH pipe. This patented structured (profile) wall pipe has a smooth interior and exterior with a hollow core that offers exceptional strength to weight characteristics. Its unique structure can be offered in a range of sizes up 120" diameter and a variety of pipe stiffness depending on customer requirements. Weholite offers superior corrosion resistance and toughness over metal and concrete. It has better flow characteristics than any other large diameter piping materials, which makes it ideal for relining failing culverts and sewers. It is very lightweight and impact resistant which typically involves less installation equipment and more forgiving handling on site. Weholite can be welded for a leak free system capable of operating at low pressure.

New Culvert & Culvert Relining



Odor Control (Foul Air) / Biofilter Systems

Storm Water Drainage and Retention

Irrigation, Water Conservation & Diversion

Sanitary Sewer & Insert Renewal

Versatile lightweight pipe system for gravity and low-pressure applications.

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Typical Resin Properties for Weholite Pipe (73° F)			
Property	Standard	Value	Unit
Density (Compounded)	ASTM D1505	0.955	gm/cm3
Melt Index (Pipe Condition 190/21.6)	ASTM D1238	7.5	gm/10min
Secant Flexural Modulus (2% Strain)	ASTM D790	118,000	psi
Tensile Strength at Yield	ASTM D638	3,200	psi
Environmental Stress Crack Resistance (Condition C)	ASTM D1693	>5,000	F_0 hrs
Hydrostatic Design Basis	ASTM D2837	1,600	psi
Carbon Black	ASTM D1603	minimum 2	%
Elongation at Break	ASTM D638	850	%

Weholite is manufactured in accordance with ASTM F894.

Weholite Pipe Size	Nominal Pipe ID (inches)	Average Outside Diameter	
		for Max. Stiffness (inches)	for Min. Stiffness (inches)
18	18	20.2	19.9
19.5	19.5	21.7	21.7
21	21	23.7	22.9
24	24	27.1	26.2
27	27	30.4	30.0
30	30	33.8	32.7
33	33	39.6	37.6
36	36	40.7	39.1
40	40	45.2	43.4
42	42	47.5	45.4
48	48	53.8	51.8
54	54	60.5	58.7
60	60	67.2	65.2
66	66	73.9	70.7
72	72	80.6	77.8
78	78	87.4	84.5
84	84	94.1	90.5
90	90	100.8	97.2
96	96	107.5	103.2
108	108	121.0	115.9
120	120	134.4	128.6

Notes

1. **The above chart represents a range of sizes and stiffness classes. Stock will vary from plant to plant. Contact ISCO for availability.**
2. **Weholite is available in a series of different Ring Stiffness Constants (RSC) values that comply with ASTM F-894-98 "Polyethylene Large Diameter Profile Wall Sewer and Drain Pipe".**
3. **Weholite is available in standard lengths of 20 and 40 feet with custom sizes 3 feet to 50 feet.**
4. **Contact your local ISCO Representative for design assistance to meet your specific project needs.**

HDPE Pipe

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