

Case Studies on PE-RT Hot Water Piping for Campus Energy

Wes Long – Performance Pipe



PE-RT Hot Water Piping For Campus Energy

Overview of PE-RT

PE-RT Case Studies



PE4710 Resin

- **PE3408 (Introduced in the early 1980's)**
 - 3 indicates High Density PE (>0.940 to 0.947)
 - 4 indicates PENT test of >10 hours
 - 08 indicates Hydrostatic Design Stress of 800 psi
- **PE4710 (Introduced to the market in 2005)**
 - 4 indicates High Density PE (>0.947 to 0.955)
 - 7 indicates PENT test of >500 hours
 - 10 indicates a Hydrostatic Design Stress of 1000 psi
- **PE4710 PE-RT (Introduced to the market in 2016)**



What is PE-RT?

- **PE4710 PE-RT Pipe & Fittings (Introduced in 2016)**
- A PE-RT material (polyethylene of raised temperature resistance) designation applies to PE materials that have an established HDB at 180F (82.2C) in PPI TR-4
- Dow's PE-RT resin is the only PE resin listed above 60 °C (140 °F) in TR-4

PPI Listing for INTREPID 2499 PE-RT

Dow Chemical Company			PE 4710			INTREPID 2499 BK		
Temp (°F)	MRS (MPa)	CRS (T,t)	HDB (psi)	HDS (psi)	SDB (psi)	PDB (psig)	HDP (psi)	Grade
73F			1600	1000				S*
180F			800					S
Displaying items 1 - 2 of 2								

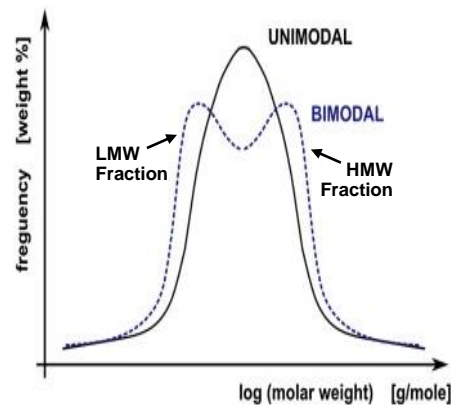
Dow Chemical Company			PE 4710			INTREPID 2499 NT		
Temp (°F)	MRS (MPa)	CRS (T,t)	HDB (psi)	HDS (psi)	SDB (psi)	PDB (psig)	HDP (psi)	Grade
73F			1600	1000				S*
180F			800					S
Displaying items 1 - 2 of 2								



PE-RT Pipe | The Bimodal Benefit

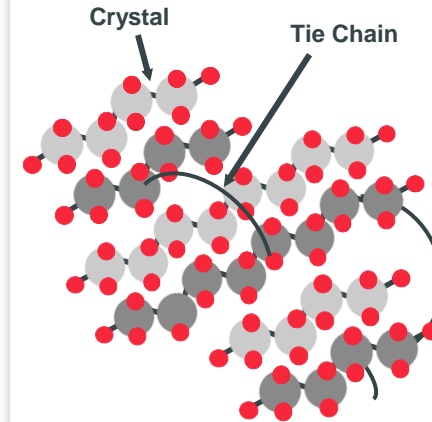
The bimodal approach utilizes a dual polyethylene reactor system to produce pipe resins that achieve excellent raised temperature performance – without the need for cross-linking. INTREPID 2499 contains a greater number of high molecular weight chains than ordinary PE4710. Bimodal technology delivers the tie chains that make it tough and temperature resistant. Patented additive technology gives it the oxidative resistance required for demanding applications.

Bimodal vs. Unimodal Property Distribution



Dual reactors (versus one) are utilized to create PE resin with bimodal (two) molecular weight peaks – providing the extruded pipe with the properties required to perform in raised temperature and oxidative environments.

Molecular Structure of PE-RT Pipe



Tie chains in the high molecular weight fraction connect the crystalline structure in the polymer, which toughens the material and gives it superior strength at high temperatures.



PE-RT Pipe Sizes & Pressure Ratings

- Solid Wall Pipe
- OD Controlled Process
 - Iron Pipe Size (IPS)
 - 1/2" (16mm) to 54" (1400mm)
- Full Range of Pipe Sizes, DR's, Pressure Capabilities, Molded & Fabricated Fittings



DR	PR @ 73°F	PR @ 180°F
7	333	167
9	250	125
11	200	100
13.5	160	80
17	125	63
21	100	50
26	80	40
32.5	63	32

PE-RT Hot Water Piping For Campus Energy

Overview of PE-RT

PE-RT Case Studies



Texas A&M University – The RELLIS Campus, America's Newest Center for Transformative Research and Education



PROJECT

RELLIS Campus
Water
Distribution
Lines

LOCATION

Texas A&M
College Station,
Texas

THE NEED

Leak-free heating
hot water and
chilled water
lines

SOLUTION

20 and 24-inch
HDPE 12-inch
PERT
Various Fittings



ISCO supplies HDPE
and PERT for water
lines at massive
university.



20" and 24" DR 17 PE4710 for Chilled Water and
12" DR 11 PlatinumStripe® 1800 Series PE-RT
Texas A&M Utilities & Energy Services



Like many colleges and universities across the country, Texas A&M in College Station, Texas always turned to carbon steel pipe and fittings for their water lines. "For years, we always did it with mechanical joints," explained Reuben Bernal, the supervisor for water distribution at the school. "Steel, direct burial, carbon steel pipe. But, just like anything else, it decays in the ground." The team faced high leak rates and dealt with too frequent interruptions to service on campus. "On a normal day, we were losing up to 40-50 gallons per minute," Bernal said. They knew there had to be a better option.

About 10 years ago, the school decided to start replacing problem areas with polyethylene pipe. "We started off on domestic water and gradually started using it in our thermal system," said Bernal. The switch was so successful, essentially all steel pipe on campus has been replaced and new construction projects utilize polyethylene pipe.

Proof of Performance

Texas A&M has become a leader among schools looking for a solution to leaking water systems. They've gone from losing 40-50 gallons per minute to only single digits. "You can look at our chart," Bernal said. "Every morning we get a reading and on campus, right now, it's at seven gallons per minute on chilled and 3.7 gallons per minute on heat. That's a huge drop, from what we were to what we are now, that's a huge change."





Gilsulate insulating backfill used for part of project compared to pre-insulated piping



PROJECT

Hospital Heat
Recovery
System

LOCATION

Iles-de-la-
Madeleine
(Magdalen
Islands), Quebec,
Canada

THE NEED

Leak-free,
corrosion-
resistant heating
and cooling dual
lines for hospital
heat recovery
system

SOLUTION

13,500' (4km) of
8" IPS DR 11
PlatinumStripe®
1800 PE-RT pipe
& fittings



ISCO offers PE-RT for a
dual line heat recovery
system.



Residual Heat Recovery Project from the Thermal Power Plant Hydro-Québec to Iles-de-la-Madeleine Hospital





Residual Heat Recovery Project from the Thermal Power Plant Hydro-Québec to Iles-de-la-Madeleine Hospital

- “It should be noted that this energy efficiency project for which financial assistance of nearly 2.5 million has been granted to the island’s integrated health and social services Centre is a residual heat recovery project of the thermal power plant Hydro-Québec.”
- “The project will reduce greenhouse gas (GHG) emissions by 1 555 T eq. CO₂, the equivalent of removing 457 light vehicles from our roads annually.”
- The project involves the use of heat discharges from the Hydro-Québec de Cap-aux-millstones thermal power station to meet the energy requirements of the facility's buildings.
- The energy recovery system will consist of the installation of heat exchangers at the thermal power plant and the hospital, as well as a transfer loop consisting of insulated pipes buried approximately 2 km away.
- “The CISSS of the islands would like to thank the partners and collaborators who contribute to the realization of this energy efficiency project which will benefit the whole community.”







6" and 8" 1800 Series PlatinumStripe® PE-RT University of MN Athletic Additions



Scope of the project

- 600' of 6" IPS 11 1800 series PE-RT
- 640' of 8" IPS 11 1800 series PE-RT
- Molded 90's, 45's, Caps, Flange Adapters
 - University of MN at Minneapolis Twin City campus (Gopher athletic village addition)
 - General Contractor = Mortenson Construction
 - Subcontractor = Horwitz Inc.
 - Engineer = MEP Associates
 - Pipe was sold by Ferguson Waterworks
 - Pipe project is the HVAC system for the new additions to the athletic department:
 - Academic Center**
 - Training Table**
 - Indoor Football Complex**
 - Women's Gymnastics Facility**
 - Olympic Sport Indoor Practice Facility**
 - Outdoor Olympic Sport Track**
 - Men's/Women's Basketball Practice Facility**
 - Wrestling Training Facility**
- This \$190MM project was completed in November 2017



Hot and cold water HVAC lines leaving mechanical building
(2 lines on the left are chilled water, 4 on the right are hot water)



Caped lines ready to be pressure tested



This new building will house men and women's basketball courts as well as training tables for the athletes



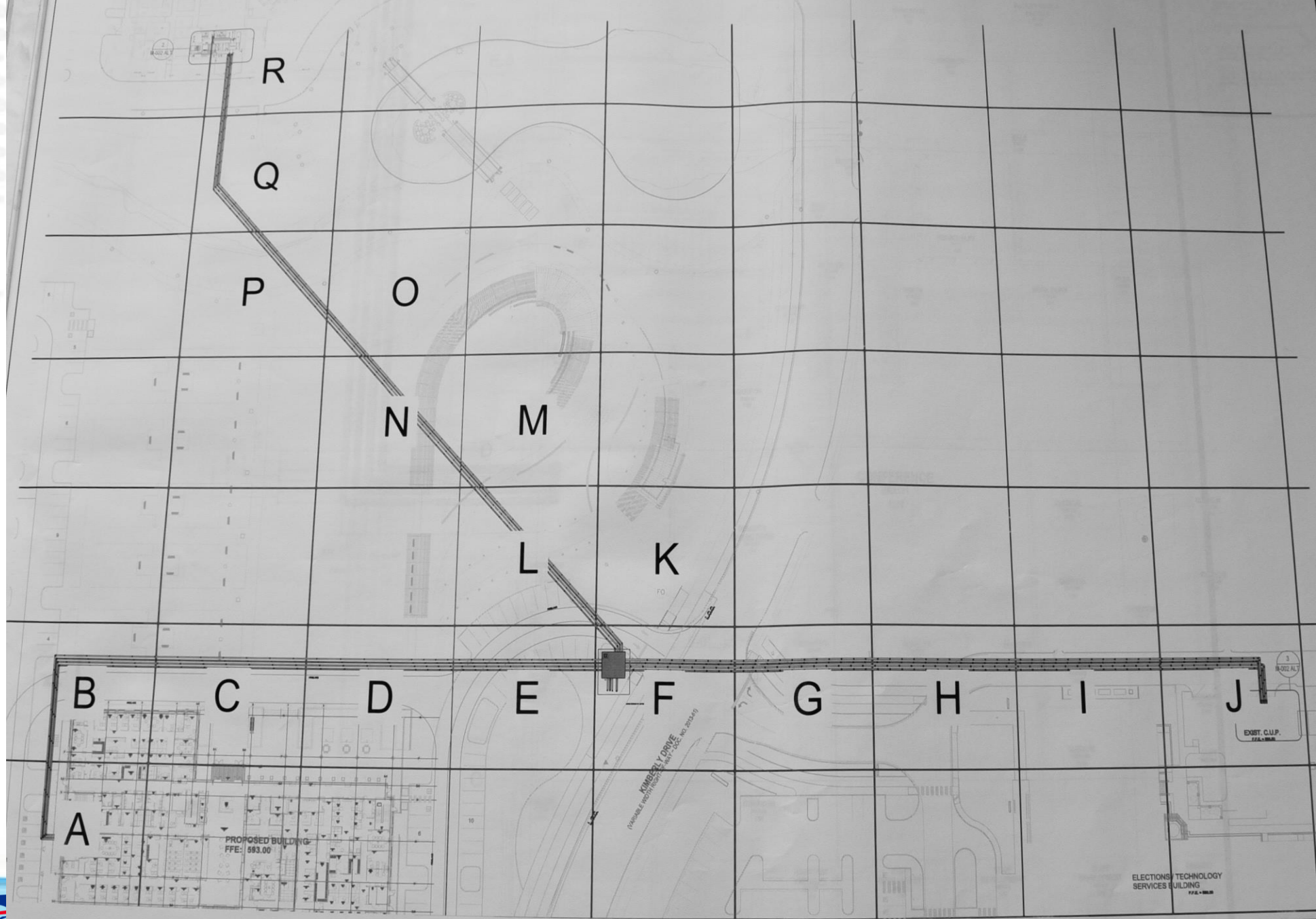
DENTON COUNTY ADMINISTRATIVE COMPLEX PHASE III Conditions of Success



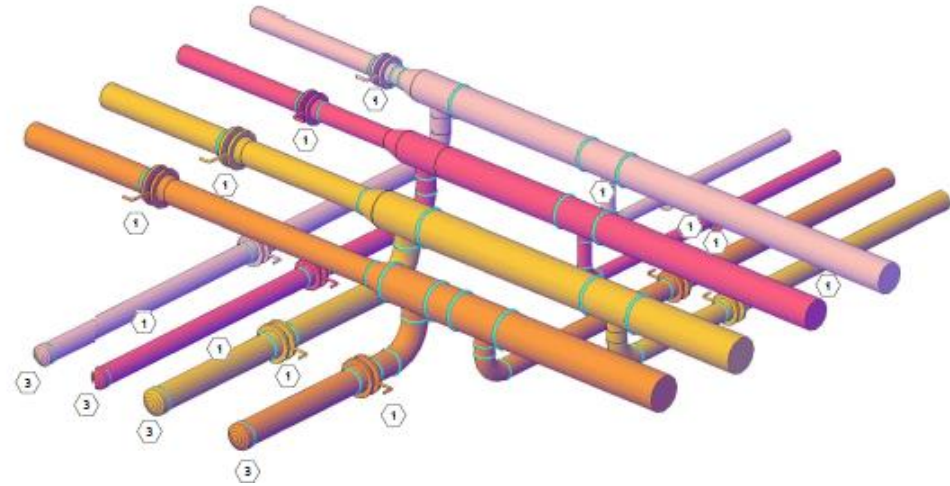
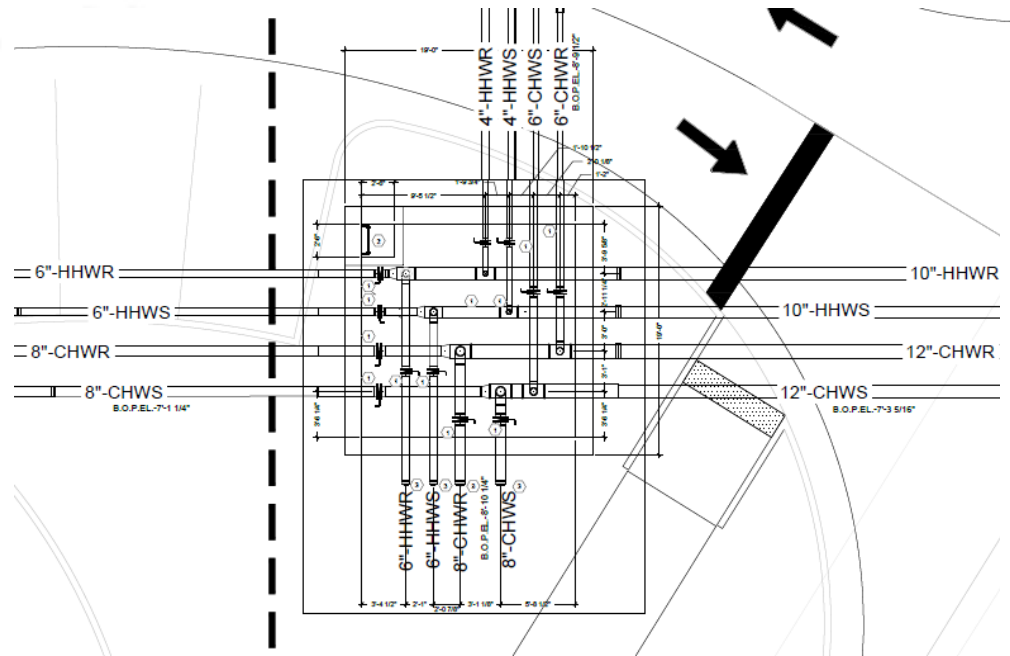
Denton County Administration Complex

- 2,280' of 6" DR 11 PE-RT
- 1,360' of 4" DR 11 PE-RT
- 1,180' of 10" DR 11 PE-RT
- Molded and Fabricated 90's, 45's, Tees, Caps, Flange Adapters
- Pipe was sold by Thermacor Process Inc.
- Engineering Contractor – HDR Inc.
- General Contractor – Sundt
- Mechanical Contractor – SkiHi Enterprises
- Project to provide hot water and chilled water distribution to Denton County Governments Buildings for heating and cooling
- Project will be complete in 1Q 2020





Underground Mechanical Pipe - Vault











CHILLED WATER RETURN

CHILLED WATER SU

HEATING WATER SUPPLY

HEATING HOT WATER RETURN







Insulation Kit with PE Sleeve and Electrofusion Wrap used to Secure Field Installed Insulation around each Fusion Joint



Banner – University Medical Center Tucson, formerly University of Arizona Medical Center

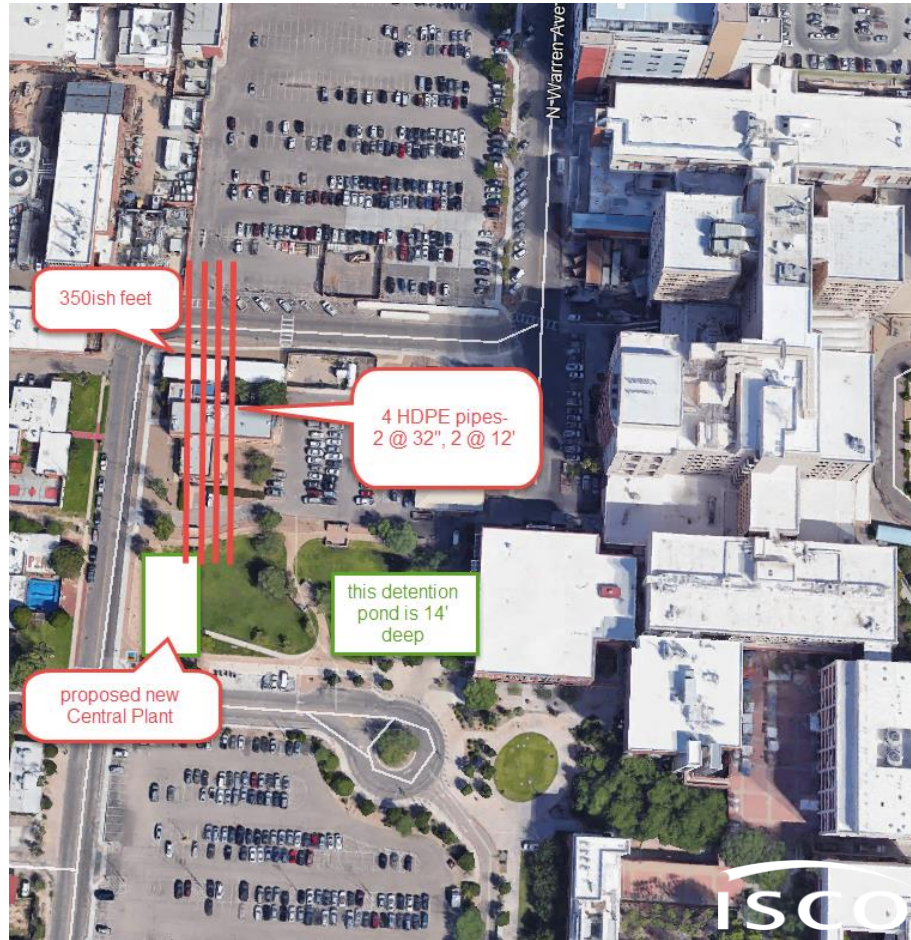
Banner – University Medicine

Banner – University Medical Center Tucson Tower

- 30" HDPE DR 11 Chilled Water
- 18" PERT DR 9 Hot Water
- Wanted to use thermoplastics HDD vs. Excavation open cut
- Material Evaluation Criteria
 - Installation
 - Burial
 - Cost
 - Timing

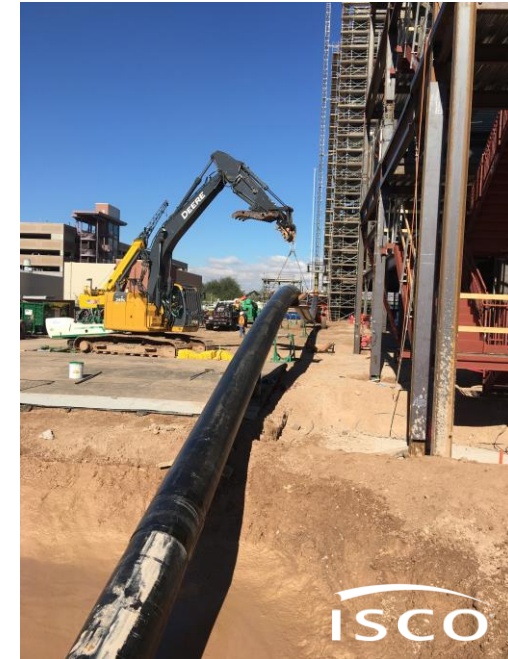


Banner – University Medical Center Tucson, formerly University of Arizona Medical Center



Banner – University Medical Center Tucson, formerly University of Arizona Medical Center

- 30" Chilled Water and 18" Hot Water lines



Conclusions & Benefits

- Cost savings achieved by the opportunity to use PE4710 PE-RT from Performance Pipe
- HDD contractor was able to install and complete ahead of schedule
- Eliminate costly road construction and traffic delays
- Resulted in \$2MM in savings compared to open cut trenches
- PE-RT was able to be joined by heat fusion creating a leak-free system
- Same fusion parameters as standard PE4710 pipes requiring no additional training
- Higher operating temperature compared to standard PE4710 products
 - Allows continuous operating range from -49°F (-45°C) to 180°F (82°C) with intermittent temperatures up to 203°F (95°C)
- >20 times PE4710 requirements for stress crack resistance allows use of native backfill from trench (sandless installation) for shallow, non-traffic direct burial applications



Thank You!



Quality. Service. Confidence.

