

Champlain Hudson 10,400 LF of 20" Steel Casing HDDs with Zero Welding or Pipe String-Out

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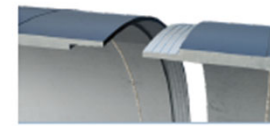
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What is Permalok® Pipe?

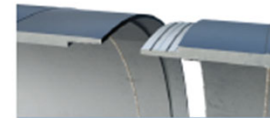
Mechanical press-fit joint that eliminates welding

- Started 30 years ago
- Over 5 Million feet of Permalok pipe has been installed
- 7 Different joint designs—
T5, T7, HDD, AB, PR, RBJ, and CC
- Custom-built for the project



T-5 Joint

The flagship T-5 joint is used most often and maintains integrity with typical loading conditions for casing pipe.



T-7 Joint

This joint features a precision-machined interference fit similar to the T-5 joint, but incorporates two rubber O-Ring gaskets.



AB Joint

The AB joint requires lower connection forces, mitigating the challenges associated with auger bore installation.



PR Joint

Designed specifically for pipe ramming, this joint reduces energy transfer loss resulting in longer drives without welding.



HDD Joint

The HDD profile incorporates an additional locking key on the male end to increase pull-apart resistance while requiring less force to join.



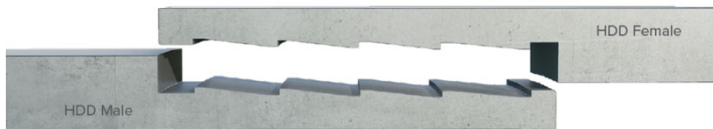
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Permalok® HDD Joint



Patented Permalok Male and Female Interlocking Joint Designed for HDD Installations

- Eliminates Pipe String-Out
- No welding necessary
- Customizable for joint length up to 40'
- 6"– 156" OD
- Wall thickness up to 2.5"



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Pipe Specifications

Built to A252 Grade 3 Specification

- Tensile Strength of 66,000 psi
- Yield Strength of 45,000 psi
- Straight seam welded
- Rings were welded onto each end of pipe



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Pipe Production

Manufactured by Northwest Pipe Company at the Permalok® facility in St. Louis, MO

- Produced 345 x 30-foot sections at a rate of 1,000 LF per week
- HDD Joint rings are precision-machined to a 0.005-in tolerance
- Quality inspected for consistent length, roundness, and joint ring straightness



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Coating

Pipe shipped to Stripmasters in Granite, IL for coating

- Coated with Pipeclad 5000 Exterior Epoxy by Sherwin Williams
- Coated at a rate of 1,100 LF per week
- Finished pipe shipped directly from Stripmasters to the jobsite
- Touch-up kits were provided



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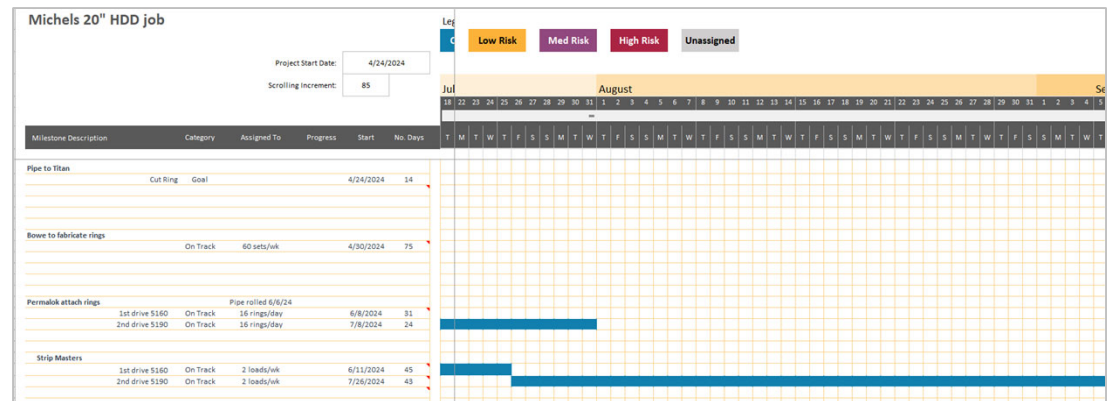
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Project Schedule & Pipe Shipment

- Pipe was shipped out by each drive
- Roughly 14 loads per drive
- Held Teams meetings to continue communication of deliveries
- Pivoted to second drive due to schedule



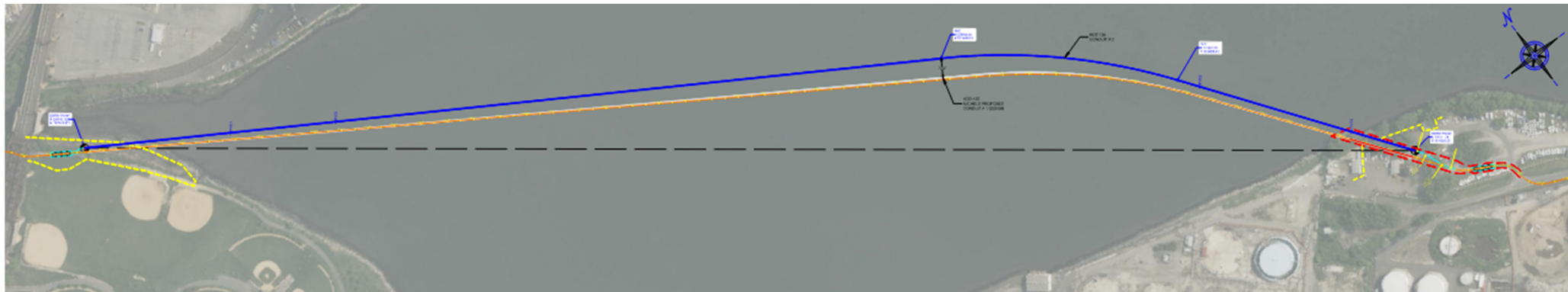
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HDD 135 Conduits 1 & 2

● **HDD 135-1**
5,081.93'

● **HDD 135-2**
5,106.76'

- 12-3/4" Pilot
- 36" Ream Pass



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On Site Pipe Storage

- Pipe unloaded and stored in rows below site
- Single equipment loader used to unload/transfer pipe
- Minimal space required



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Pipe Storage & Transfer





Installation

- Rows of pipe transferred to the work area by front loader
- Repair station for inspection and repair of any defects in coating
- Joints lifted with excavator and straps to gangway
- Aligned joint with male/female ends and pressed into place



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Joint Connection

- Connects by pushing new pipe male joint into installed female joint
- Can apply silicone sealant to assist in pipe fit up and seal of joint
- Permalok “POP” noise ensures tight fit



Joint Connection

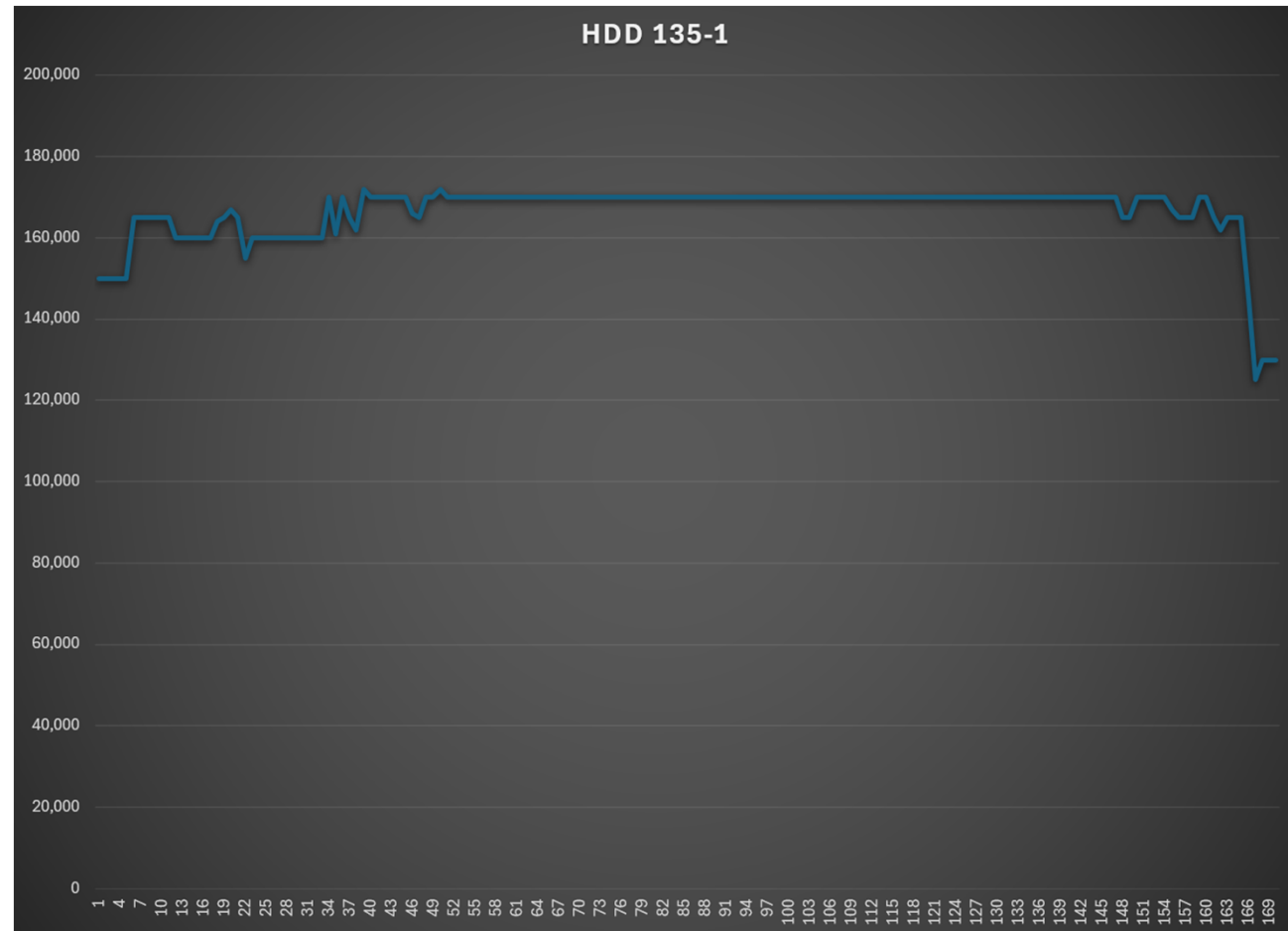


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HDD 135-1

- Thrust (right)
- Makeup Thrust
 - 30-70 klbs
 - Avg 56,000 lbs
- Total Joints Installed
 - 170 (5,100')
- Avg Install Rate
 - 28.33 Joints/Shift
 - 850' /shift



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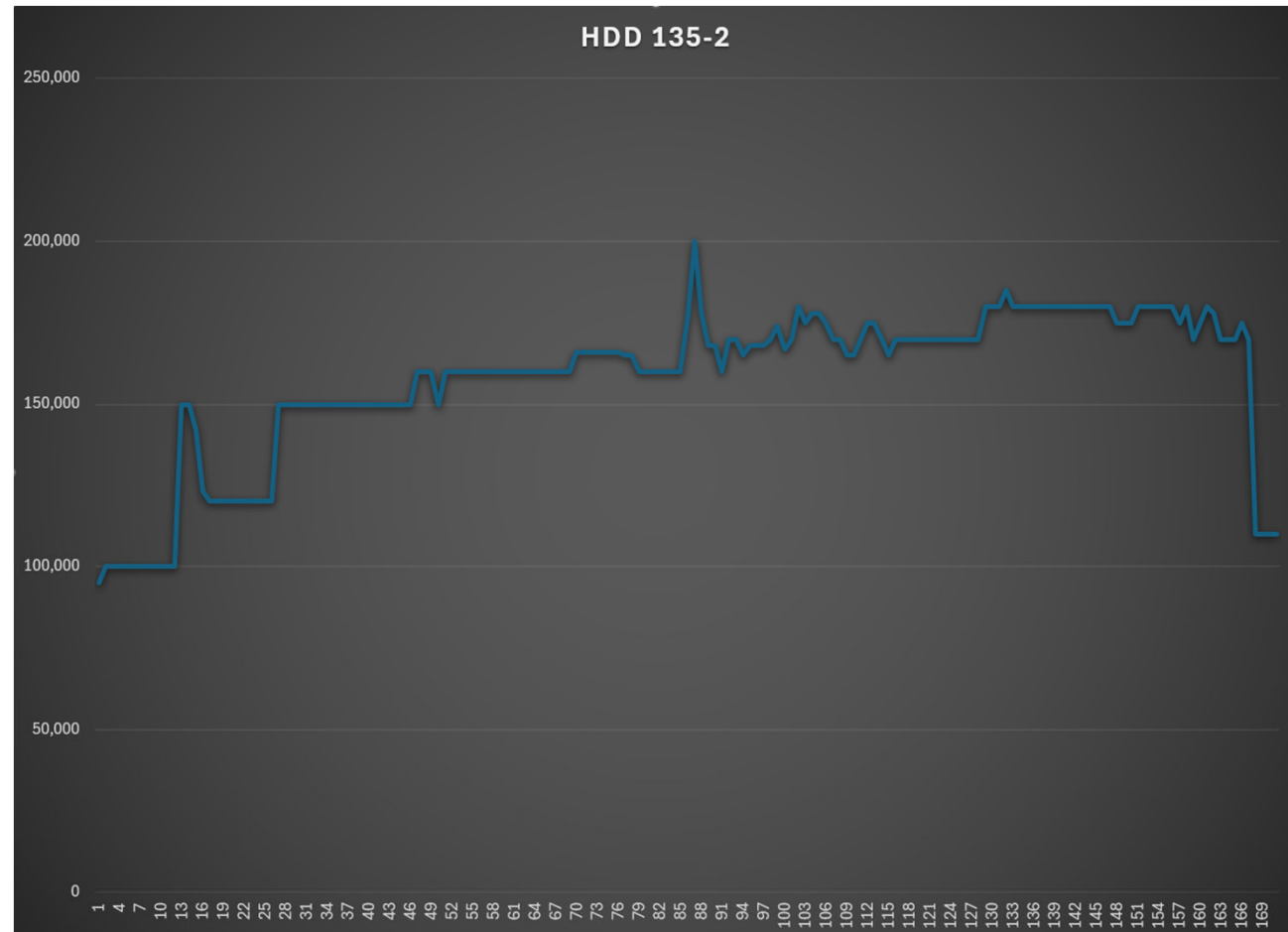
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HDD 135-2

- Thrust (right)
- Makeup Thrust
 - 30-75 klbs
 - Avg 54,000 lbs
- Total Joints Installed
 - 171 (5,130')
- Avg Install Rate
 - 28.5 Joints/Shift
 - 855' /shift



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Lessons Learned

1. Coating Selection

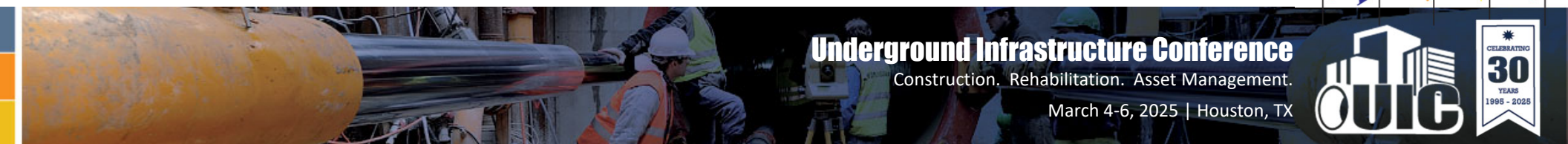
Some of the joints would “spider” coating at the connection when press-fit together due to load. Potentially use a more epoxy-based coating.

2. Push Ring Fit-Up

Some form of a cradle at the push ring for pipe joints to sit into to help speed up process.

3. Pull Rig Setup

Use of swivel and 100 LF of welded casing proved to be successful in taking any vibration or disturbance during installation, would recommend this to contractors when installing.



Questions?

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