

Perham Creek Culvert Replacement Project

Columbia River Highway
Hood River County

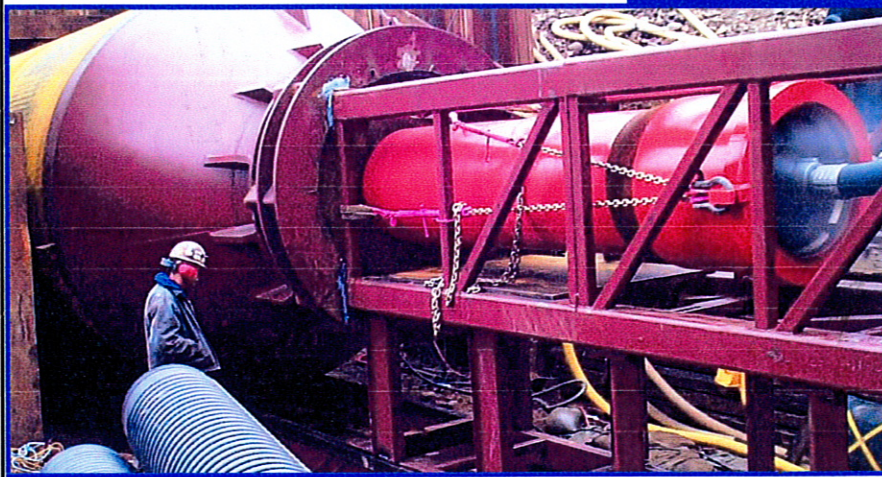


Project Overview:

- Divert the existing creek into a temporary diversion pipe
- Construct access pit, backstop, and track system for hydraulic ramming operations
- Using trenchless technology ram a 12ft diameter culvert under all four lanes of freeway and the neighboring railroad tracks, a total length of 225ft
- Weld baffles inside pipe to create calm water locations for fish populations
- Pour wing-walls and taper the outlet of the pipe to match the existing earthen slope
- Realign the creek and pond area to the new culvert
- Plug and abandon existing 4.5ft culvert

Access Pit and Ramming Setup

Due to the sensitive nature of Perham Creek, special precautionary measures were necessary to ensure the protection of the wildlife and scenic nature of this area. Dewatering of the streambed took place only after the fish in the creek and pond area had been removed and relocated. After dewatering, sheet piling was driven to shored-up the access pit area. A concrete pad and track system was laid to help maintain the alignment of the pipe. The backstop was constructed to withstand the million pounds of force expected from the hammer and hydraulic ram. A specially designed cone carried the force of the hammer to the full circumference of the pipe. By applying constant pressure, the hydraulic ram increased the effectiveness of the hammer's blow.

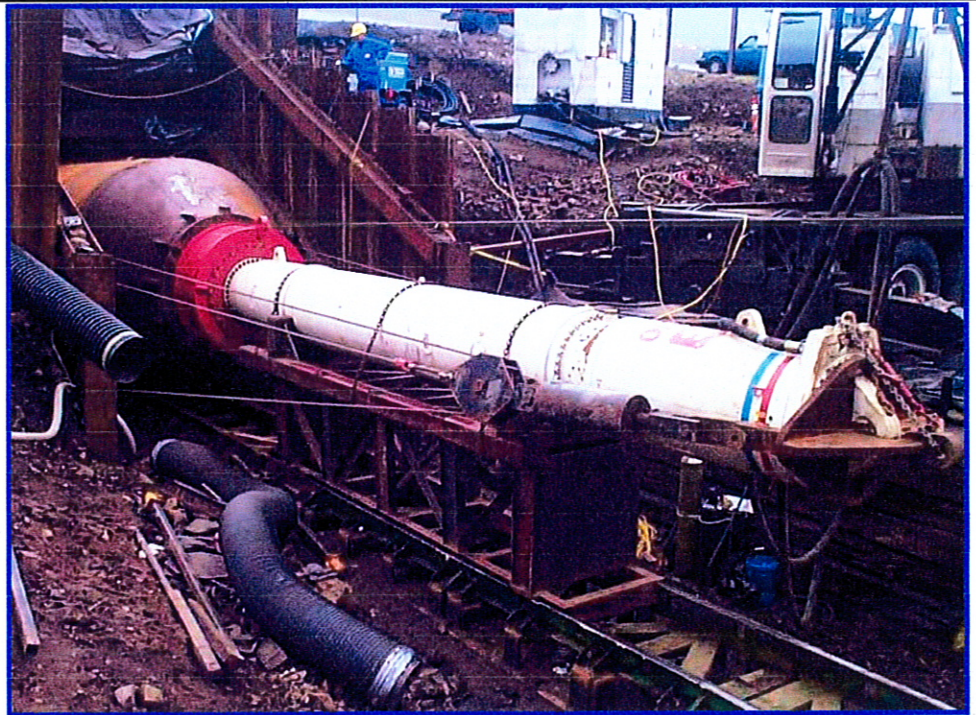


Pipe Ramming

Once the first fabricated pipe arrived and was set in place, the ramming operation began. As specified by the contract, a pneumatic hammer was used in conjunction with a hydraulic ram. This method required the use of a backstop to absorb the tremendous force of the hammer and ram. The largest pneumatic hammer ever built, called the Apollo, was used during the course of the ramming. When the never before used Apollo began operating, it moved the pipe at approximately 15 ft/hr.

Re-Tooling

Several times throughout the course of the ramming operation, the cone was removed and the pipe spoils were excavated. These "clean-outs" along with a lubricant called bentonite helped make the pipe pass more smoothly through the rocky soil. The bentonite was applied at the cutting edge of the pipe through small tubes welded to its top. The 25,353 lbs. ram, Apollo, finished the first 155ft of the pipe. Due to the enormous forces placed upon the backstop, from the hammer and the hydraulic ram, it began to fail. With a failing backstop and slow progress, a new technique was necessary to finish the ramming of the pipe.



The Final Ramming

For the final 70ft of the pipe a recently advancing proprietary technology was used. A S-280 modified offshore pile driver, part of an engineered system, was used horizontally to finish the driving of the pipe. In order to use the S-280 hammer, the tracks used for ramming were realigned and a spacer was reconfigured for the hammer. Large cables, connected to the existing sheet piling, applied constant pressure to the pipe. With no further need for the backstop, portions of it were removed to make way for the longer hammer. While not even working at full capacity, the S-280 was able to drive the pipe at approximately 23 ft/hr. Once the pipe broke through, work began to clean-out the pipe, weld the baffles, and realign the creek to the new pipe.



Interesting Project Facts

- *The cutting edge of the pipe had very little damage done to it during the ramming operation*
- *Each 45ft section of pipe weighted 102,730 lbs., making the total weight of the pipe 513,650 lbs.*
- *Blasting mats were placed over the outlet side of the pipe to prevent rocks from sliding when the pipe broke through*
- *Water was found at the bottom of the pipe even before it had broken through to the Columbia River*
- *The sound of the ram hitting the pipe was 110-123 decibels, requiring both ear plugs and ear muffs to be worn onsite*
- *Specially placed boulders and baffles within the pipe will allow fish, such as steelhead trout and coho salmon, to pass the culvert and spawn in Perham Creek*



Oregon Department Of Transportation

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