Tanner Creek Stream Diversion Cleans Up Portland's Willamette River

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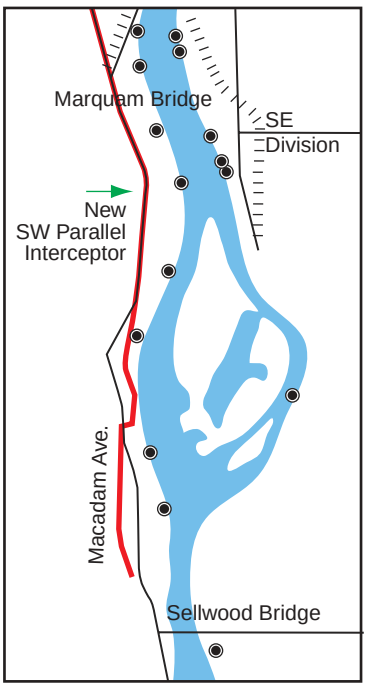
Reinforced concrete pipe is being used on the construction of a major combined sewer overflow (CSO) reduction project in Portland, Oregon. The city has just reached its half way mark of a 20-year program designed to reduce the amount of sewage and stormwater entering Portland's reach of the Willamette River. Among the many on-going projects is the Tanner Creek Stream Diversion that will transport storm water from the Tanner and Nicolai watersheds directly to the Willamette River. The project removes stream flows from combined sewers to help reduce combined sewer overflows.



Over 10 miles of new pipes and tunnels are planned along the west side of the Willamette River to collect combined sewer overflows and convey effluent to treatment plants.

In the 1880s, Portland built roadside ditches that carried sewage, household trash, and horse manure directly into the Willamette River. As streets were paved, the city installed sewer lines to carry sewage, stormwater, and the flow of some creeks to the river and Columbia Slough. By 1939, the river was so polluted that fish could not survive in its waters. In the early 1950s, Portland built its first sewage treatment plant and sewer pipes conveyed household wastewater, stormwater runoff, and the flow from creeks to the plant for treatment. Until the overflow reduction program was initiated in the early nineties, the combined sewers would fill during rainfall and discharge a mixture of approximately 20% untreated sewage and 80% storm-water runoff into the river and slough. The overflow discharge helped prevent sewage backups. In a typical year, sewer overflows poured about 2.8 billion gallons into the river through 42 outfall pipes.

72-inch diameter RCP is being installed adjacent to the original Tanner Creek Diversion sewer in downtown Portland.

The original sewer included cast-in-place structures as shown in this 1917 photo.

The Southwest Parallel Interceptor is one of several projects that will be built by 2011. Total program costs are expected to exceed $1 billion. Almost three miles long, the interceptor collects and stores combined sewer effluent, and directs it to the Columbia Boulevard Wastewater Treatment Plant (CBWTP) at a controlled rate for treatment, before discharge into the Willamette River. The Tanner Creek Diversion Project separates the flow of the creek from the combined sewer system.

Tanner Creek and other smaller streams once flowed freely from the west hills to the Willamette River. In the early 20th century, Portland officials diverted Tan-

ner Creek and other west hills streams into underground pipes to free land for development and to control flooding. Until the diversion project was started, Tanner Creek flowed into Portland's combined sewer system and contributed to combined sewer overflows into the Willamette River.

The Tanner Creek Diversion is being built in several phases in Northwest and Southwest Portland. Contracts for Phase 2 and Phase 5 were awarded in September 2001. Rinker Materials, Hydro Conduit Division, a long-time member of the American Concrete Pipe Association, was selected to provide the precast reinforced concrete pipe and other concrete drainage structures for Phase 2 and 5 of the project. Robison Construction, Inc., commenced installation of the Hydro Conduit-supplied pipe in early December.

A 72-inch diameter intermediate jacking station section being lowered into the jacking pit.

Around-the-clock deliveries of microtunnel pipe were required to allow pipe to be fed continuously into the jacking pits.

Phase 2 is the construction of a sanitary sewer system that will carry sewage to the CBWTP. It consists of approximately 877 feet of rubber-gasketed 72-inch diameter Class III, IV, and V RCP, 3,710 feet of 72-inch diameter Class III and V microtunneling pipe, approximately 87 feet of rubber-gasketed 60-inch diameter Class V RCP, and approximately 326 feet of rubber-gasketed 18-inch diameter Class III RCP. In addition to the pipe, Hydro Conduit supplied 16 manholes ranging in size from 48-inch to 144-inch diameter units. This phase is being constructed under the Clean Water Act as amended through the auspices of the Environmental Protection Agency.

Phase 5 is the current construction of a RCP that carries Tanner Creek water to a point where it connects with the original Tanner Creek sewer that was cast-in-place using wood forms. The original pipe, that was built nearly 100 years ago, will be relined and put back into service to carry clean Tanner Creek water directly to the Willamette River. Reinforced concrete pipe supplied for this phase of the project includes 1500 feet of rubber-gasketed 72-inch diameter Class III and V pipe for open cut and microtunneling, and four manholes ranging in depths from 25 to 45 feet.

The City of Portland specified stringent inspection requirements for the manufacture of the 72-inch diameter microtunneling pipe. Representatives from the city were onsite at all times during production of the microtunnel pipe to ensure adherence to the multitude of project specifications and to measure manufactured tolerances. All cages were inspected prior to pouring the pieces and, once the pieces had cured, measurements were taken to ensure perpendicularity that is critical during the jacking process. Instrumental to the inspection process was Pat Corcoran, Public Works Inspector I, City of Portland. Pat Corcoran reports to Tom Pfeiffer, P.E. who leads the Material Testing Laboratory for the City of Portland.

The beginning of the project required connection of the 72-inch diameter RCP to a portion of existing 84-inch diameter RCP pipe by means of a concentric reducer. The plans specified that the reducer be produced of the same material as the existing pipe. To avoid producing one piece of 84-inch diameter RCP to manufacture the reducer, Hydro Conduit submitted and received approval for the use of a steel reducer, with mortar lining. Other special pieces included the manufacture of intermediate jacking station sections with modified joint designs. In particular, several pieces of pipe were manufactured to have a spigot on each end to ac-

commodate the bore machine. Derek Clifford, Hydro Conduit's draftsman, was instrumental in working out various revisions on submittal drawings to accommodate the customer's field modifications.

Delivery of the microtunnel pipe was unique because once the contractor began to bore and jack the pipe behind the bore machine, the jacking could not stop until the contractor reached one of several receiving pits between installations. With the project located in downtown Portland and with storage space at a minimum, around-the-clock deliveries were required to allow pipe to be fed continuously into the jacking pits. At several instances during construction, work stopped and restarted which required the dispatch office to be "on-call" for pipe deliveries. During one incident, Geoff Clifford, Hydro Conduit's dispatcher, was called in at 2:00 a.m. He had to roust Hydro employees out of bed to service the customer's needs, due to situations that arose in the field. Wade Bruffet, Hydro Conduit's Field Representative, was instrumental in assisting the customer with last minute needs. Additionally, Mark Hutchinson, the City of Portland Project Manager, diligently evaluated and produced numerous resolutions to issues over the course of the project.

By 2011, the City of Portland will have eliminated combined sewer overflows. Cornerstone projects will include the large sewer pipe installation to reduce direct discharge into the river and slough, sump installations to capture runoff before it reaches the sewers and the disconnection of downspouts from the sewer system. By separating creeks from combined sewers, the volume of overflow to the Willamette River will be reduced by approximately 260 million gallons per year. Construction of 10 miles of new pipes, tunnels, and two pump stations along the Westside of the Willamette River to collect and convey the combined sewer overflows to the existing Portsmouth Tunnel and onto the CBWTP for treatment will reduce overflows by 555 million gallons per year. And, construction of new CBWTP facilities (to receive and treat 2.5 billion gallons of combined sewage a year from the west and Eastside Willamette CSO facilities) will remove pollutants and disinfect the treated water before discharge into the Columbia River. The 20-year program is expected to cost $1 billion.

(Source: Several publications of the Bureau of Environmental Services, City of Portland. Photos courtesy of Mark Hutchinson, City of Portland.)

Project: Tanner Creek Stream Diversion Project
Phases 2 and 5

Owner: Environmental Services
City of Portland
Dean Marriott, Director
Mark Hutchinson, P.E., Project Manager

Designers: Montgomery Watson,
Ed Barnhurst, P.E.
URS Greiner Woodward Clyde
Garry Struthers Associates, Inc.
David Evans and Associates
Kleinfelder, Inc.

Contractor: Robison Construction, Inc.
Tigard, Oregon
Bret Campbell, Project Engineer
Jan Babendererde, Project Engineer

Quantities: 877 feet – 72-inch diameter
Class III, IV and V RCP
3710 feet – 72-inch diameter
Class III and V microtunnel pipe
87 feet – 60-inch diameter
Class V RCP
326 feet – 18-inch diameter
Class III RCP

Producer: Rinker Materials Hydro Conduit Division
Portland Plant
Peter Hunot/ Peter Van Tilburg,
General Manager

Rinker Materials, Hydro Conduit Division-Portland, a longtime member of the American Concrete Pipe Association, has been manufacturing and supplying reinforced concrete pipe for the Portland Oregon area since 1984. The Portland plant manufactures concrete pipe and manholes up to 144-inch diameter, catch basins, box culverts, Stormceptor® structures, and CON/SPAN Bridge Systems. Additionally, it operates a video inspection crew, air-test and vacuum-testing crew, and a manhole channeling crew. Florida-based Rinker Materials is a major supplier of construction materials, aggregates, and ready-mixed concrete throughout the United States. For more information on Rinker Materials, Hydro Conduit Division, visit: www.rinker.com.