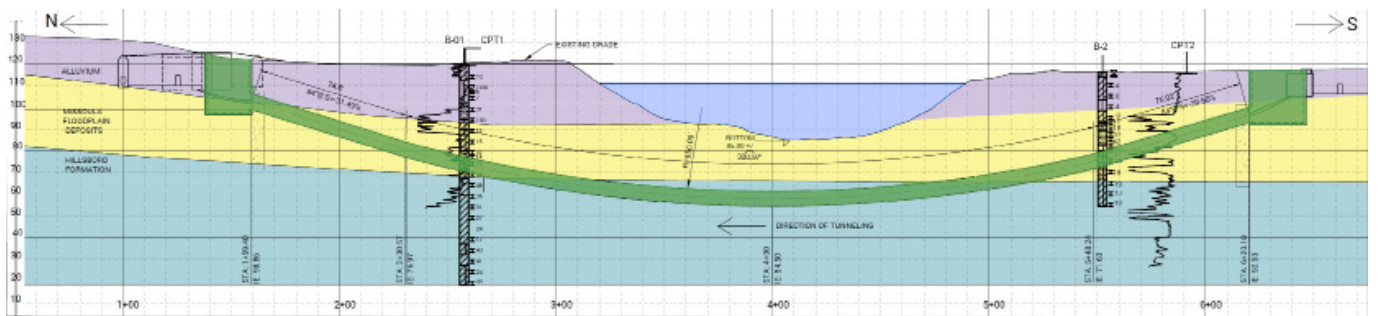


Steepest grade on a microtunneled Siphon in North America



The King City Siphon, which crosses the Tualatin River, forms part of the Tualatin Interceptor and Siphon Improvements (TISI) Project located in Portland, Oregon constructed under a Design Build Contract mechanism. The siphon includes a 471-foot long, 67-inch inner diameter tunnel comprising a 650-foot radius vertical “U” curve. A reinforced concrete casing pipe designed by Jackcontrol to incorporate the curve using the Jackcontrol Hydraulic Joint for pressure transfer was installed using a new Herrenknecht AVN 1800 machine with double-steering articulation. The microtunnel construction was successfully completed in less than one month. To achieve the vertical curve, the pipe and pipe joint geometry, curve radii, required jacking force capacity, and MTBM articulation joints were specifically designed to meet the project constraints. Additionally, the Jackcontrol real time monitoring system provided valuable information on the behavior of the jacking pipes and the articulation of the joints during construction.



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AT A GLANCE

Project name	Tualatin Interceptor and Siphon Improvements
Project location	Tualatin, OR
Time of completion	November 2018
Specialties	Steep downwards slope in the start shaft, steep upwards slope in the receiving shaft, tight vertical curve between
Total length	143 m / 471 ft.
Pipe ID	1700 mm / 66.9 in.
Pipe OD	2100 mm / 82.7 in.
Alignment	Vertical curve / siphon
Min. curve radius	198 m / 650 ft.
Pipe material	Reinforced Concrete
Pipe length	3 m / 9.84 ft.
Geology & groundwater	Alluvium (Clay and Silt); Missoula Flood Deposits (stiff clay, soft to medium dense silt); Hillsboro Formation (stiff, hard, lean and fat clay); groundwater level close to surface
Hydraulic Joint	JC250, single loop, admissible jacking force 6500 kN
Guidance system	VMT U.N.S. with water level
TBM	Herrenknecht AVND1800
Owner	Clean Water Services
Trenchless Designer	Aldea Services
Contractor	Michels Tunneling