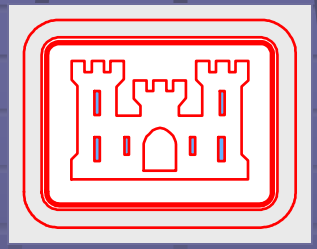
GEOSYNTHETICS AND CONSTRUCTION OF THE SECOND POWERHOUSE CORNER COLLECTOR SURFACE FLOW BYPASS PROJECT

BONNEVILLE LOCK AND DAM PROJECT
OREGON AND WASHINGTON



US Army Corps of Engineers

Portland District

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Geotechnical Design Section

Hydraulics, Hydrology, and Geotechnical Design Branch

TOPIC: Geotechnical Engineering and Use of Geosynthetic Fabrics, Geogrids, Geofoam, and Geocomposite Wall Drains.

Geosynthetics were used for Foundation Improvement, Reinforced Embankments and Slopes, minimizing Lateral Earth Pressures, providing subsurface drainage path for the Transportation Channel wall, and for materials separation.

Project used Geosynthetic materials to:

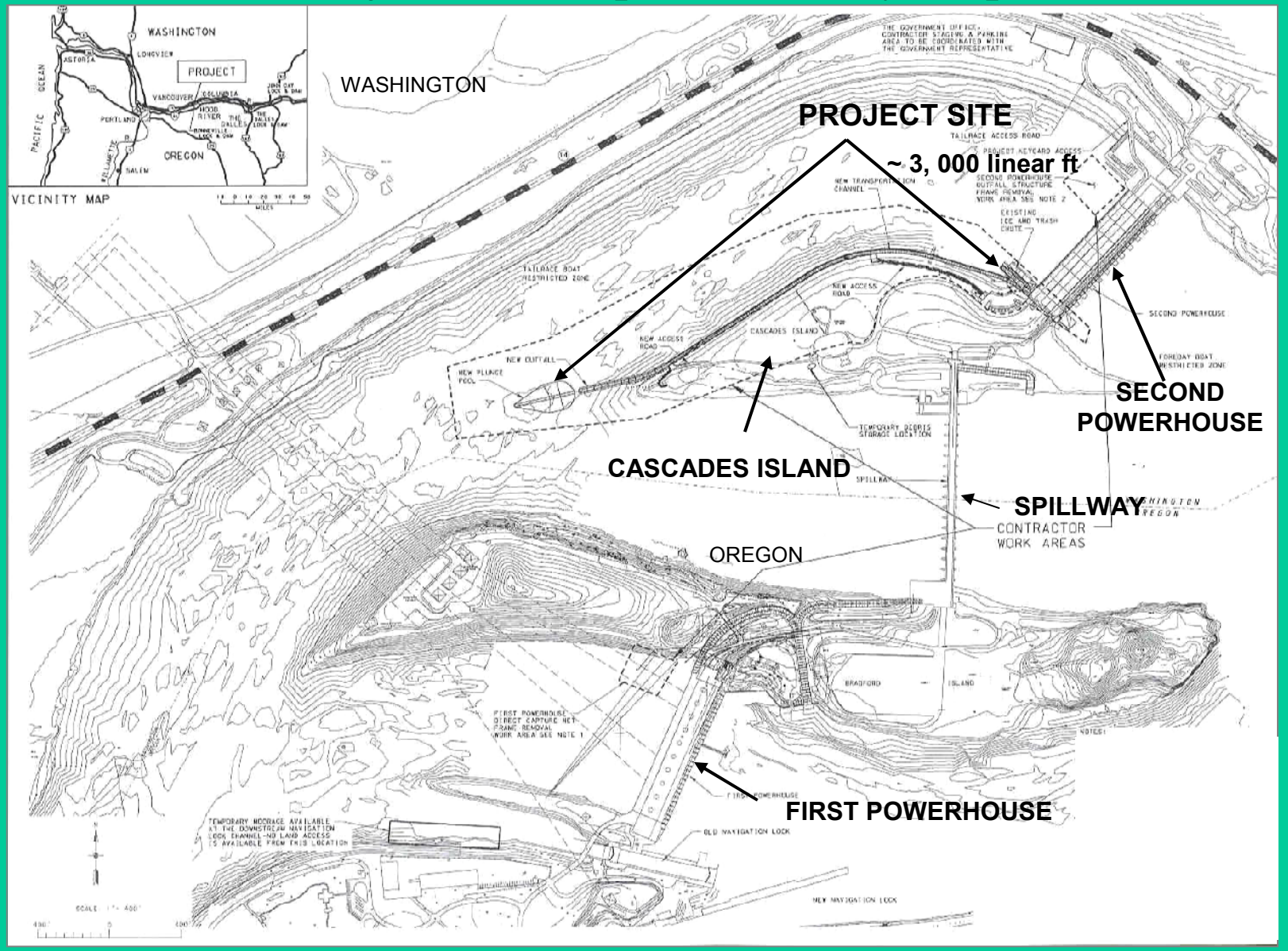
- Contain (separate) and Improve foundation materials
- Distribute loading under the Transportation Channel slab
- Provide strength and stability using Geogrids in reinforced soil embankments
- Provide drainage from upslope
- Provide scour protection in the Plunge Pool area

Contract type was “Best Value” evaluated on construction planning, schedule, and cost. Project was completed in 2004.

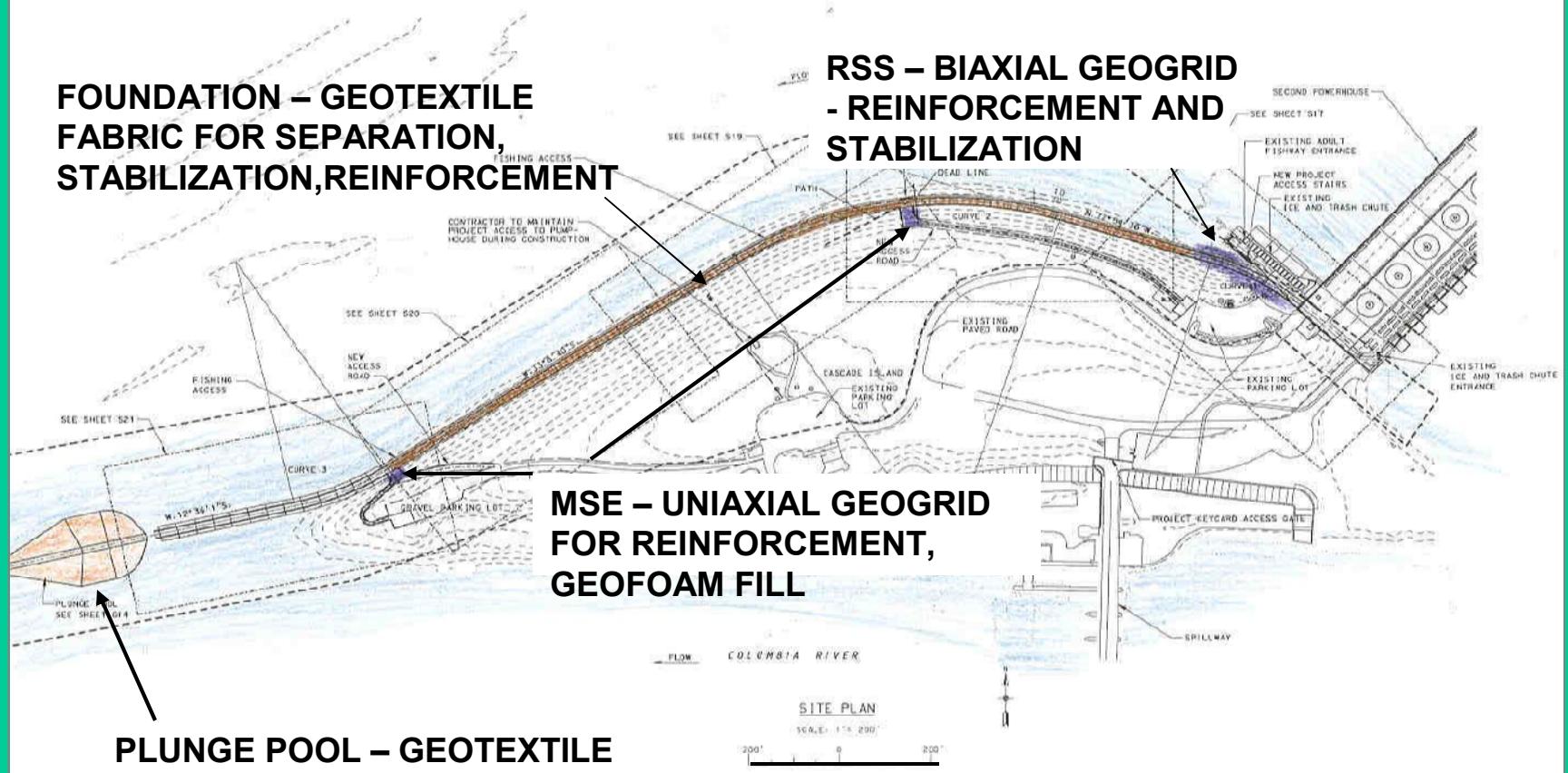
Contractor for the Second Powerhouse Corner Collector Surface Bypass Project was:

Kiewit-Manson, Joint Venture

Project Site Map and Vicinity Map



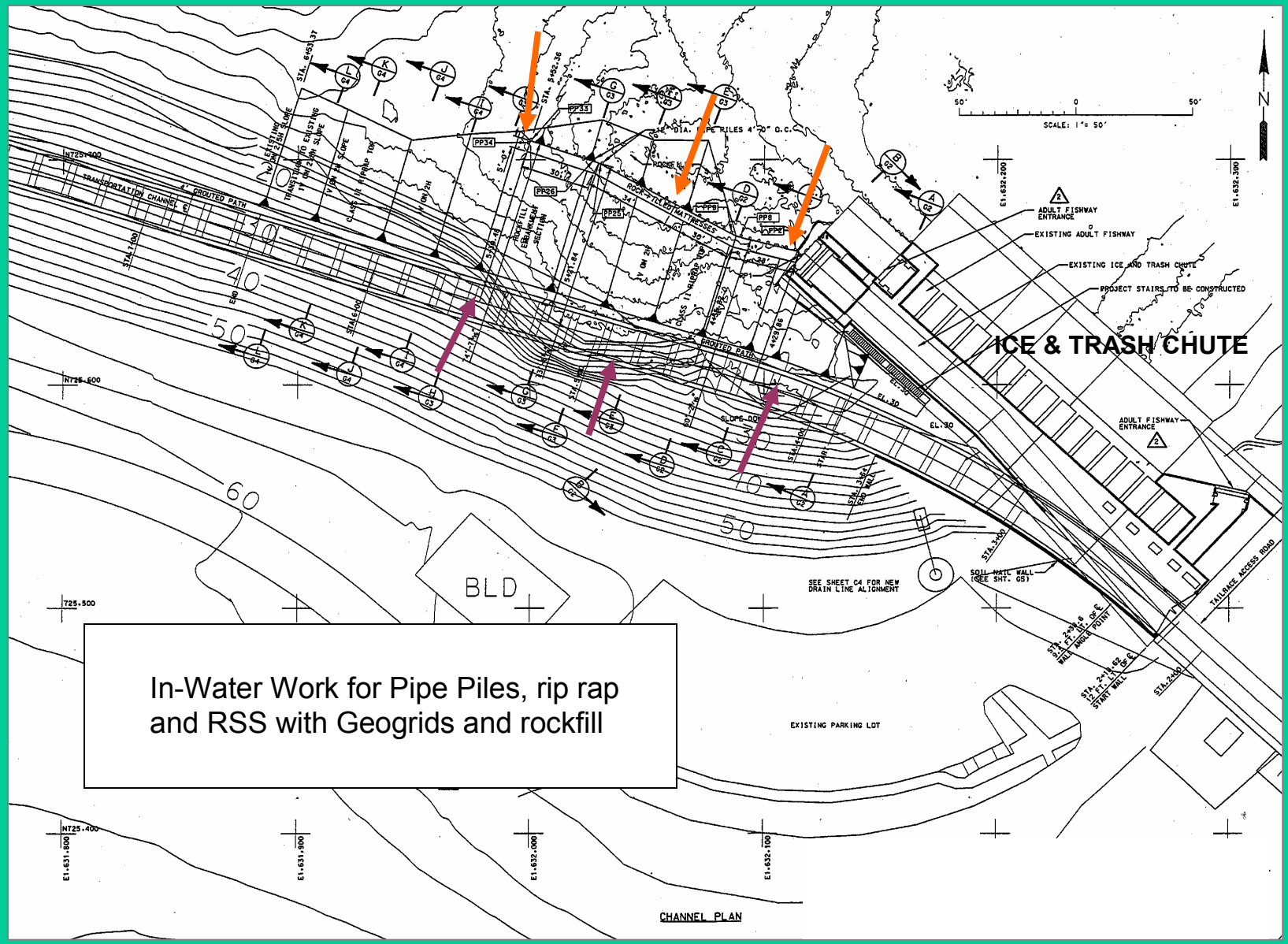
Feature Map


FOUNDATION – GEOTEXTILE FABRIC FOR SEPARATION, STABILIZATION,REINFORCEMENT
RSS – BIAXIAL GEOGRID - REINFORCEMENT AND STABILIZATION
MSE – UNIAXIAL GEOGRID FOR REINFORCEMENT, GEOFOAM FILL
PLUNGE POOL – GEOTEXTILE FABRIC FOR SEPARATION UNDER CONCRETE MATTRESSES
VARIOUS FOUNDATION AREAS – GEOTEXTILE FABRIC WITH ROCK - FOR STABILIZATION, REINFORCEMENT, AND SEPARATION
GEOCOMPOSITE DRAIN USE ALONG BACKFILLED TRANSPORTATION CHANNEL
SITE PLAN
COLUMBIA RIVER
SECOND POWERHOUSE
EXISTING PAVED ROAD
EXISTING PARKING LOT
GRAVEL PARKING LOT
PROJECT KEYCARD ACCESS GATE
SPILLWAY
CASCADE ISLAND

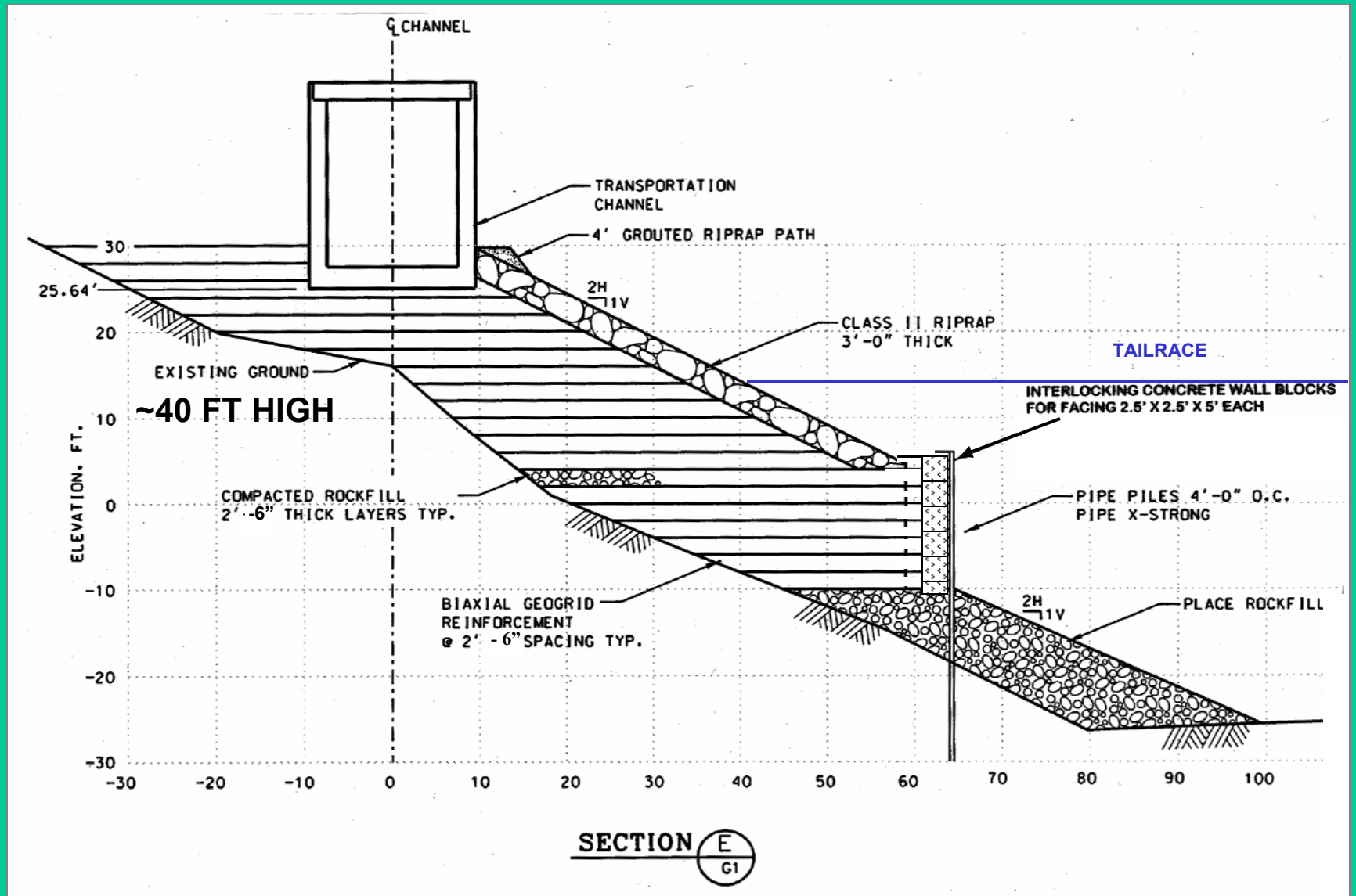
Bonneville Second Powerhouse
Cascades Island site of the Transportation Channel

Geotextile fabric over soft foundation sands - covered with rock for foundation improvement

Upstream Plan View – Rockfill RSS



RSS Cross Section



Construction of the Rockfill RSS Embankment Alignment piles, Concrete Block Facing, and Geogrid Reinforcement.

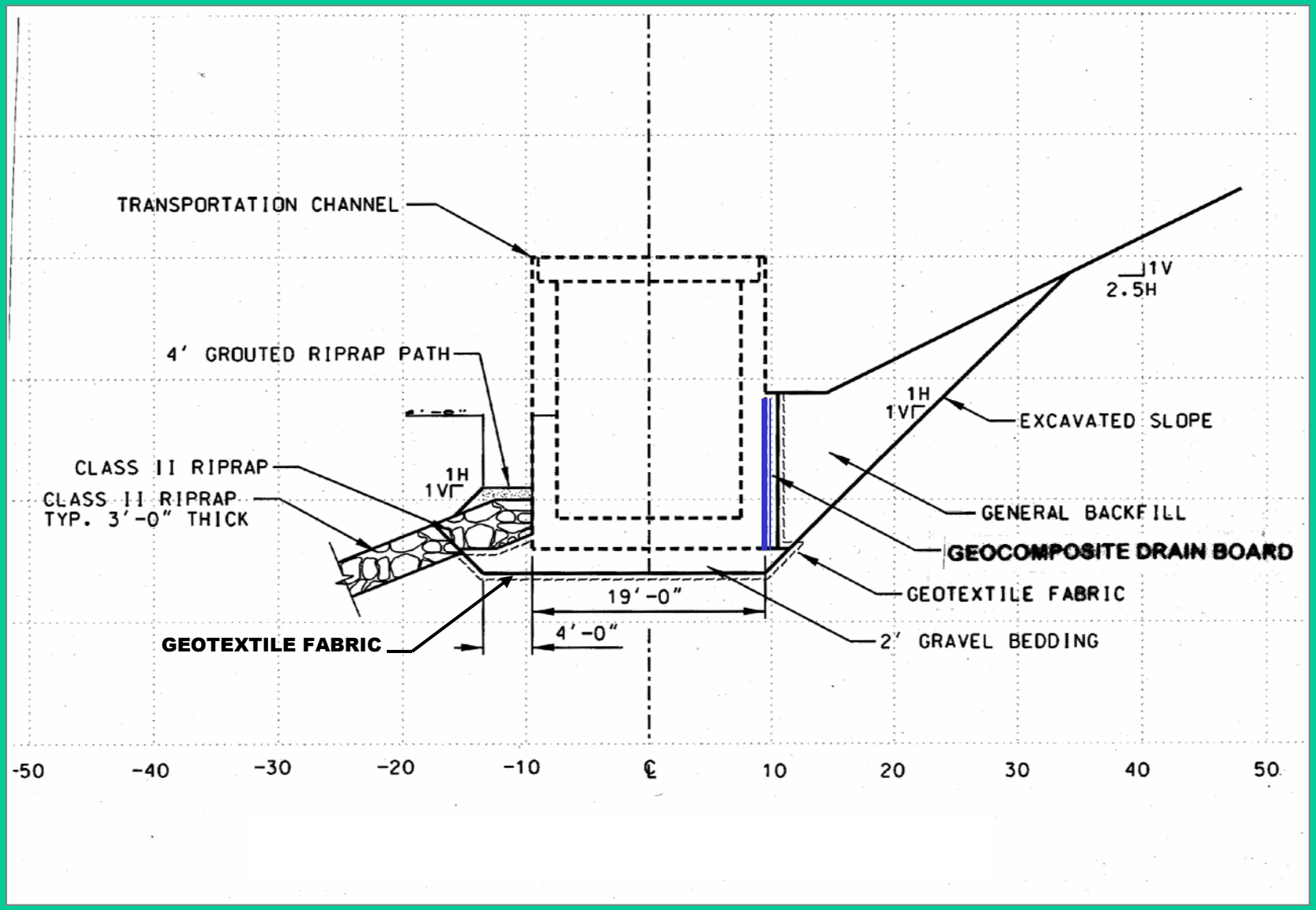
Construction of the RSS Embankment - Layered Bi-Axial Geogrids with Rockfill

To provide separation, improve foundation bearing, and drainage for the Transportation Channel slab, a compacted bedding gravel layer on a Geotextile Fabric was constructed.

The Transportation Channel slab was then formed and placed on the bedding.

Geotextile fabric installed and 2-foot thick gravel layer was placed and compacted.

Geotextile Fabric and Geocomposite Drain

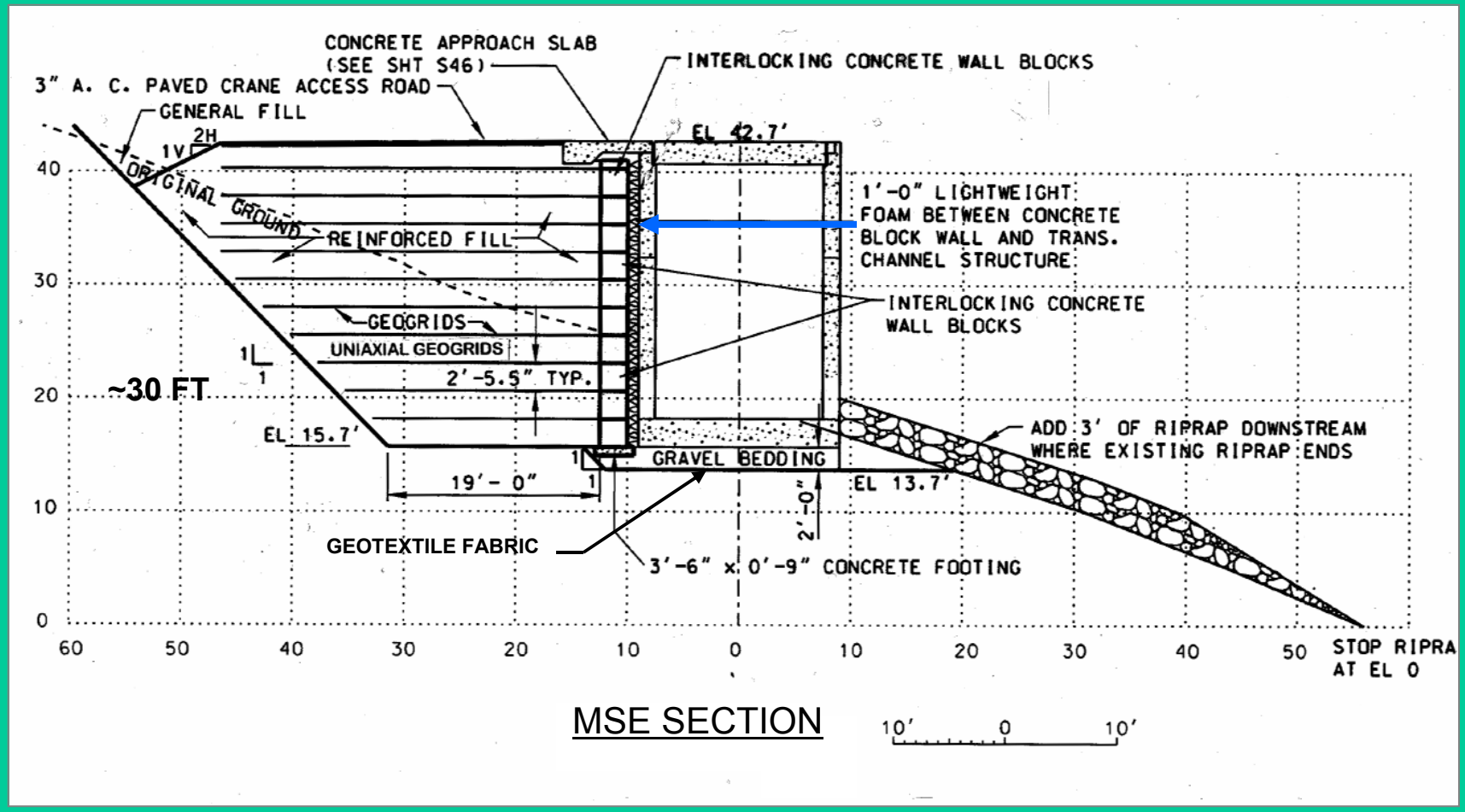


Geocomposite Drain on Transportation Channel Wall
Geocomposite Drain ran full length of the wall

To provide access to the top of the Transportation Channel, two Mechanically Stabilized Embankments (MSE) fills were constructed using Geogrids and compacted gravel.

One-foot thick Geofoam was placed against the Channel wall prior to start of constructing the MSE fill to reduce lateral pressures of the embankment.

Uniaxial Geogrids and Lightweight Geofoam



MSE SECTION

Geocomposite Wall Drain and Geogrid Reinforcement

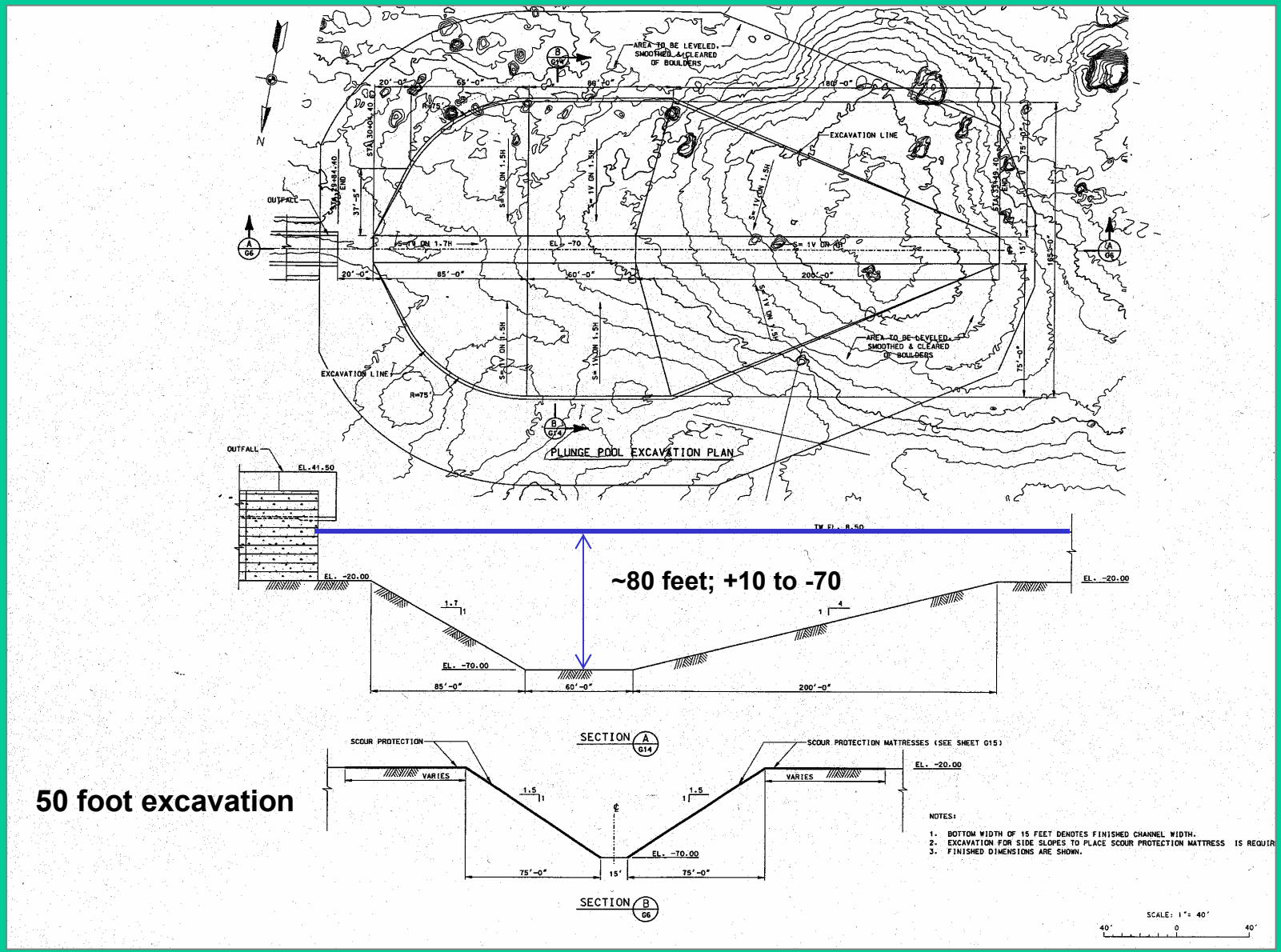
Geogrid reinforced MSE embankment with concrete block facing on Geofoam against the channel wall

Contractor VE Proposal - use a MSE embankment to backfill an open cut was accepted for the upstream portion of the Channel wall. Originally a soil nail wall and top-down excavation had been planned - but the elected open cut remained stable.

Layered geogrids and granular backfill, wire mesh facing with geotextile fabric butted up to Geofoam on the Channel wall.

Geogrid reinforcement on backfill. Embankment facing wire mesh with the geotextile fabric against Geofoam blocks

Plunge Pool - Articulated Concrete Mattresses over Geotextile Fabric



50 foot excavation

Mattress on barge with Geotextile Fabric

Mattress and frame for placement in the water

Bypass in Operation

In Operation

Conclusion:

Many Geosynthetic Products were used as originally designed or as proposed during construction by the Contractor.

Geosynthetics used contributed toward the successful construction and operation of the Bypass System.

Questions?

Thank You!