McMillin Reservoir

History, Decision Process, Replacement/Covering

Tacoma Water

- ~100,000 customers/households served
- ~65% of services inside the City of Tacoma
- Average daily use of ~50 mgd
- ~90% Green River, ~10% groundwater wells
- Gravity "backbone"
  - 21 storage reservoirs, storing 182 mg
  - 29 pumping stations capable of 120 mgd
  - 25 wells capable of 59 mgd
  - 78 Pressure reducing stations

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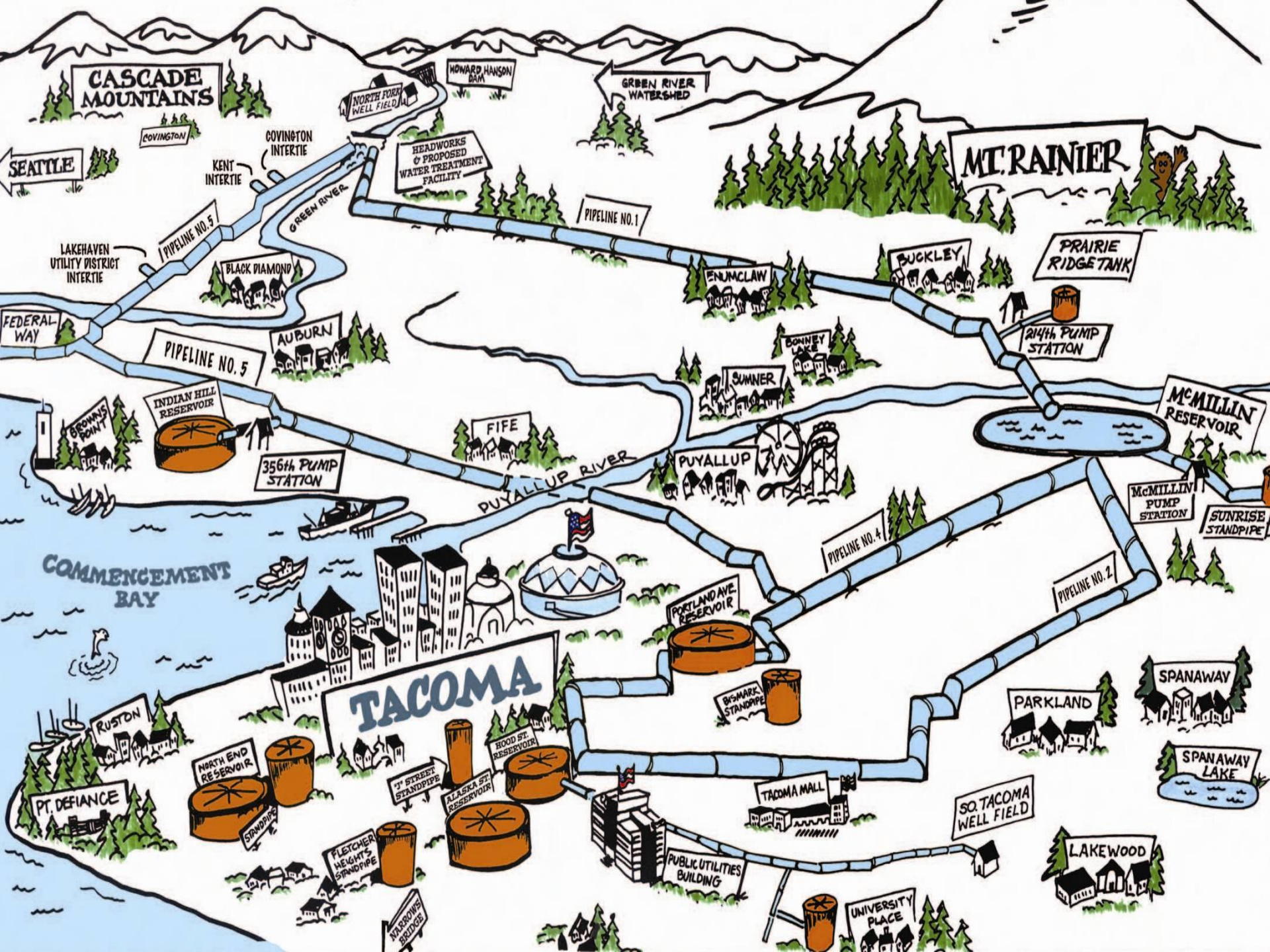
CASCADE MOUNTAINS
NORTH FORK WELL FIELD
HOWARD HANSON DAM
GREEN RIVER WATERSHED
MT. RAINIER
COVINGTON
SEATTLE
COVINGTON INTERTIE
KENT INTERTIE
HEADWORKS & PROPOSED WATER TREATMENT FACILITY
GREEN RIVER
PIPELINE NO. 1
PIPELINE NO. 5
LAKEHAVEN UTILITY DISTRICT INTERTIE
BLACK DIAMOND
ENUMCLAW
BUCKLEY
PRAIRIE RIDGE TANK
FEDERAL WAY
AUBURN
PIPELINE NO. 5
214th PUMP STATION
BONNEY LAKE
SUMNER
McMILLIN RESERVOIR
INDIAN HILL RESERVOIR
BROWNS POINT
FIFE
356th PUMP STATION
PUYALLUP RIVER
PUYALLUP
McMILLIN PUMP STATION
SUNRISE STANDPIPE
PIPELINE NO. 4
COMMENCEMENT BAY
PIPELINE NO. 2
PORTLAND AVE. RESERVOIR
TACOMA
BISMARK STANDPIPE
SPANAWAY
PARKLAND
RUSTON
NORTH END RESERVOIR
HOOD ST. RESERVOIR
'T' STREET STANDPIPE
ALASKA ST. RESERVOIR
SPANAWAY LAKE
PT. DEFIANCE
STANDPIPE
TACOMA MALL
SO. TACOMA WELL FIELD
FLETCHER HEIGHTS STANDPIPE
PUBLIC UTILITIES BUILDING
LAKEWOOD
NARROWS BRIDGE
UNIVERSITY PLACE

McMillin Reservoir #1, built in 1911

2 basins, 11 miles from Tacoma, 110 mg - large capacity

McMillin Reservoir #2, built in 1956

100 mg, Driven by Dam Construction on Green River

McMillin Reservoir History

- **In the Early Days**

  Ran up to 42 mgd continuously, shut off the pipeline during turbidity events, lived off McMillin storage until turbidity had passed.

- **Then in the 1950's to 1970's**

  Ran 72mgd continuously, spilled unused and/or turbid water to the Puyallup River. Note: this water was also chlorinated.

- **In Recent Times**

  Pipeline is now "upstream controlled", so we only take what we need. We no longer take water from one river system and continuously spill chlorinated, turbid water to another river system.

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Issues with Open Reservoirs

- **Water Quality**
  - **Algae growth (sunlight, slow moving water)**
  - **Loss of chlorine residual, forcing rechlorination**
  - **Contamination from birds and other animals**
  - **Incomplete mixing leading to high water age**
- **Water Security**
  - **In today's climate security is a real concern**

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Why Address McMillin Reservoir Now?

- Dept of Health and other Federal Regulations
- Second Supply Project (P5) decreased flow through McMillin reservoir
- Received ARRA stimulus loan, plus DWSRF and PWTF low interest loans
- Estimate for the work was $56 million; with the bid we received, we will build it for less than $38 million (0.57 $/gal)

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Decision Process for McMillin Reservoir

- Determined that 67mg would be sufficient storage at McMillin Reservoir in the short term (100 mg long term).

- Reviewed an extensive list of alternatives to replace or cover the open basins at McMillin

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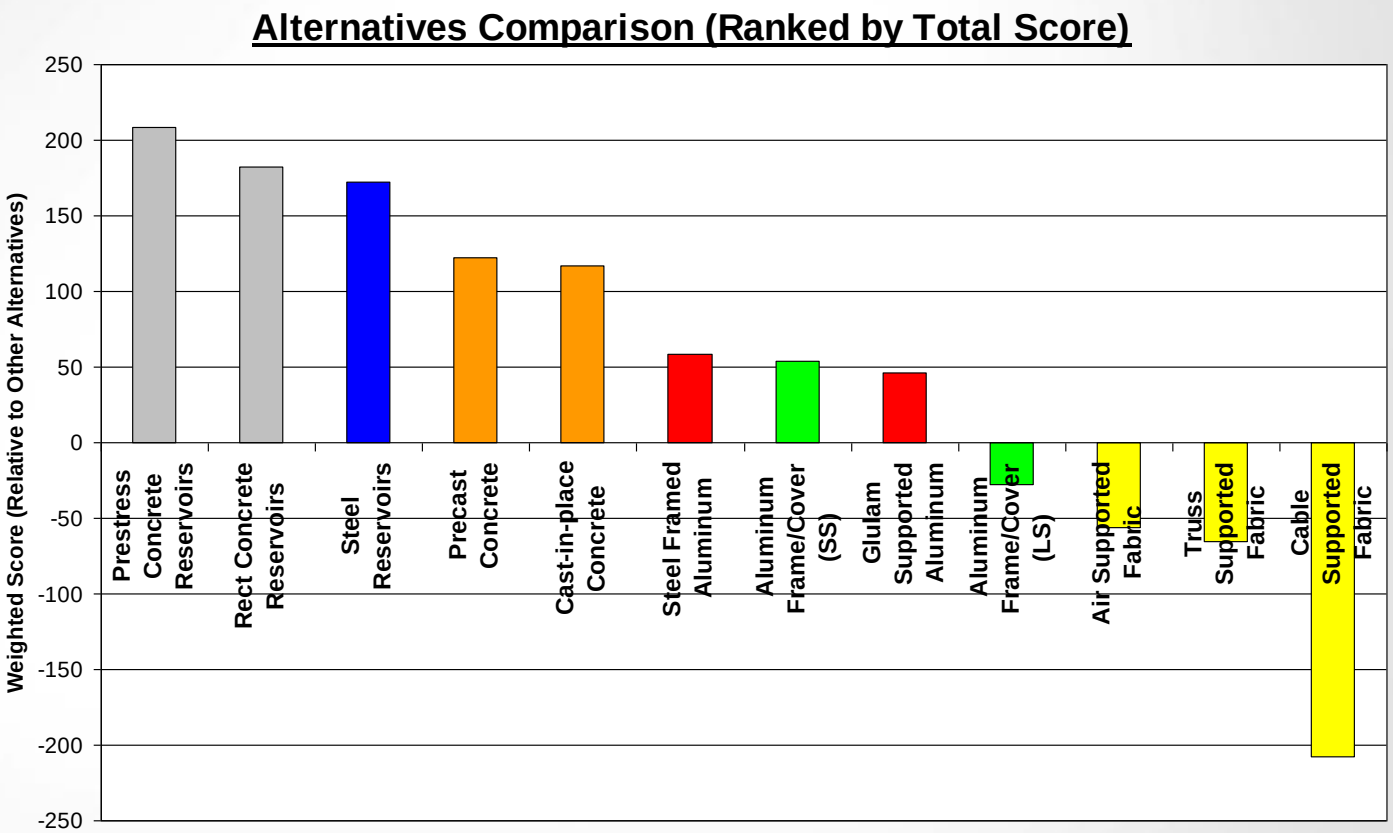
McMillin Reservoir Cover Selection

Criteria

- 100 Year Life Cycle Cost
- Life Expectancy
- Security/Vandal Resistance
- Ease of Interior Cleaning
- Flexibility of Operations
- Initial Construction Cost
- Ease of Safety Equipment
- Exterior Maintenance Required
- Watertight Integrity
- Resistance to Natural Hazards
- Water Quality
- Inspectability
- Aesthetics
- Ventilation



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Project Participants

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Tacoma Water
Project Manager

Geoff Dillard, P.E.
RH2 Engineers
Project Manager for the Consultant Design Team

Erik Peterson, P.E.
Peterson Structural Engineers, Inc
Structural Design Engineer

Joel Anderson
Skaar Construction Inc., the General Contractor
Construction manager

Tom Bloomer
DYK Inc.
Prestressing Subcontractor

Ed Smith
PSI
Project Manager responsible for Special Inspections

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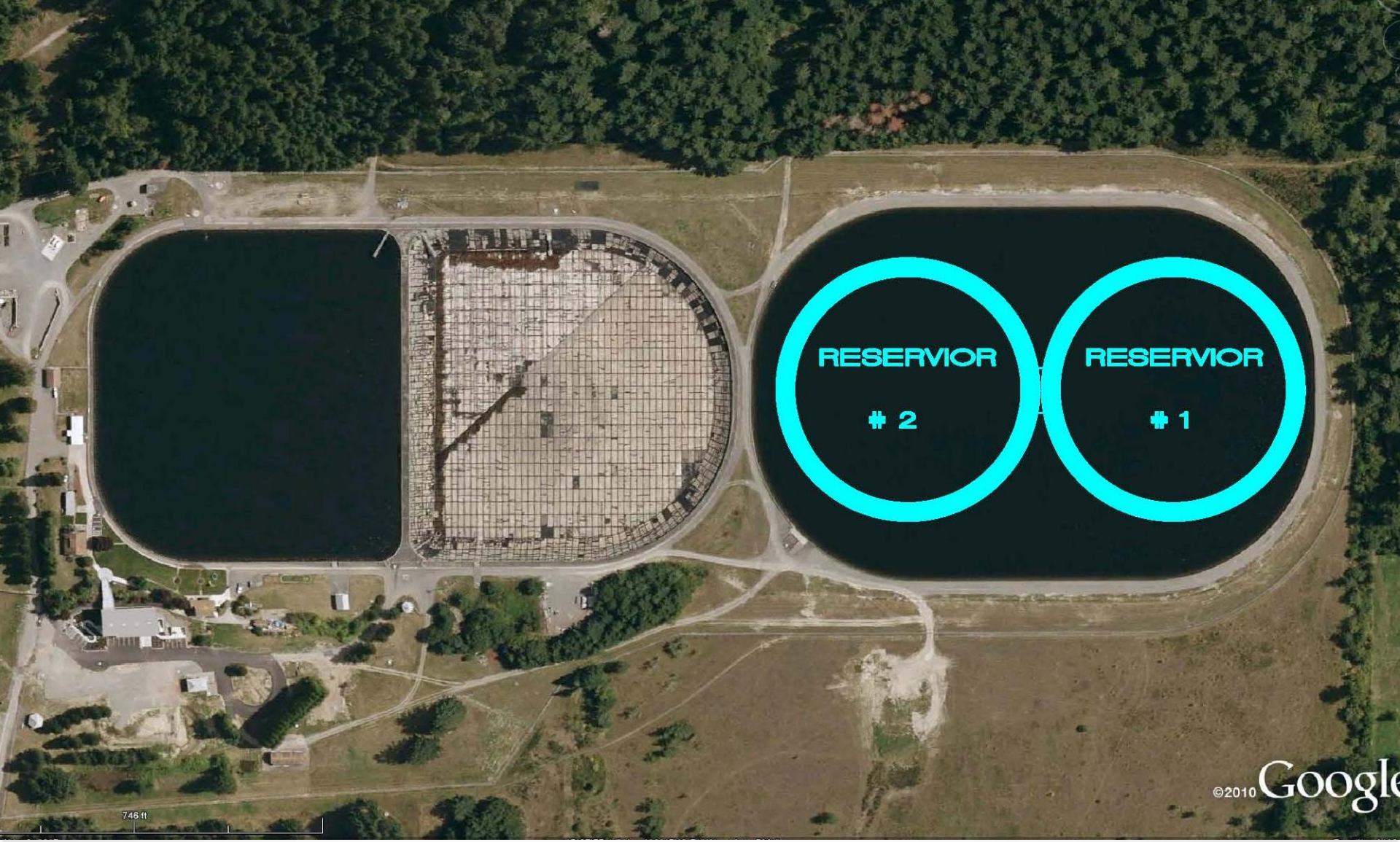

Google Earth historical photo of site

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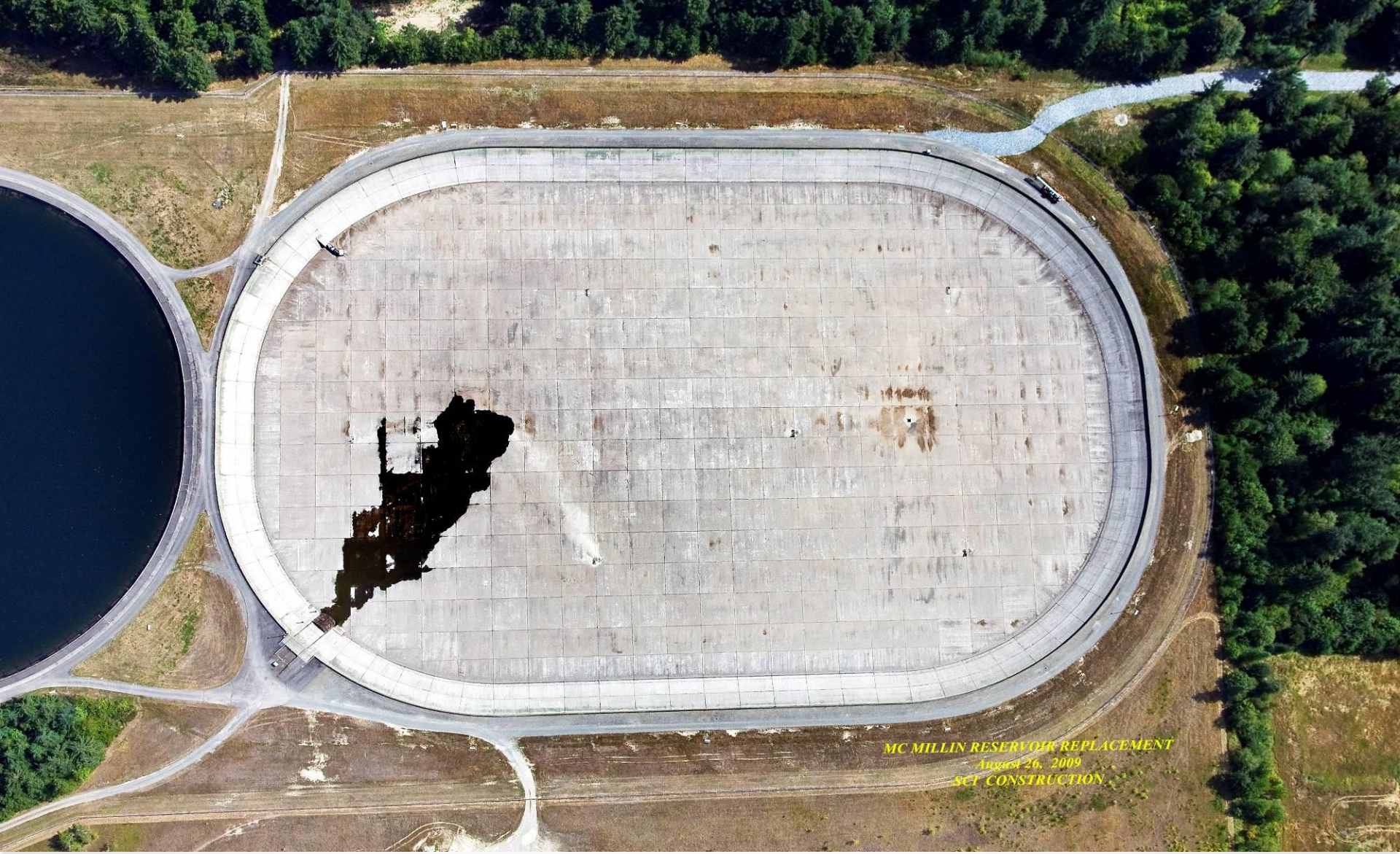

Aerial Photos by Skytech **Aerial Photos - Sept 2009**

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Photo by Skytech Aerial Photos - Oct 2009

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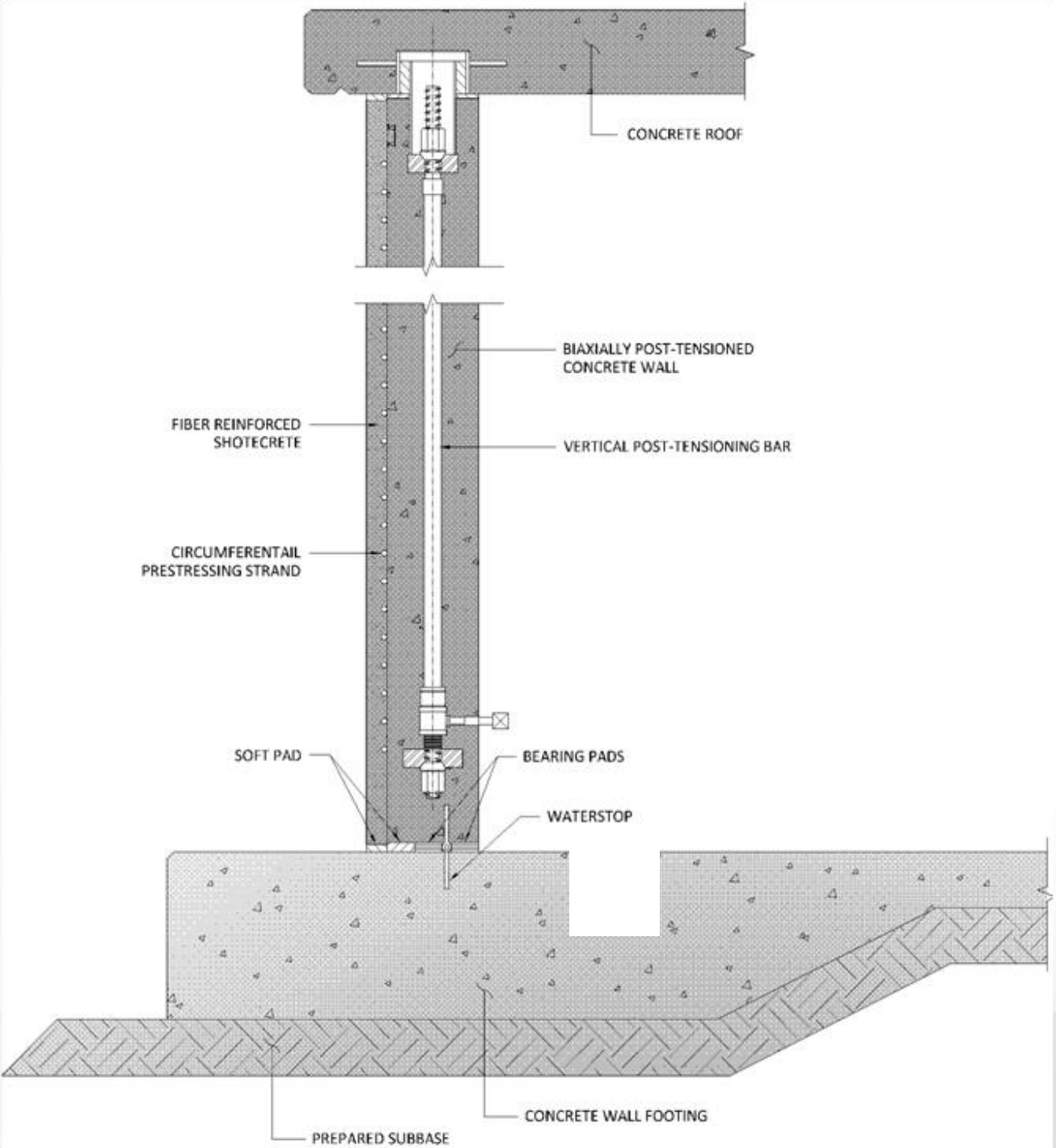

Wall Section

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30 mil Liner

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Floor-Wall Connection

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Floor Slabs

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Core Wall

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One of our favorite characters on the job!

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Columns

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Special Inspection

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Roof Shoring

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Wrapping Machine

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First layer of
Pre-stressing wire

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Typical Hatch Entrance

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Sampling/Light Ports

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Drain Trough

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Piping – Inlet and Overflow

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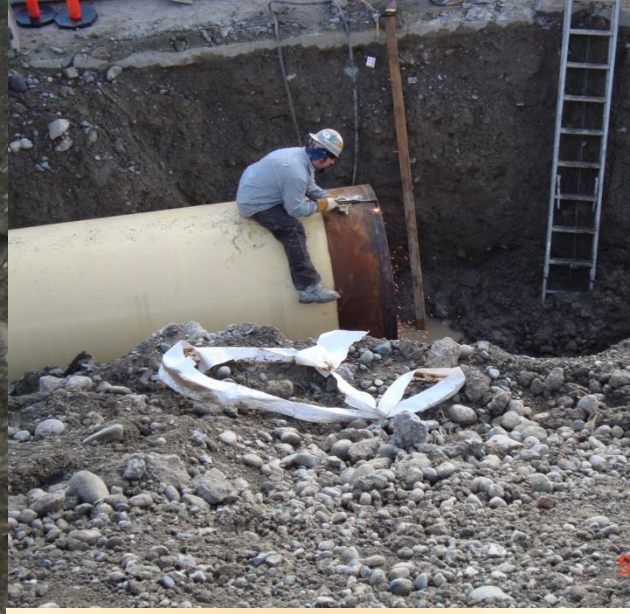

Piping – Inlet , Outlet and Interior of Drain

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Photo by Skytech Aerial Photos - Oct 2010

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