Low Lake Level Pumping Station

NV Section of the Air & Waste Management Association
August 10, 2016
The Situation

- Drought in the Colorado River basin
- Colorado River supplies 90% of Las Vegas’ water
Lake Mead Water Level Impacts

Current Lake Elevation 1073'

Elevation 1050'

Elevation 1000'

Elevation 1200'

INTAKE NO. 1

INTAKE NO. 2

Saddle Island
Isolation Gate

Isolation Gate Installation 12’x14’
Isolate Intake No. 2 and No. 3
Stainless Steel - 12’ x 14’
Drill & Blast

Drilling Blast Holes in Tunnel
Completed drive June ‘13
Vegas Tunnel Constructors (Design-Build) ~ $450M

**Access Shaft**
- ~ 600’ deep
- 30’ finished interior diameter

**Tunnel**
- Launch Chamber ~ 202’ long, 47’ W x 35’ H
- Starter Tunnel ~ 450’ long, 27’ W x 25’ H
- TBM tunnel
  - 20’ finished internal diameter
  - ~ 14,904’ long
  - 14” concrete segmental lining

**Intake Structure**
- 96’ high
- 16’ diameter riser
- Radial inlet
Back then…

Drilling Jumbo Truck - Hoover Dam Diversion Tunnels
http://www.usbr.gov/history/photos/dams007.jpg
Tunnel Boring Machine (TBM) Hybrid Design for Slurry and Open Mode mining

Handle more challenging ground conditions (water pressure, etc)

Manufactured in Germany by Herrenknecht

23.5’ outside diameter
Strand Jacks Used to Handle Weight and Depth
Starter Tunnel
Shaped Charges

- Placed on rock surface
- 7.5 kg / charge
- Placement structure
  - 30 ft x 30 ft
- Small blasts at surface
Intake Structure Installation

February and March 2012

Total Tremie Concrete = 11,300 cy
Intake Structure Tie in

10-ft.
Low Lake Level Pumping Station (L3PS)
CMAR – Underground

- Pumping Station
- Access Shaft
- Electrical Maintenance Building
- Electrical Substation
- Discharge Aqueducts
- Causeway
Low Lake Level Pumping Station (L3PS)  
CMAR – Underground

- Grade Pad El 1260
- (34) 72” ID Well Shafts
- 26’ ID Riser Shaft
- 26’ ID Access Shaft
- 377’ Long Horseshoe Forebay
- Invert El 733
L3PS - Pump Well Shafts
Pre-Excavation Grouting

October 2015
L3PS - Pump Well Shafts
L3PS Well Shaft Cutter Head
L3PS - Pump Well Shafts
L3PS - Pump Well Shafts
L3PS - Pump Well Shafts
L3PS – Underground Excavation
L3PS Access Shaft
Underground Excavation

- 160 feet deep
L3PS – Underground Excavation
Access Shaft Blast
L3PS – Underground Excavation
Access Shaft Muck
L3PS – Underground Excavation
Access Shaft Sinking
L3PS – Aboveground Design

- Hydropneumatic Tank
- Pumping Station
- Gantry Crane
- Electrical / Maintenance Building
- Surge Tank
- Valve Vaults
- Discharge Piping and Valves
L3PS – Test Pump Procurement

- Minimum Lake Level El 875
- Maximum Lake Level El 1060
- 30 mgd Constant Speed Pumps
L3PS – Discharge Aqueducts

144” Low Lift Aqueduct

144” High Lift Aqueduct