

SR 25/US 27 Okeechobee Road Depressed Roadway Design-Build

Connecting Communities... One Crossroad At a Time



2008 Annual FACERS Conference
Presented by: Nelson Canjura, PE and Larry Low, PE
June 25, 2008

HDR

Project Location

- Located in City of Hialeah, Miami-Dade County
- Last Segment of Okeechobee Improvements Between Le Jeune Rd & Palmetto Expressway

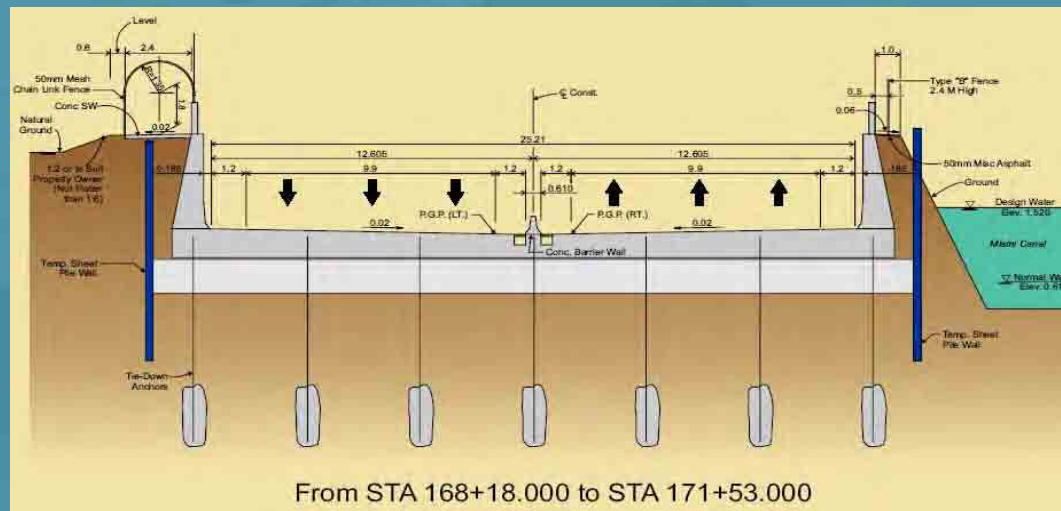


Project Overview

- **Reconstruction of 0.4 miles of Okeechobee Blvd.**
- **Depressed roadway section**
- **Six-lane divided roadway**
- **Pump station**
- **Railroad Bridge**
- **Lighting**
- **CCTV Camera System for Detour & Depressed Section**
- **Metro Rail parking lot improvements**
- **Utility relocations**

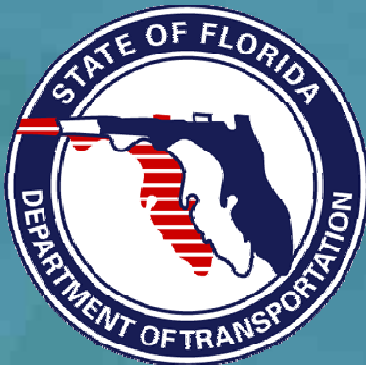


Project Layout



Project Team

- ⌚ Owner: FDOT District 6
- ⌚ Design Build Team:
 - HDR Engineering
 - Kiewit Southern Corporation
- ⌚ CEI: Consul-Tech



Why a Depressed Roadway?

- 26 train crossings per day
- Inconvenient to traveling public due to constant traffic flow interruption
- Heavy commercial corridor
- 45,000 ADT



Options Considered



- Okeechobee Over SR 934 & Metrorail
- Third level bridge
- Impacts to Metro Rail Station & Hotel

Options Considered



- **FEC RR Over Okeechobee & Under Metrorail**
- **Required raising Metro Rail - Impacts to Station**
- **Raising FEC RR impacted Rail Yard**

Procurement

- Best Value Adjusted Score
- Departments Budget: \$35,000,000

Price Proposal (Bid Opening)

Contractor	BPP	PCT	TS	Adj. Score
KSC / HDR	\$34,899,841	590	92.67	503,954.94
MCM / HNTB	\$37,965,421	565	87.17	565,186.26
PCL / T.Y. Lin	\$39,880,975	780	87.67	632,862.59

Project Challenges

- On-going Reconstruction of SR 934
- 26 Train Crossings per day on FEC RR
- Miami Canal
- Construction Constraint's from overpasses



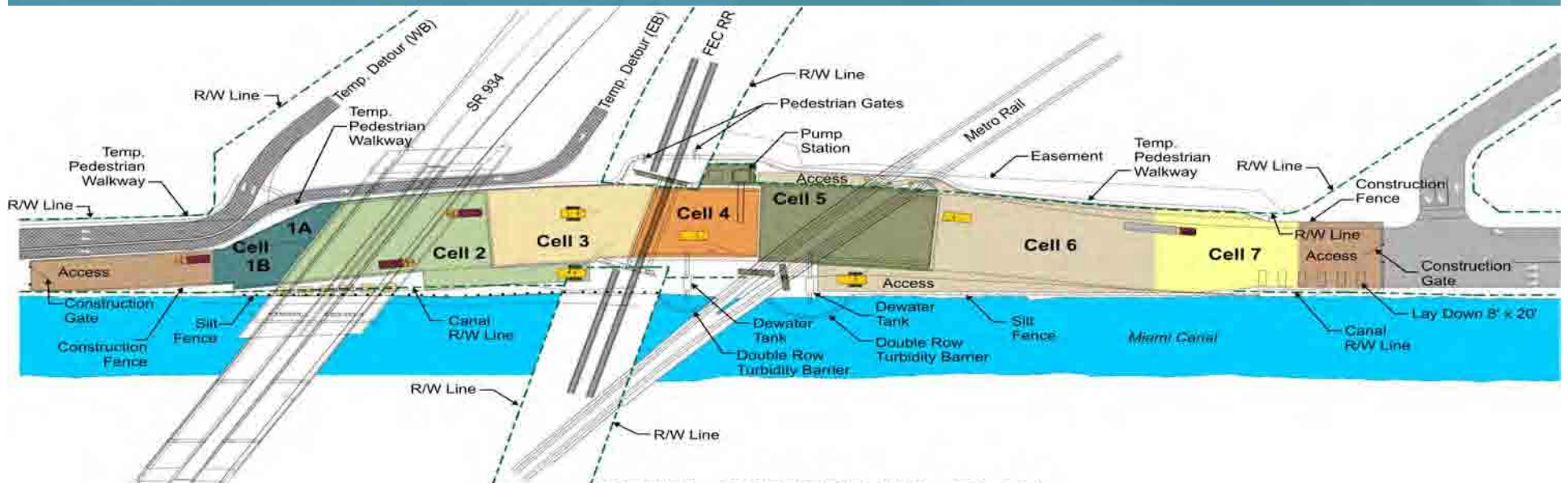
Project Challenges

- Maintain existing RR Traffic during construction of Depressed Roadway
- Construction of new RR Bridge
- Excavation of Roadway under submerged conditions
- Max 10 Month Road Closure



Project Challenges

- Detour for Roadway Closure
- Depressed Section Constructed in Cells
- Steel Sheet Pile Cofferdam Design for Support of Excavation



Project Challenges

- 2nd Depressed Roadway Section in Florida.
- 1st- Kinney Tunnel in Ft. Lauderdale, built in 1960.
- Low point of roadway -26' below water table

Kinney Tunnel in Ft. Lauderdale
Built in 1960

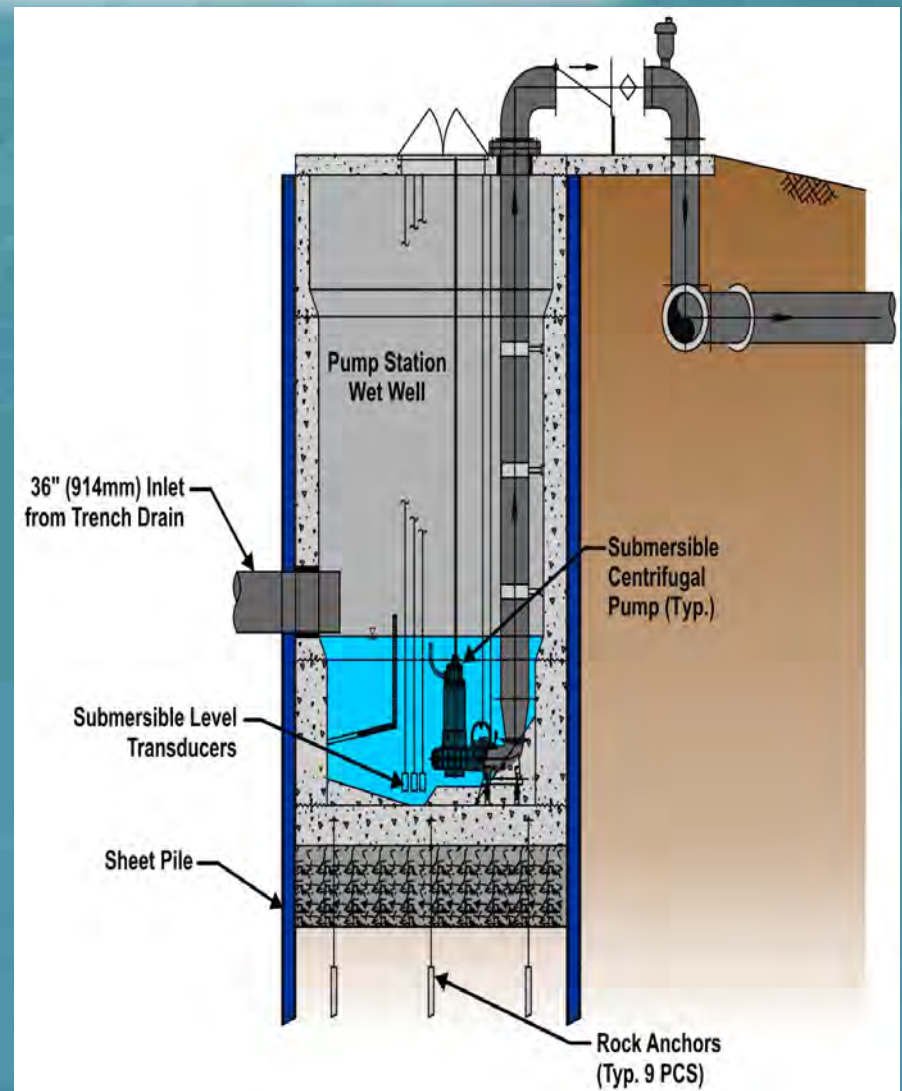


Project Challenges

- SFWMD Environmental Resource Permit
 - Early Work Permit –(Phase I MOT)
 - Right of Way Use Permit
- DERM Permits
 - Class II Stormwater Discharge Permit
 - Class V Temporary Dewatering Permit
- FDEP –National Pollutant Discharge Elimination System (NPDES)
- U.S. Army Corps of Engineers (USACE)
- City of Hialeah Building Permit
- Water Use Permit
- Miami Dade Co.- Tree Removal Permit

Project Challenges

- **Pump Station Design**
 - Designed for 50yr/24 hr storm
 - Wet well system
 - Three submersible 85 hp pumps (one backup)
 - Backup Generator Fuel System-72 hr fuel supply
 - SCADA Monitoring System
 - Above Ground Control building
- **Tight Site Conditions**
- **40' Depth**

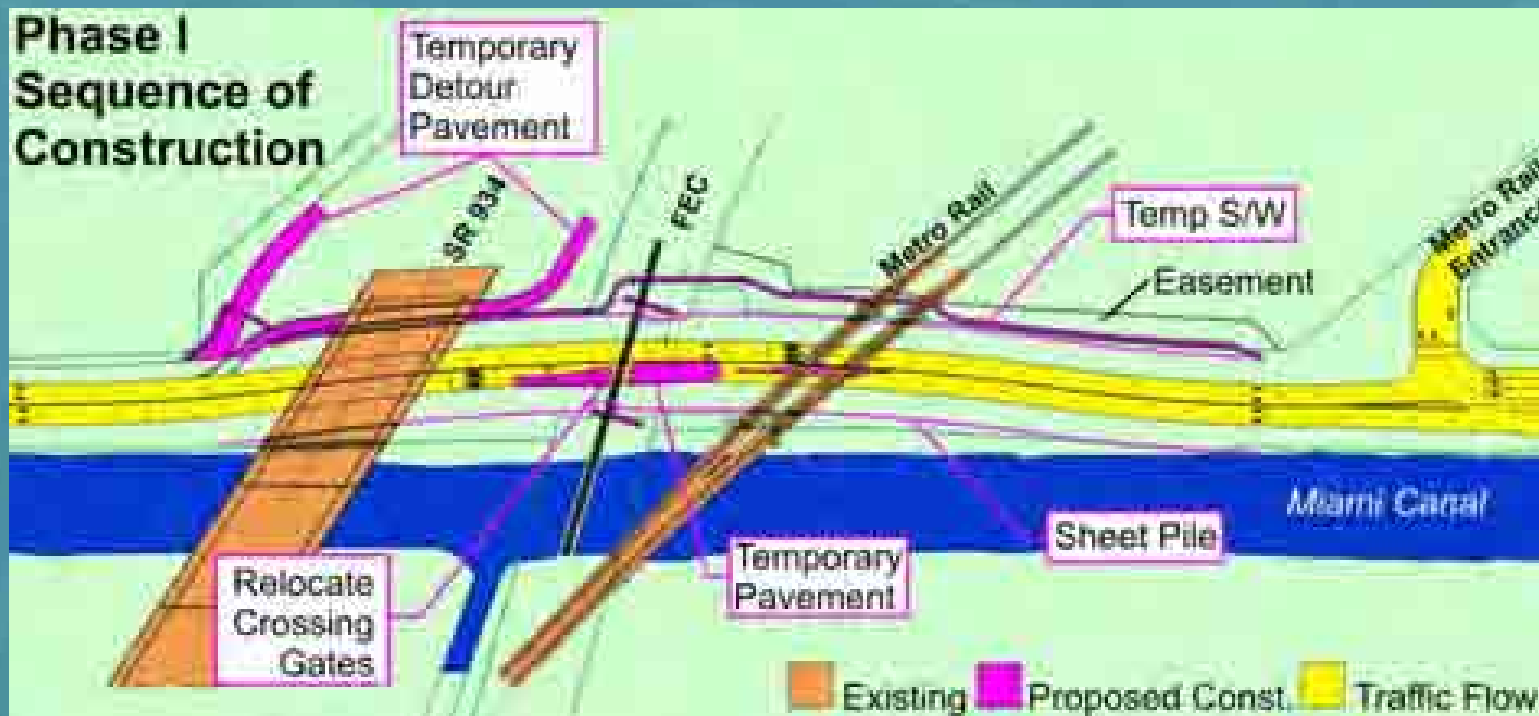


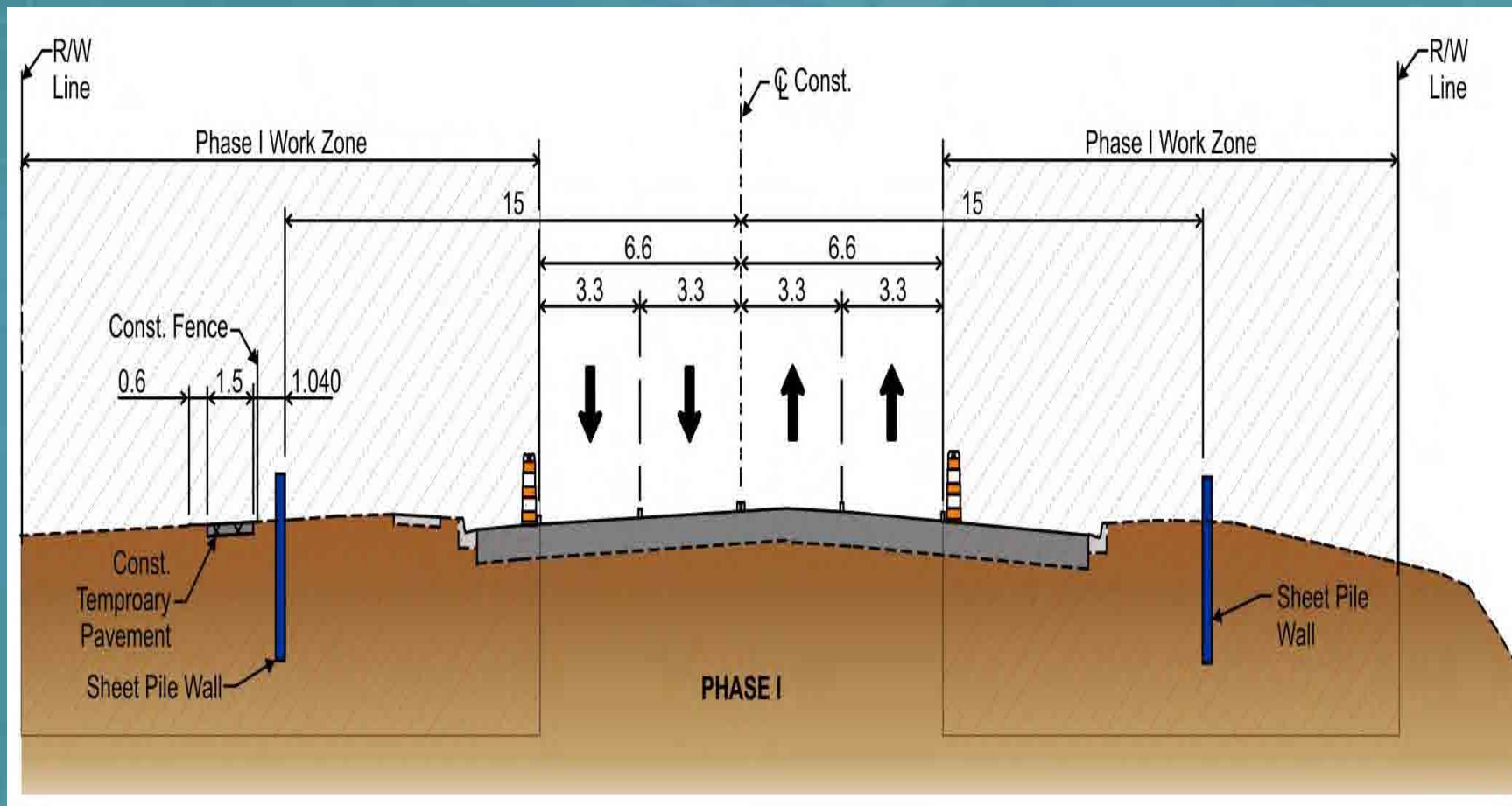
Detention Ponds



Phase I MOT

- Shift traffic to median with 2-WB & 1-EB lanes.
- Drive sheet Pile along Okeechobee Rd
- Construct Temporary Detour & Sidewalk





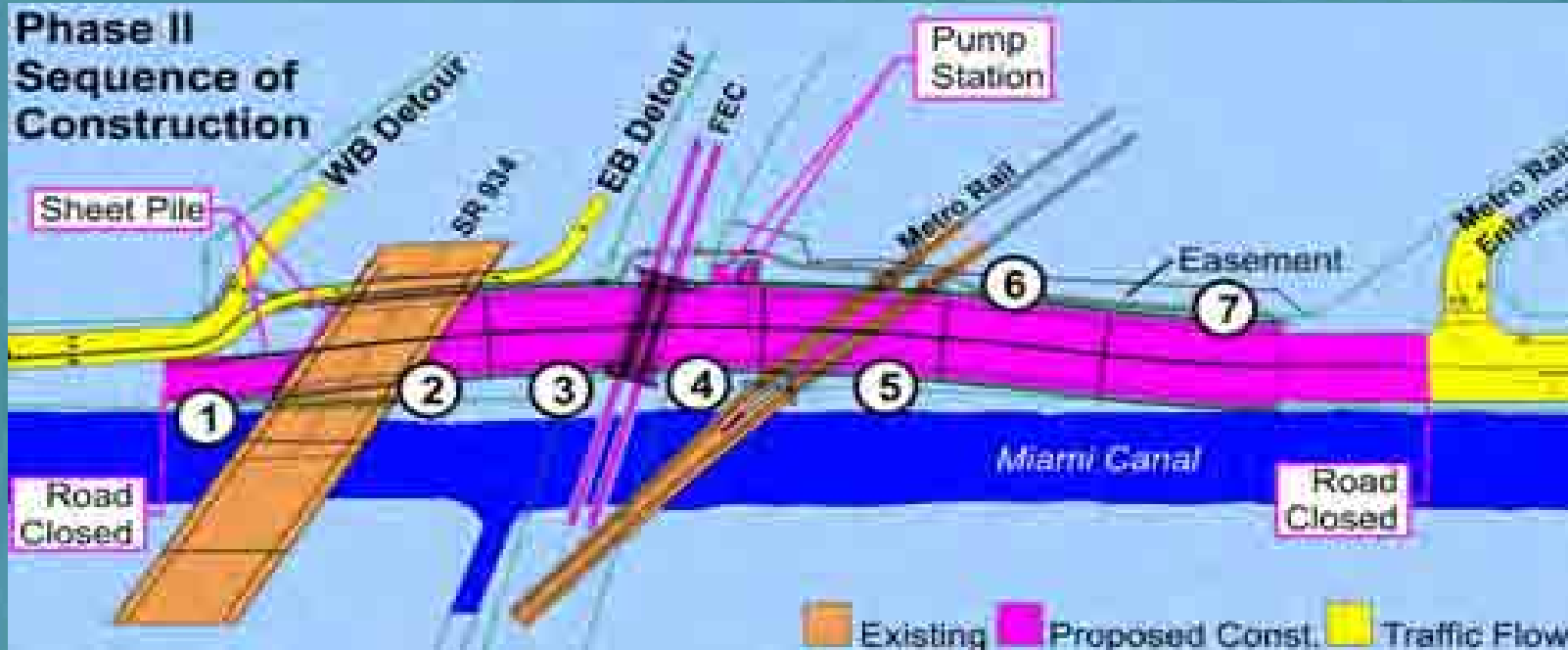
Phase I MOT



Sheet Pile Installation

Phase II MOT

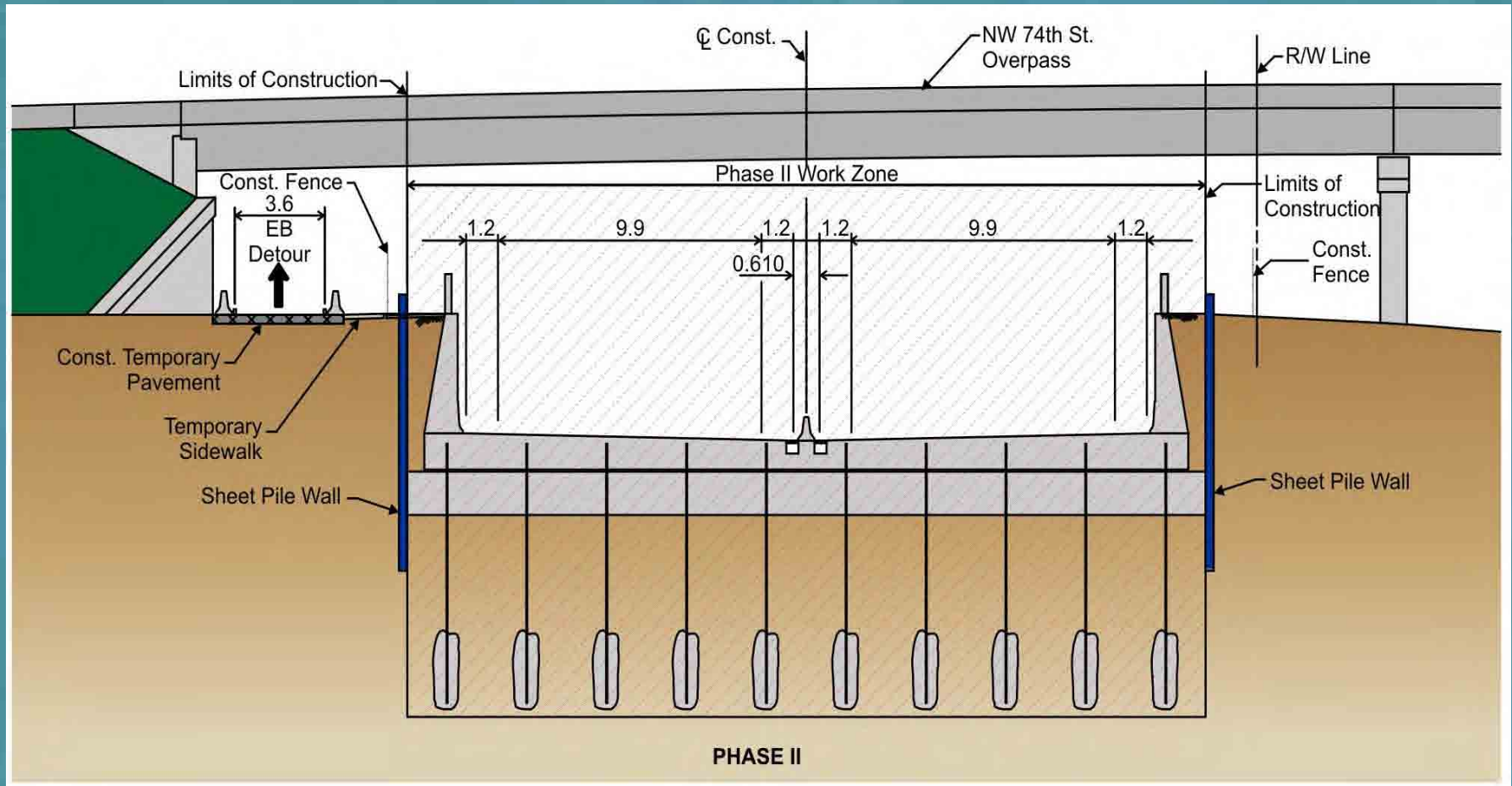
- Close Okeechobee Rd (W. 8th to W. 12th Ave.)
- Re-route Traffic along Detour
- Construct Depressed Roadway (7 Cells)
- Construct FEC RR Bridge & Pump Station



Detour Route



Phase II MOT



Phases II MOT

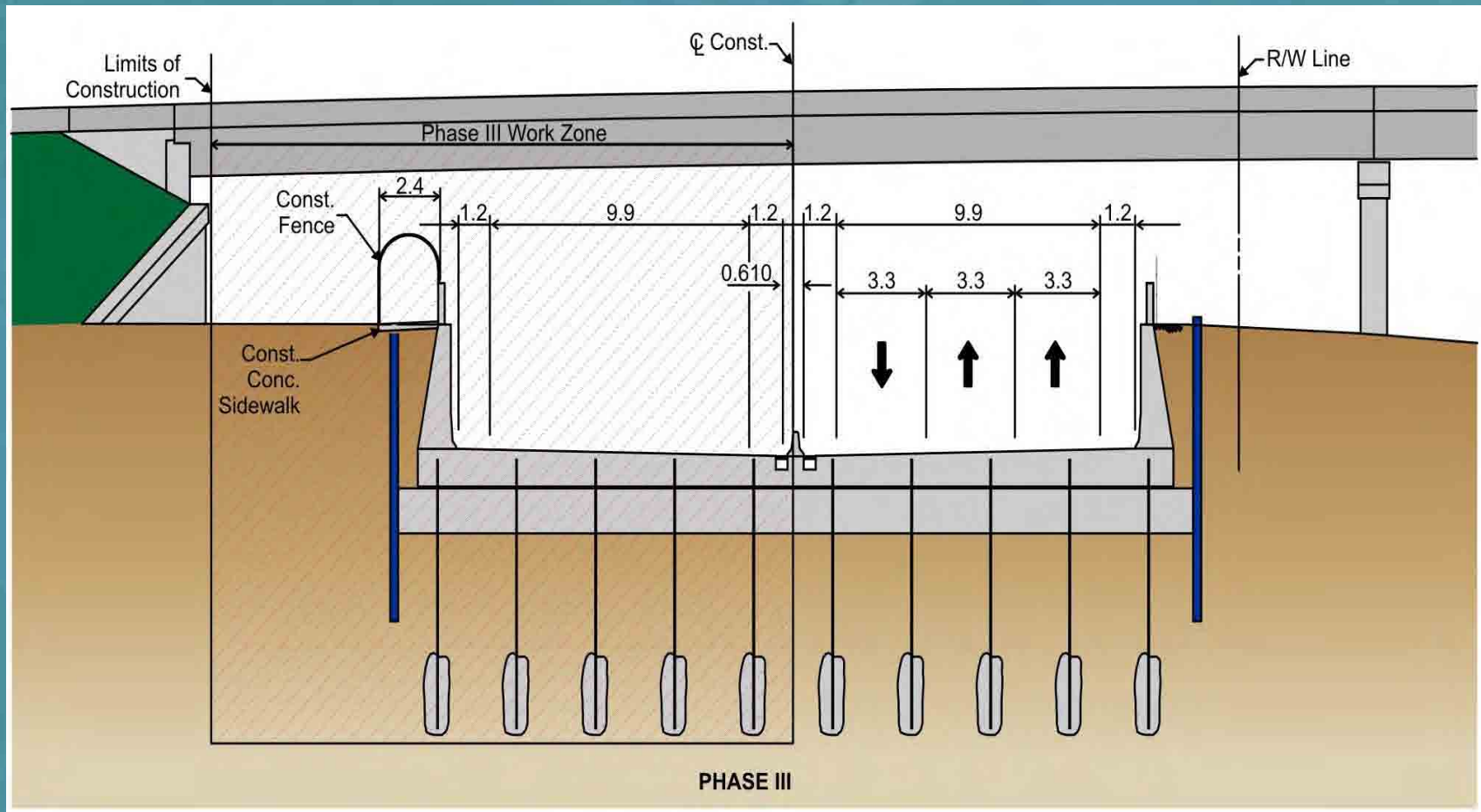


Phase III MOT

- Open Okeechobee- Two EB & One WB Lanes
- Remove Detour & Const. Ponds
- Complete Cell 1, Wall Construction & Median Barrier



Phase III MOT

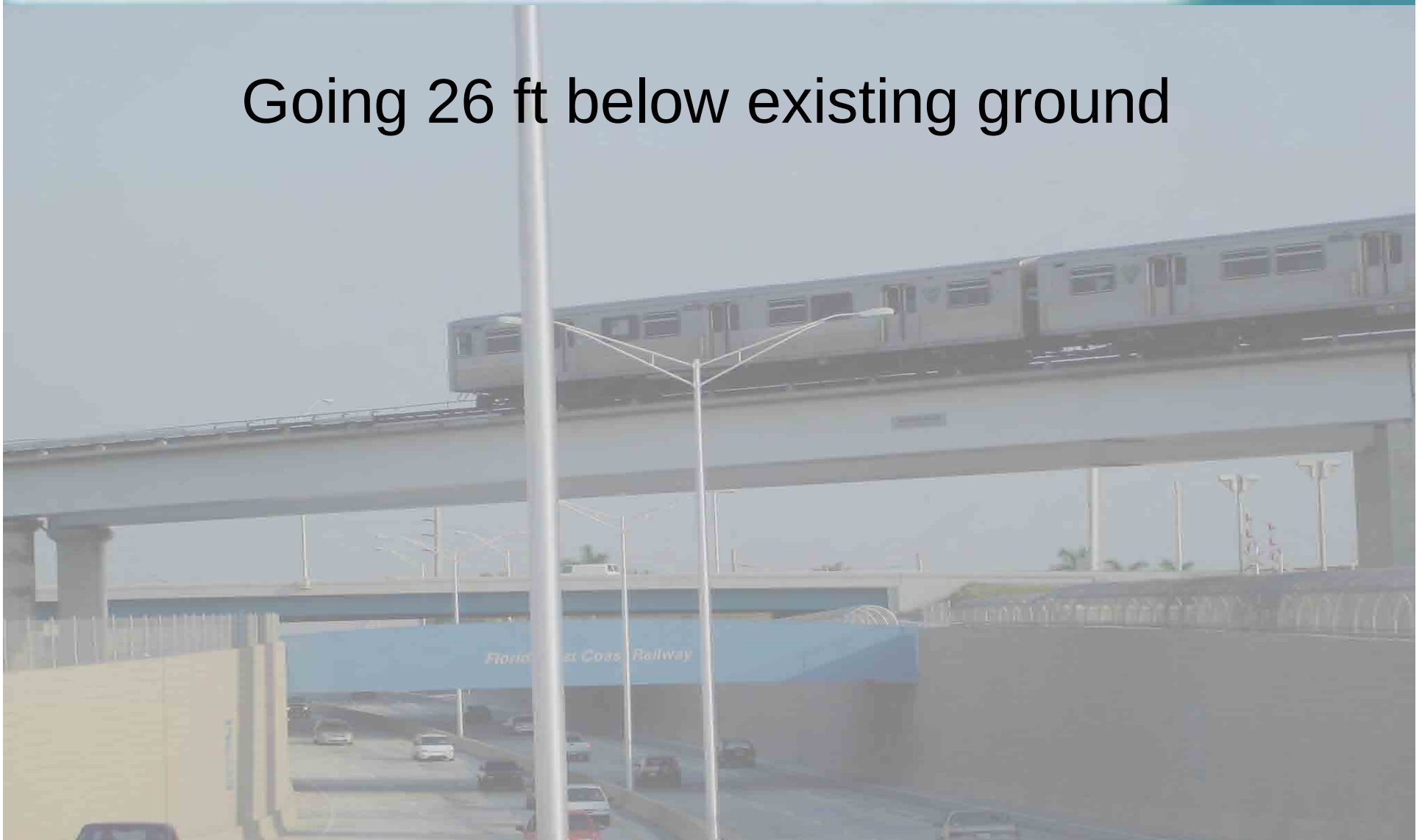


Phase III MOT

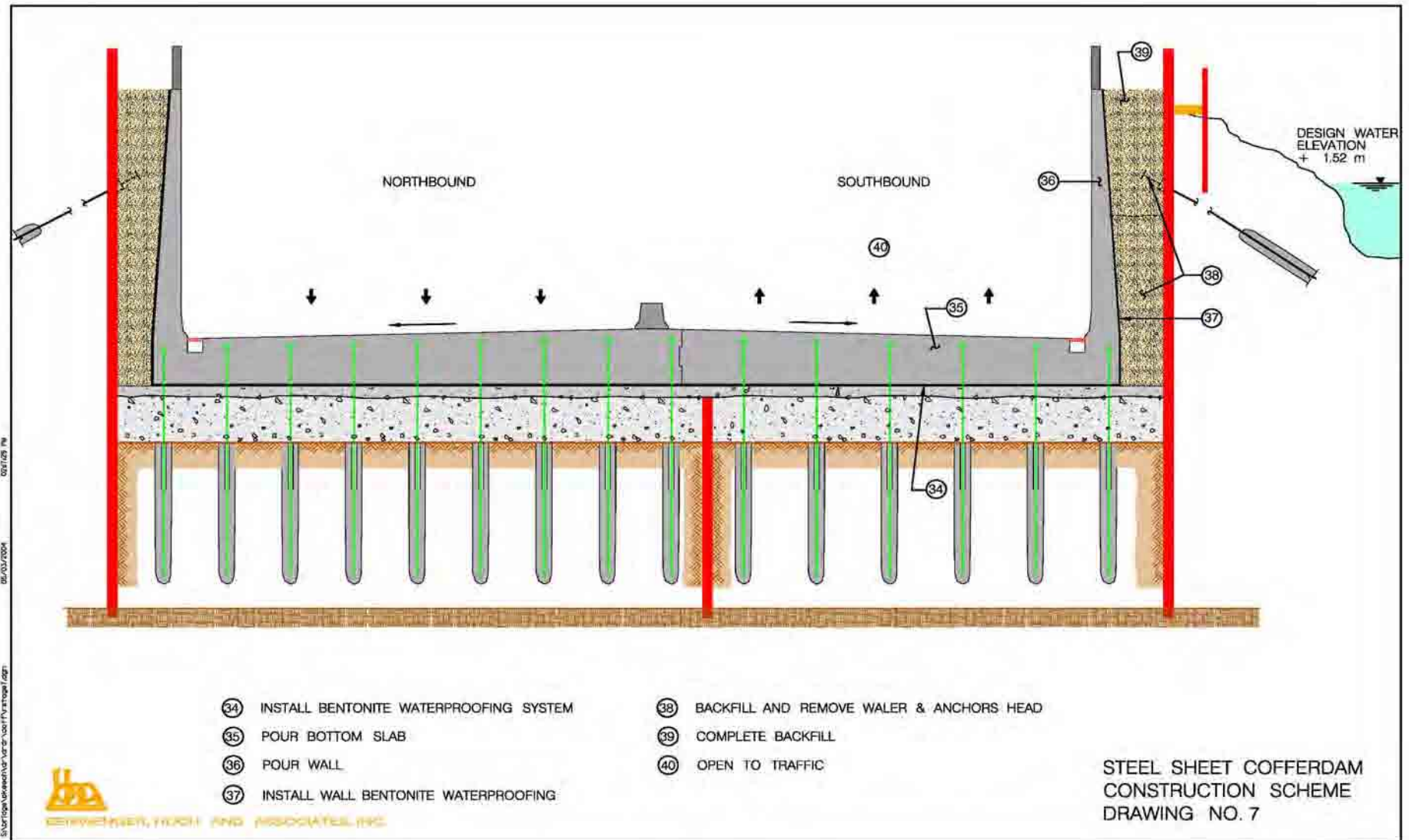


Depressed Roadway Concept

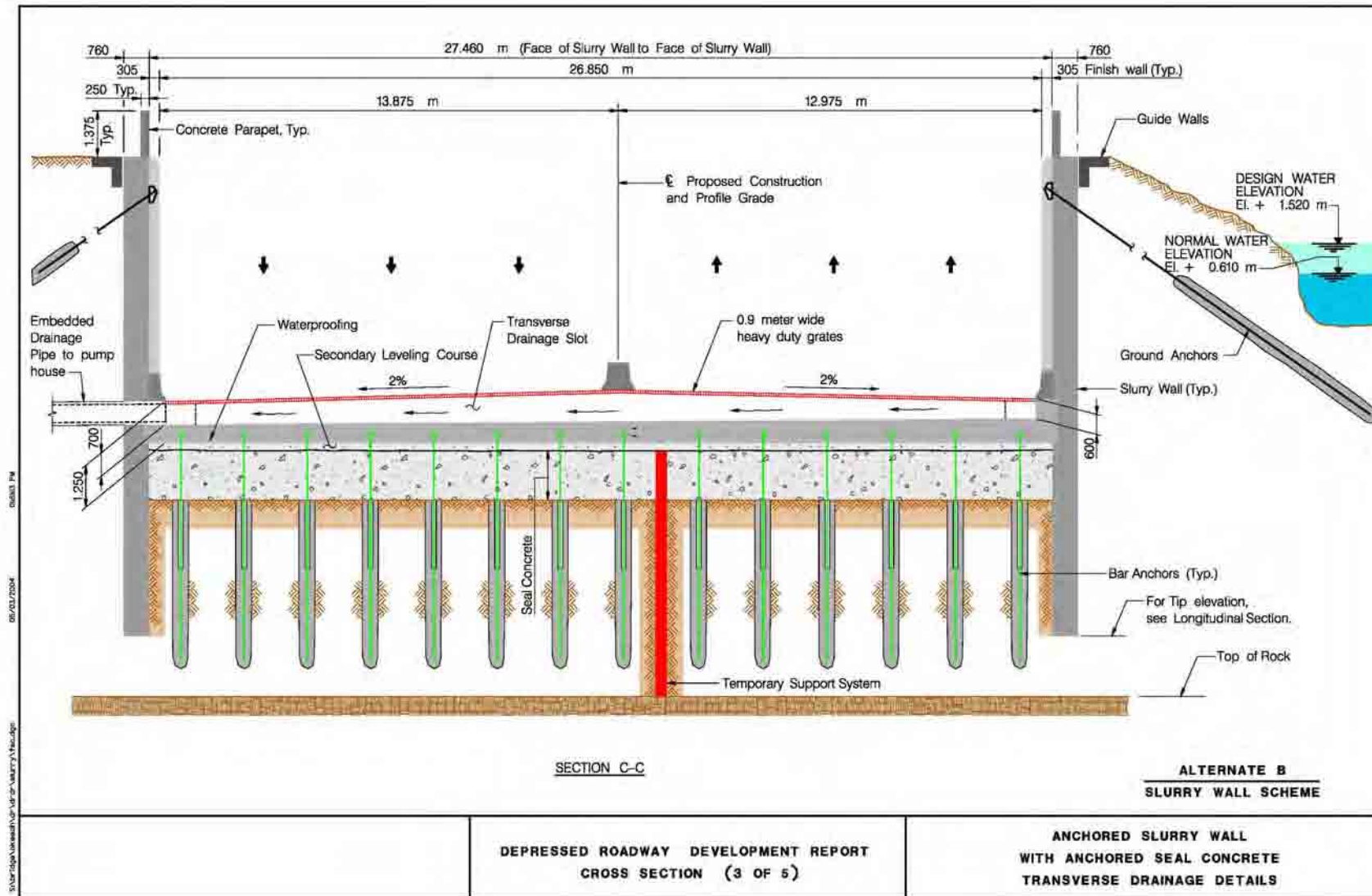
Going 26 ft below existing ground

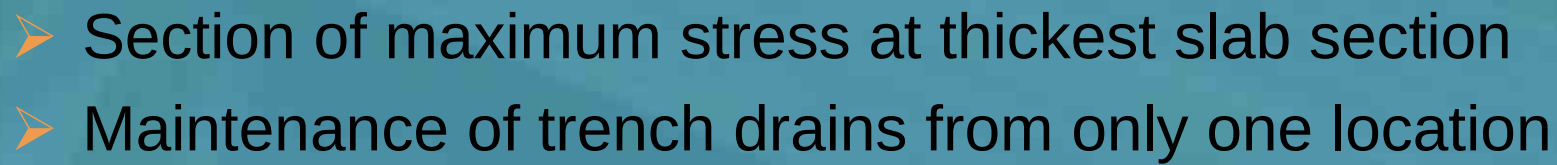


RFP Concept



RFP Concept



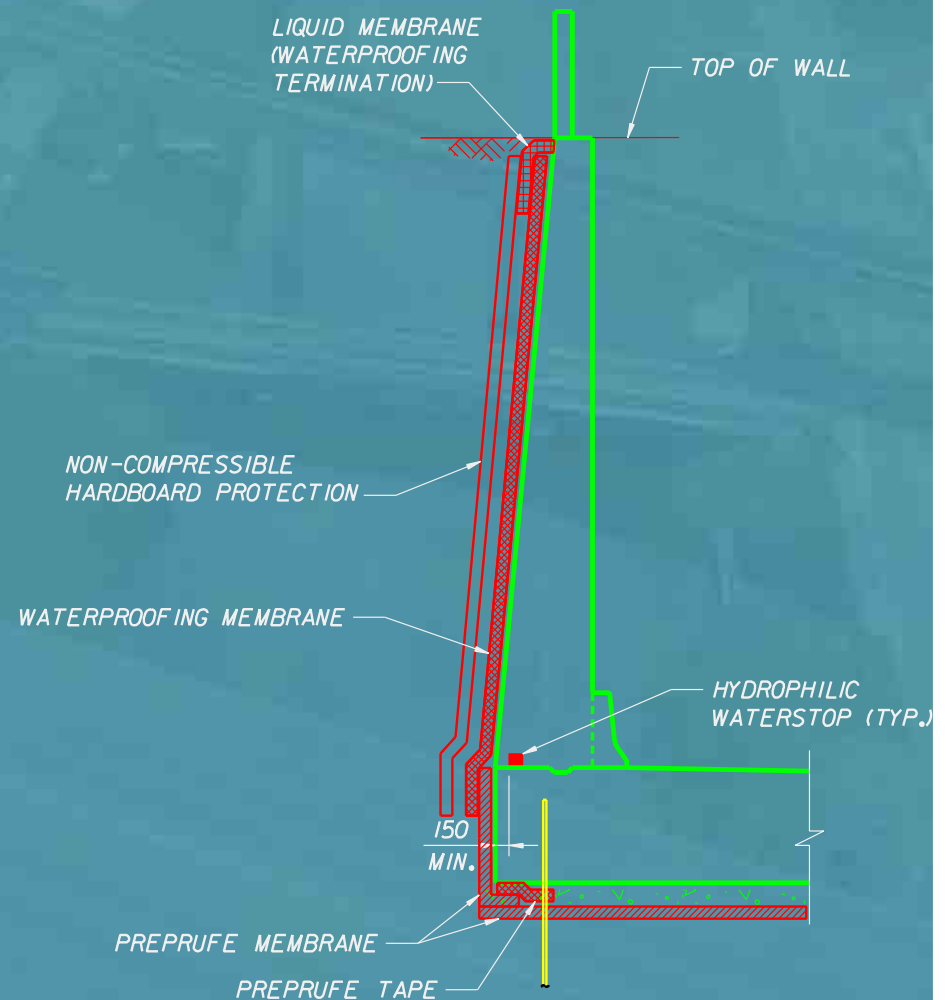


Typical Section – Inverted Slab



Typical Section – Inverted Slab

- Water Table up to EL. 1.52 m
 - Finish ground at EL. 2.5 m+
 - Deepest cut @ EL. -5.53m
 - 7m of water = 23 ft
- Water leakage – two tier
 - Waterproofing of walls and bottom slab
 - Waterstops at every CJ

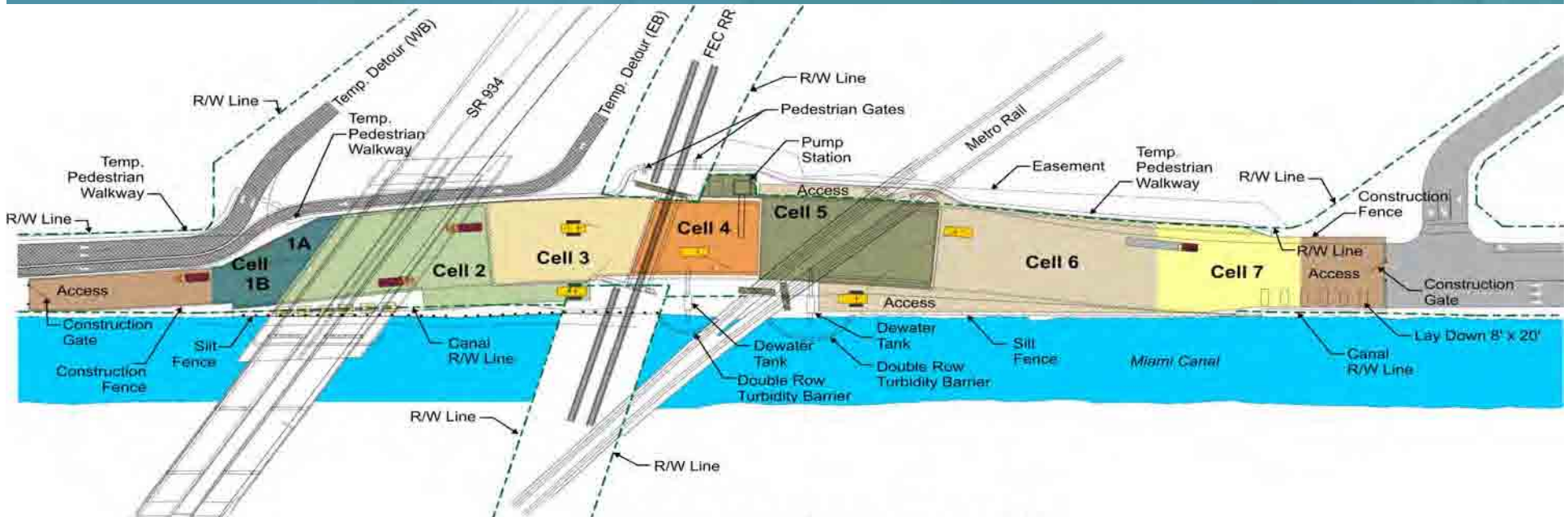


Cofferdam Construction

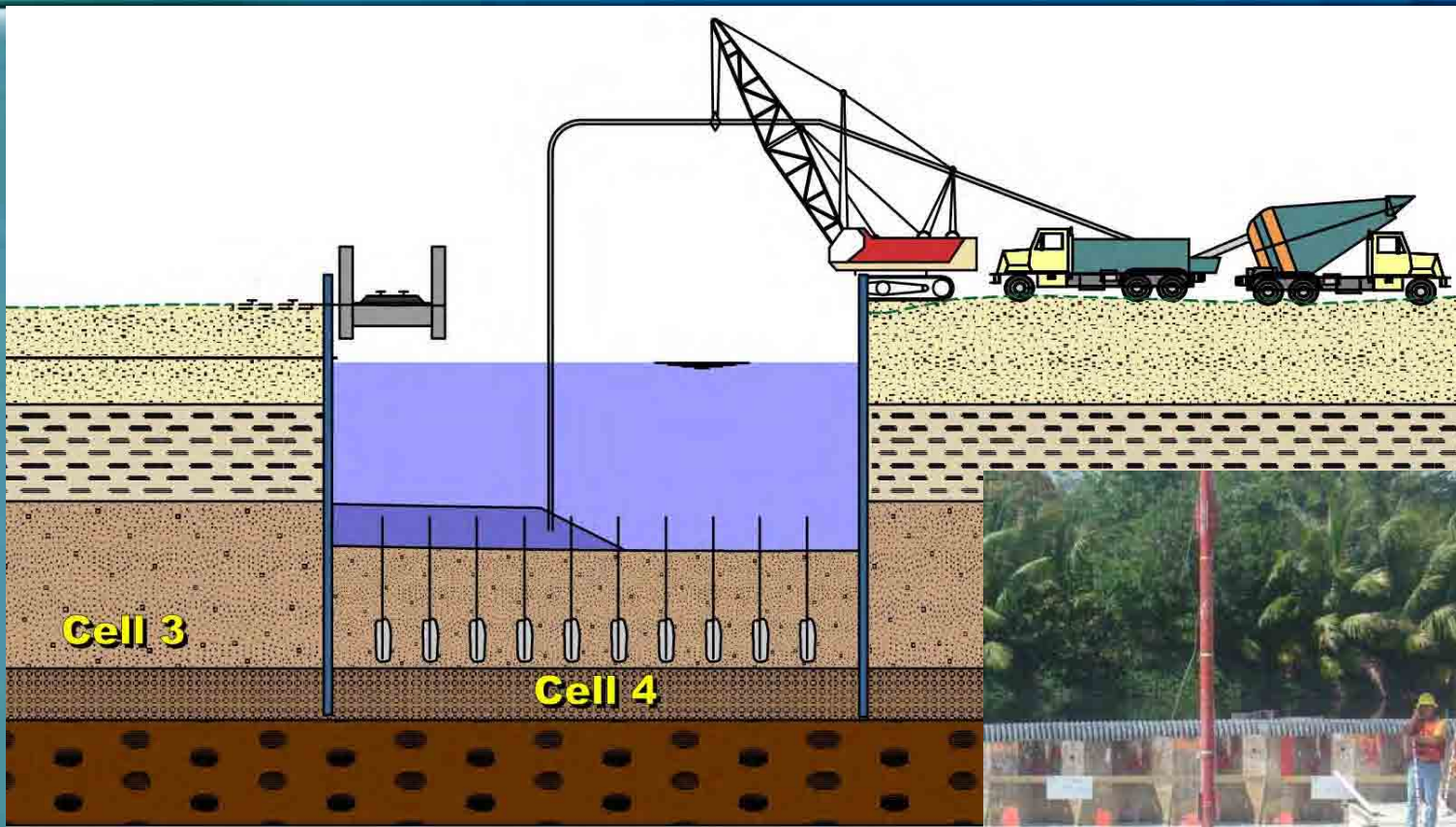
How do we build it?

Schedule: 10 mo road closure (Kiewit
promised 280 days ~9 mo)

Cofferdam Construction

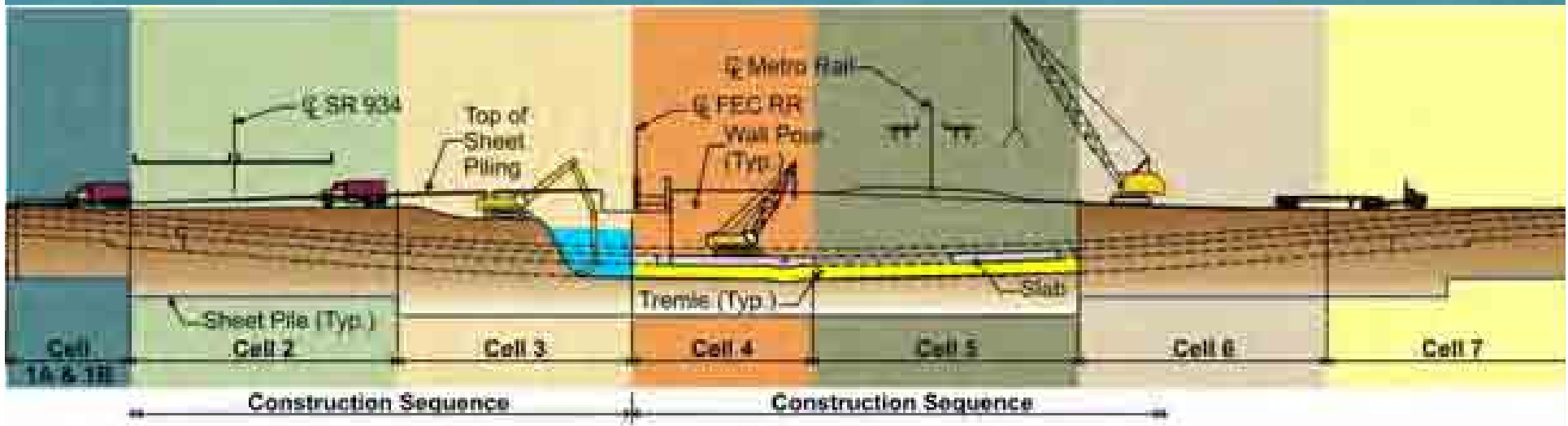


Cofferdam Construction





Tremie Construction Sequence



- Cell 7: 4/1/06 and 4/8/06, 800 CY each pour
- Cell 4: 4/29/06 4000 CY
- Cell 6: 5/20/06 3500 CY
- Cell 5: 7/1/2006 3200 CY
- Concrete: 26,215 m³ (34,290 cy) ~ 3400 Trucks



Pump Station Cofferd Cell



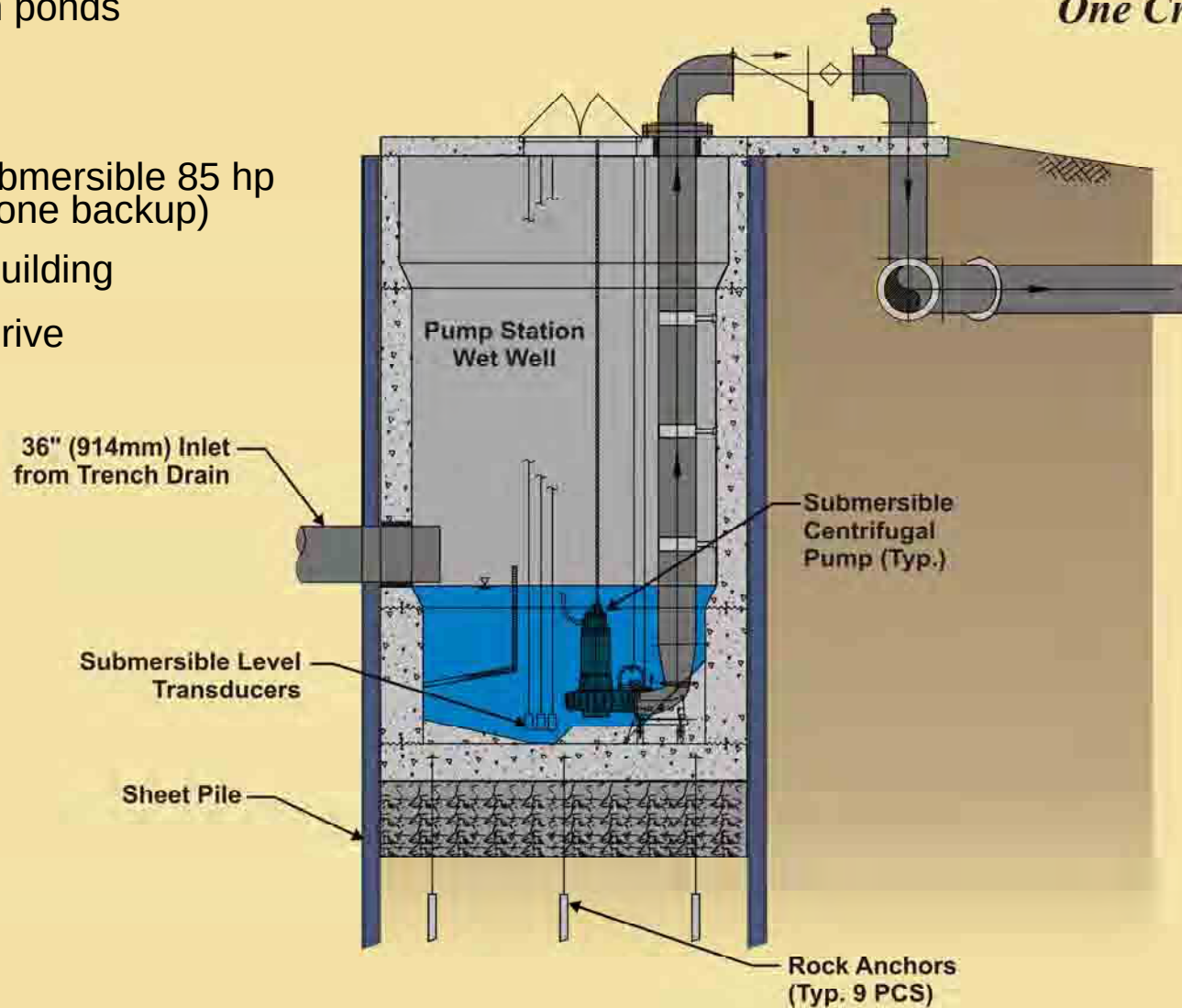
Foundation Element	EL, m	EL, ft
Ground Surface	3.05	10
Top Wet Well Slab	-6.91	-22.7
Bottom Wet Well Slab	-7.52	-24.7
Bottom Tremie Seal Slab	-8.74	-28.7



Pump Station Cross-Section SR 25/US 27/Okeechobee Road Design-Build

- Stormwater discharge to detention ponds
- Wet well
- Three submersible 85 hp pumps (one backup)
- Control building
- Access drive

*Connecting Communities
One Crossroad At A Time*



Cofferdam Soil Anchors (~280)



Cofferdam Cell 4



Cofferdam Cell 4

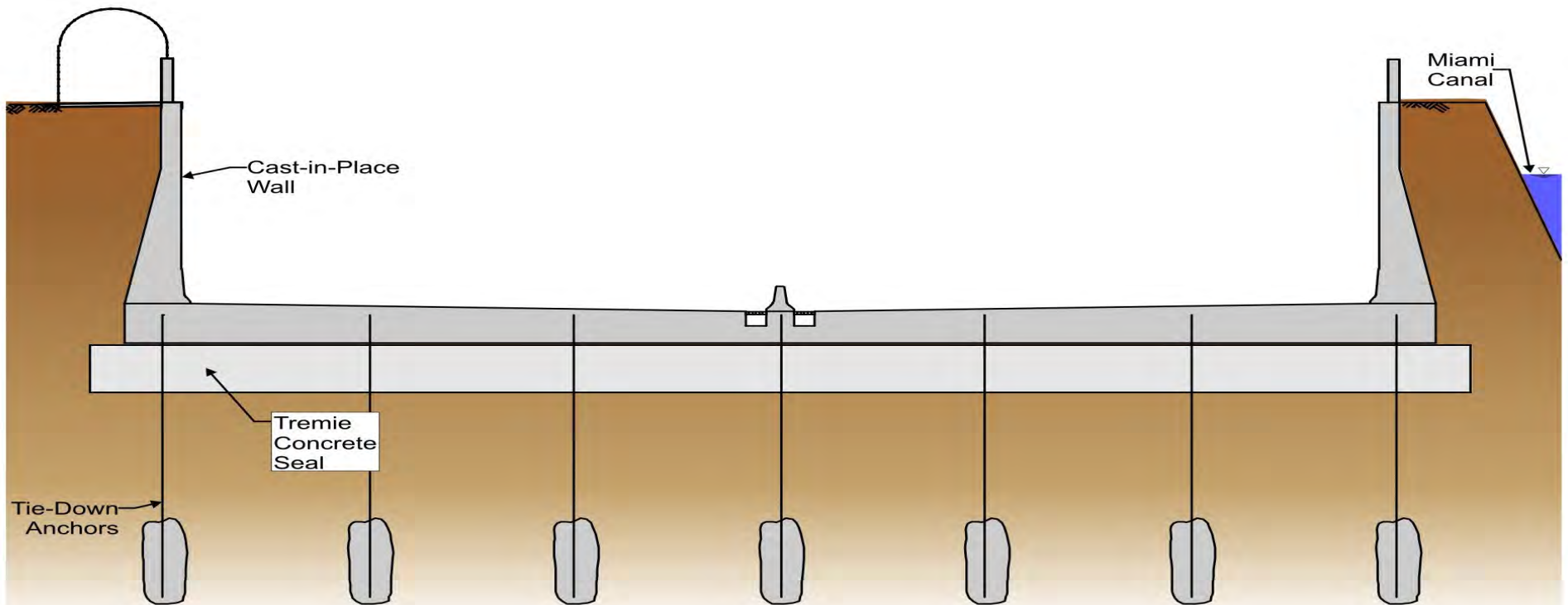


Cofferdam Cell 4

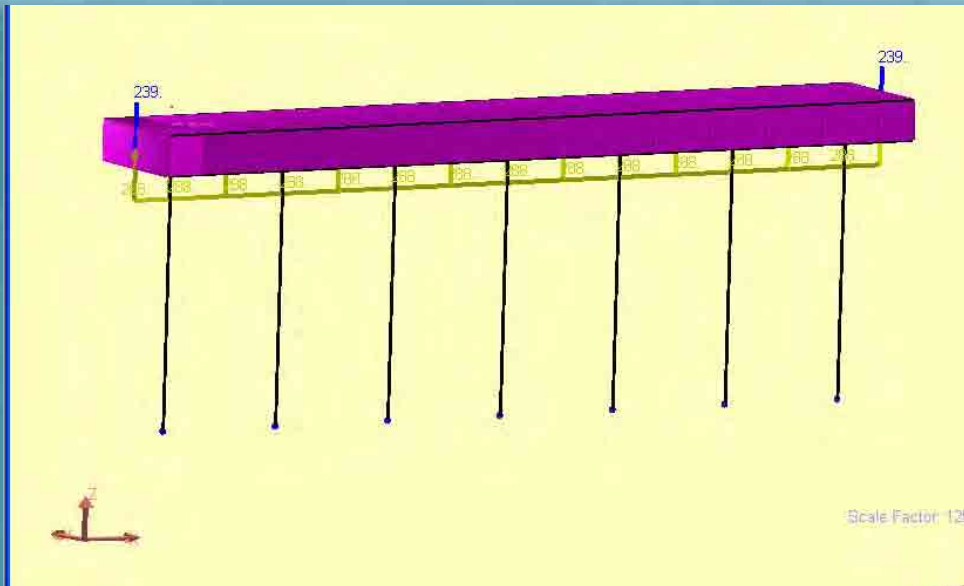


Structural Modeling

- Modeling follows construction sequence
 - Tremie seal with ground anchors
 - Final Section: Tremie, structural slab + walls

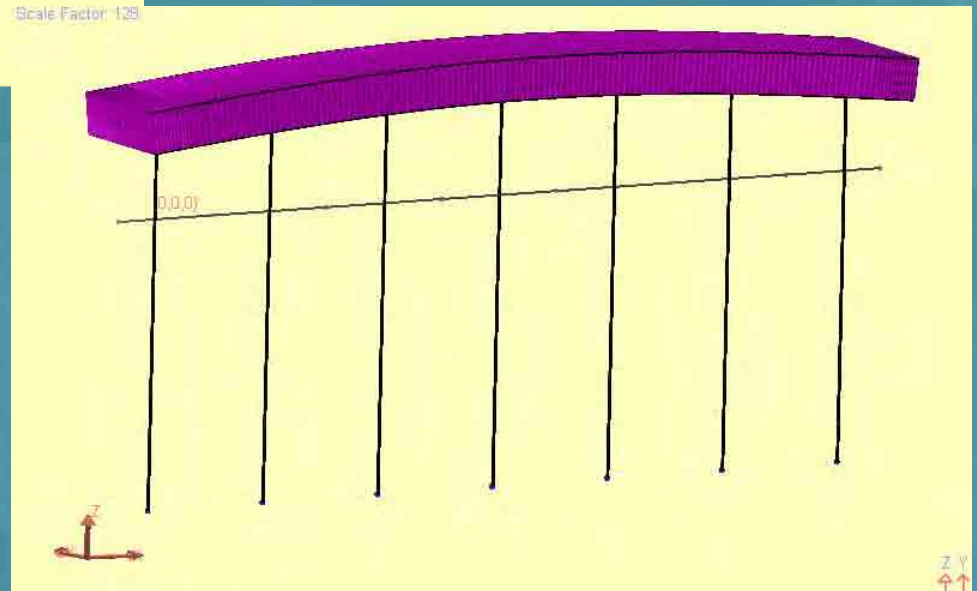


Tremie Seal w/ Ground Anchors

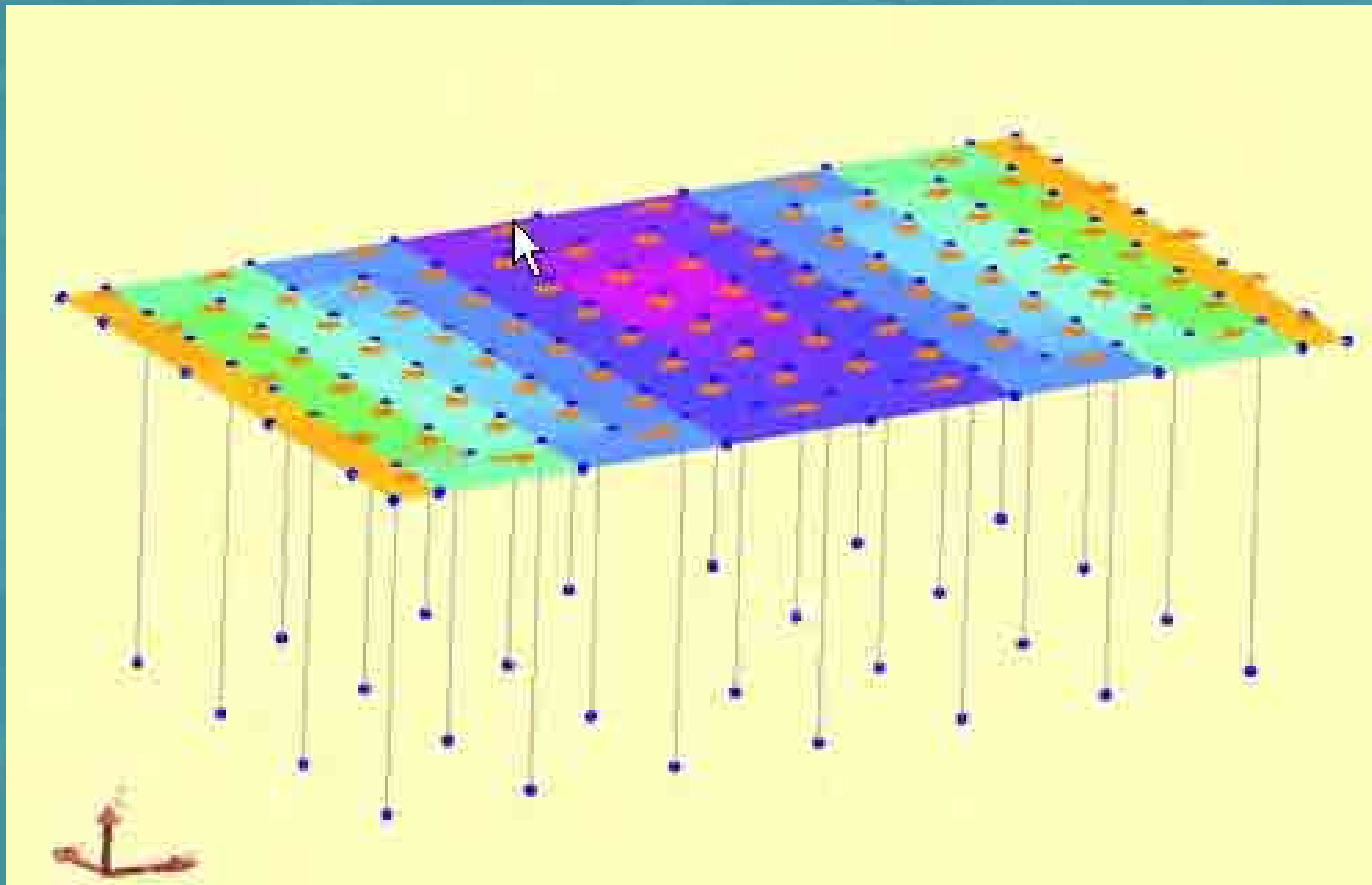


- Loading
- Self Weight
- Sheet piling
- Water Pressure on Tremie

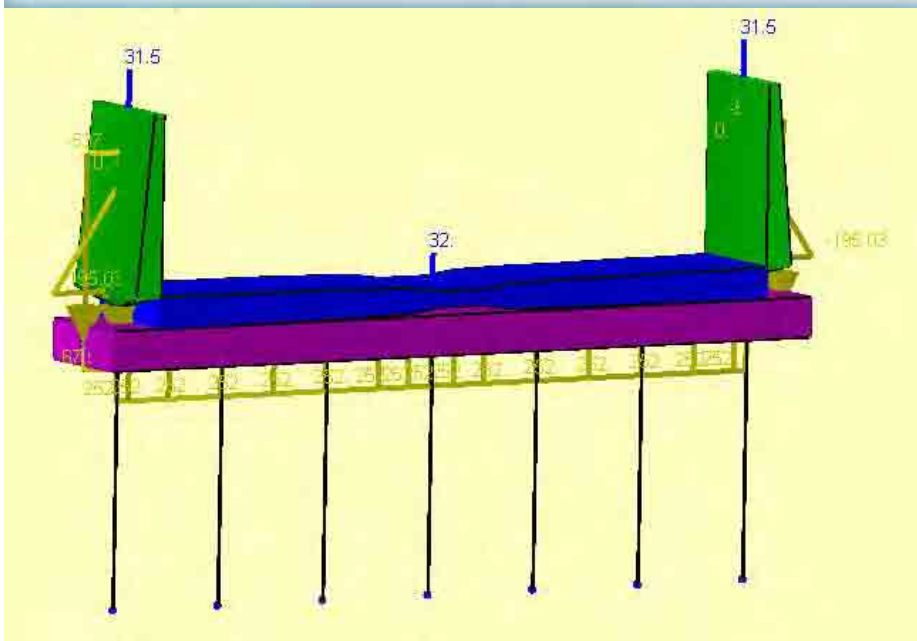
Scale Factor: 1.29



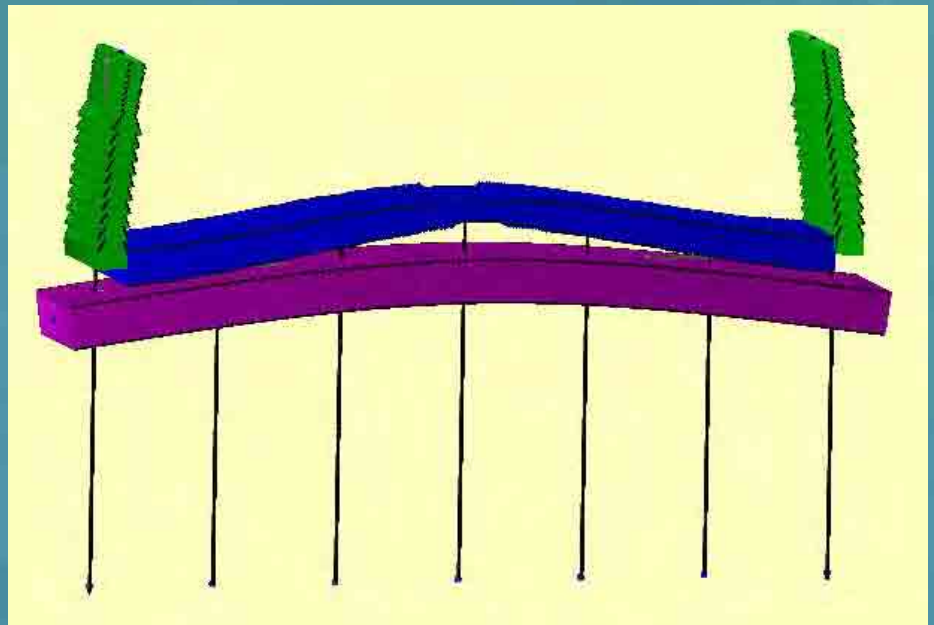
Tremie w/ Failed Ground Anchor



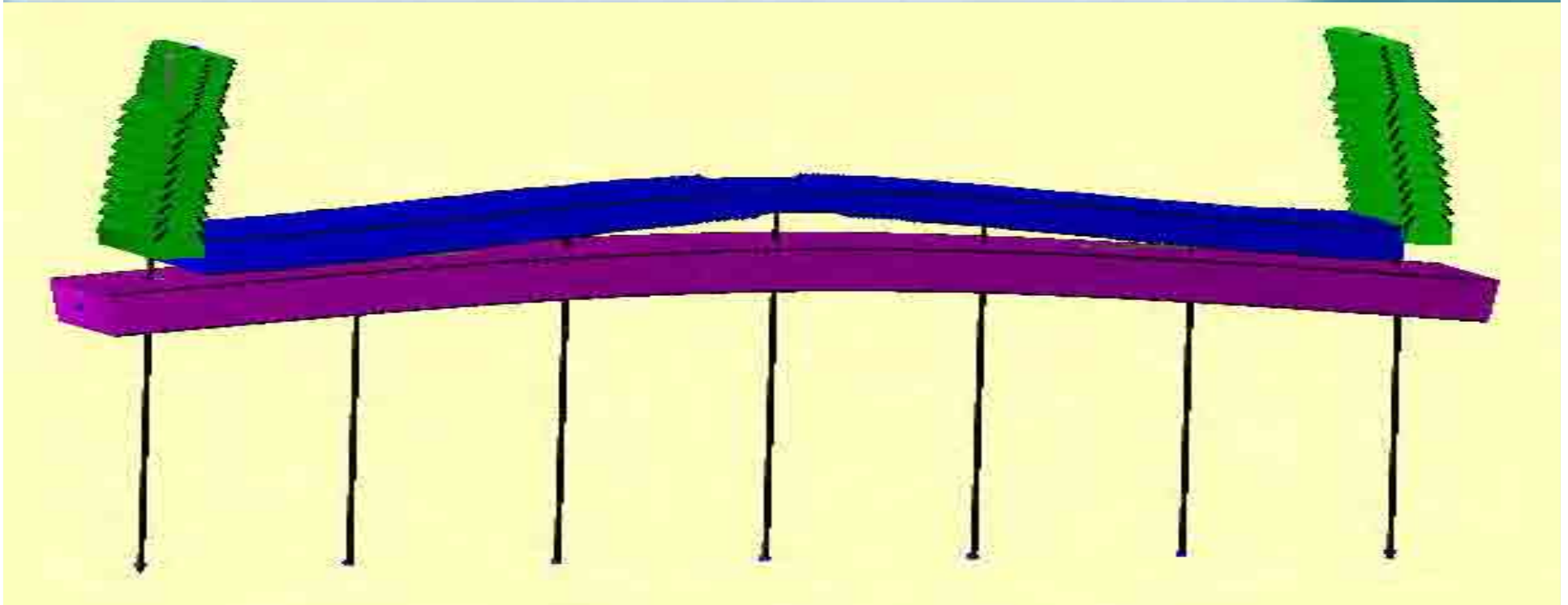
Depressed Section



- Self Weight
- Water Pressure on Tremie
- Water Pressure on Walls
- Surcharge on Walls
- Earth Pressure on Walls

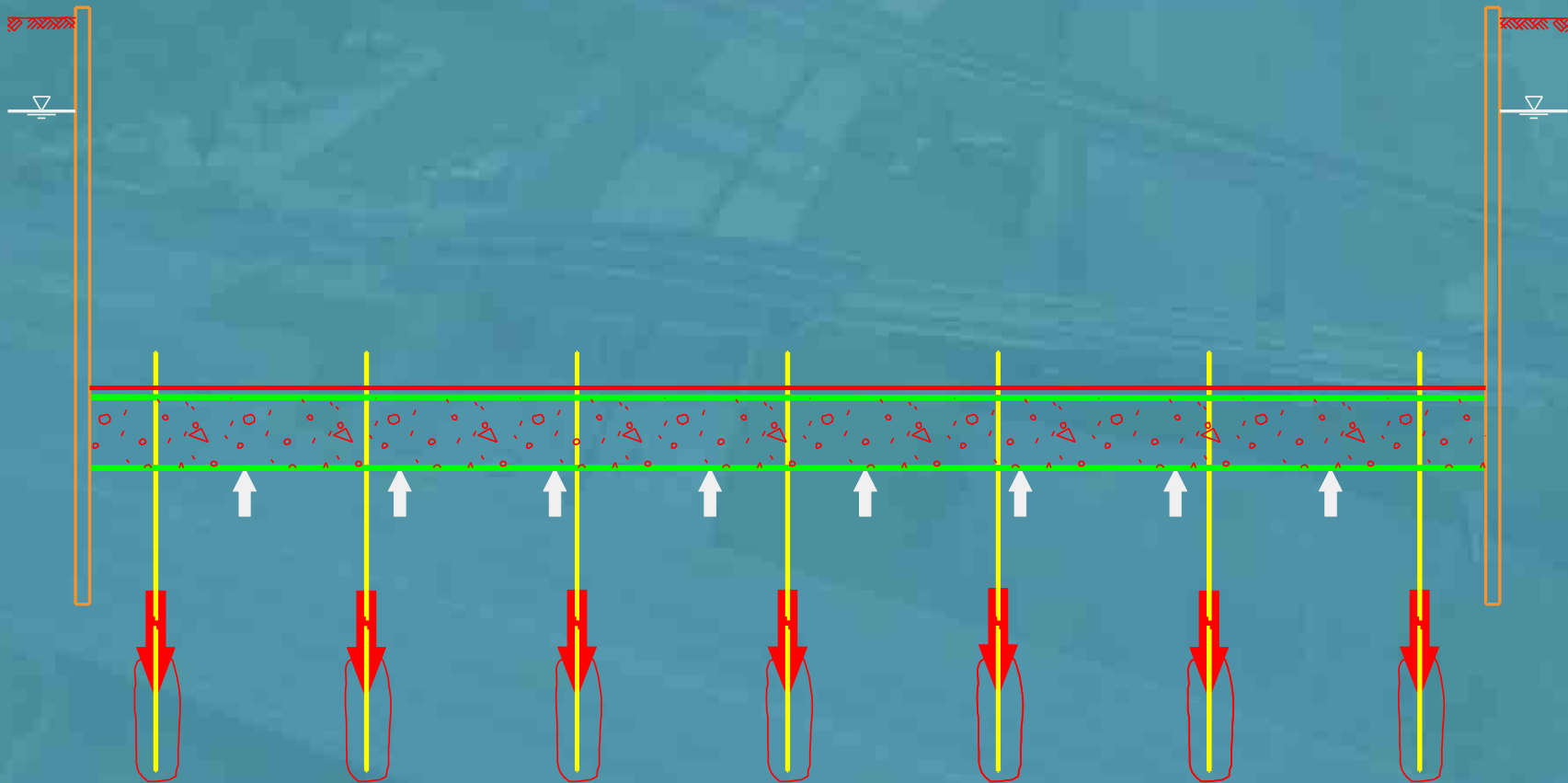


Depressed Section

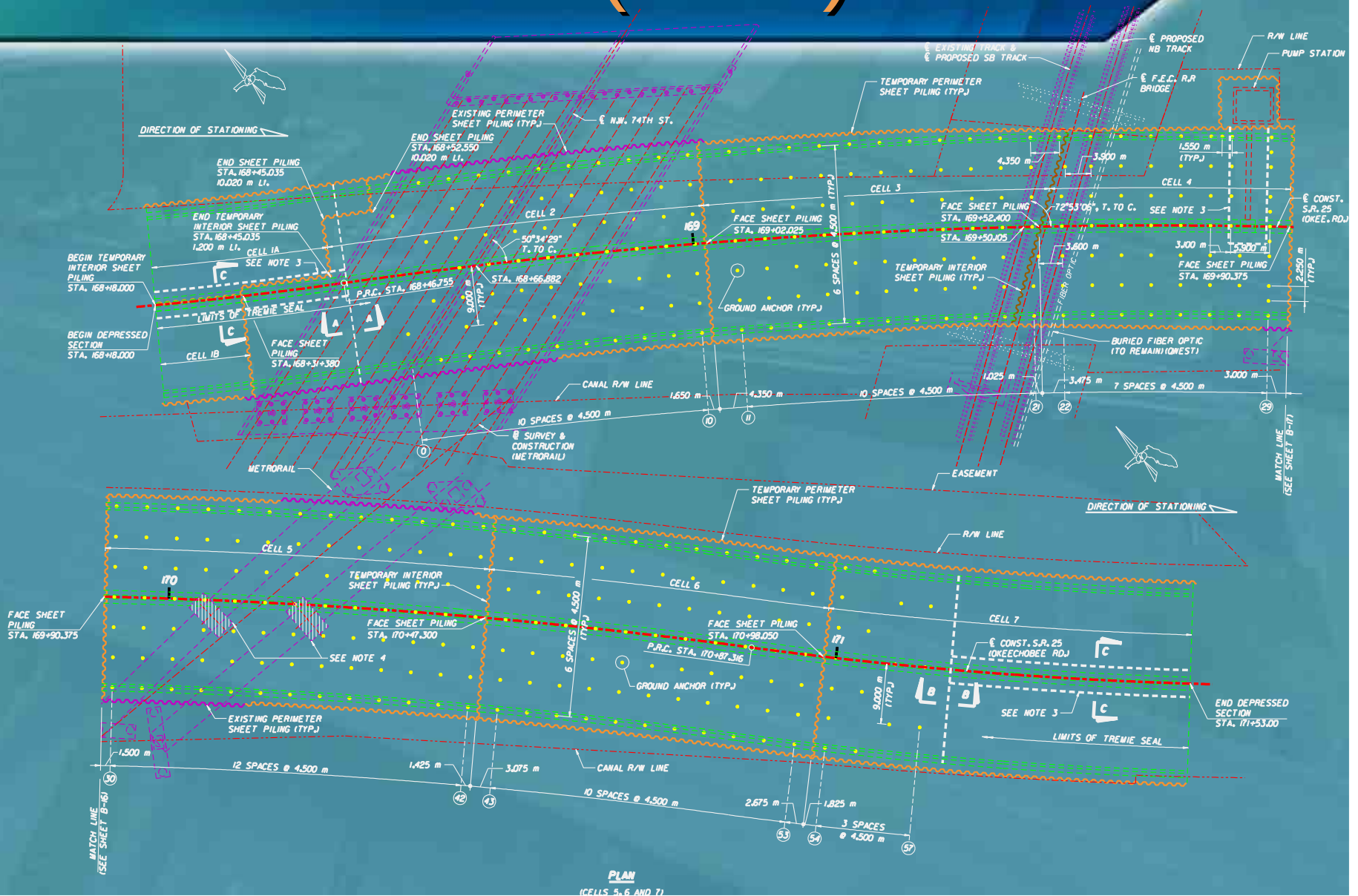


- Unanchored Tremie
- Anchored Tremie, Noncomposite Slab for Bouyancy
- Anchored Tremie, Composite Slab for Bouyancy

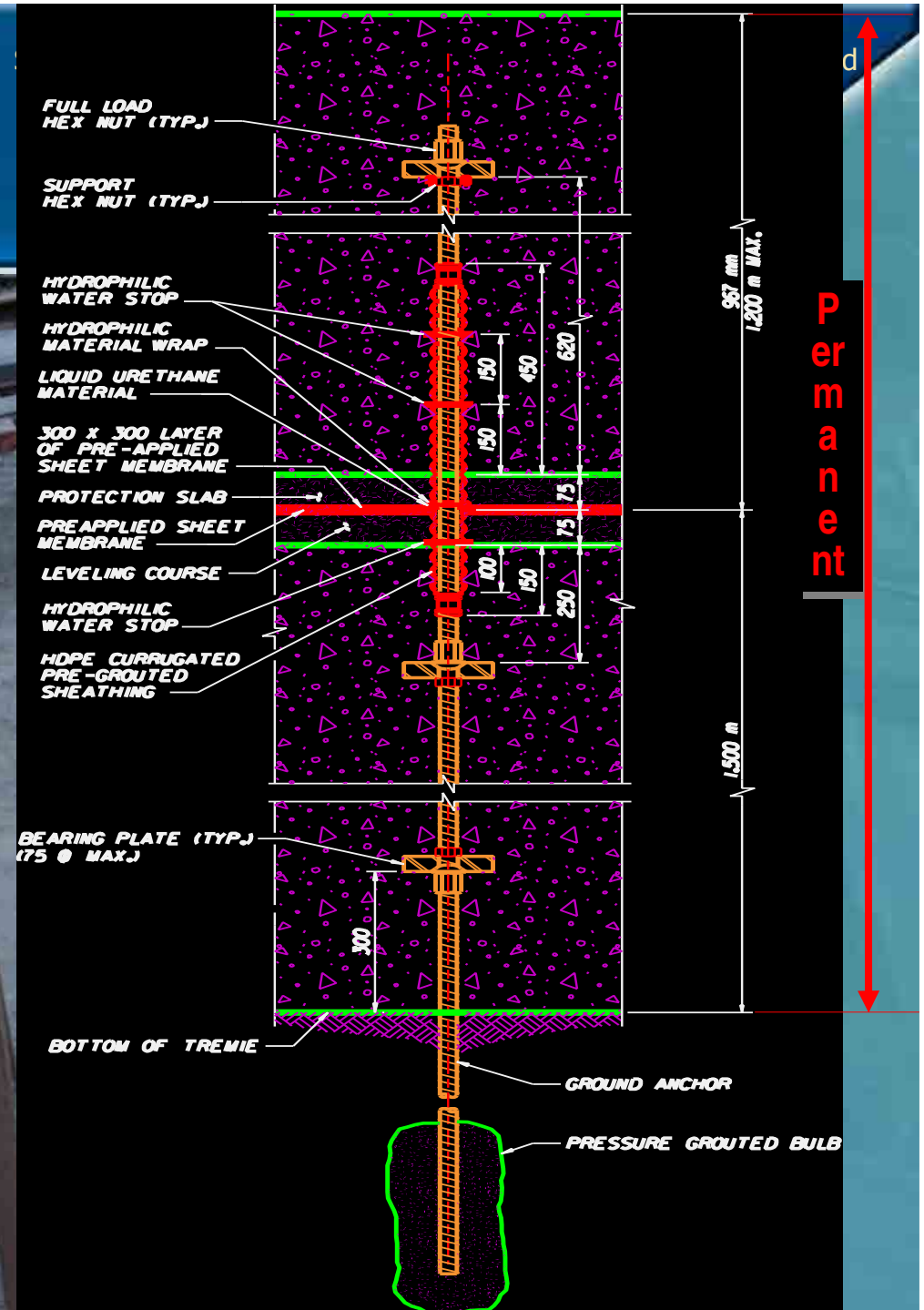
Depressed Section



Maximum Anchor loads during Construction



Ground Anchors



Ground Anchors



Ground Anchors



Ground Anchors



Waterproofing



Waterproofing Leveling Course



Waterproofing Leveling Course



Slab Construction



Slab Construction



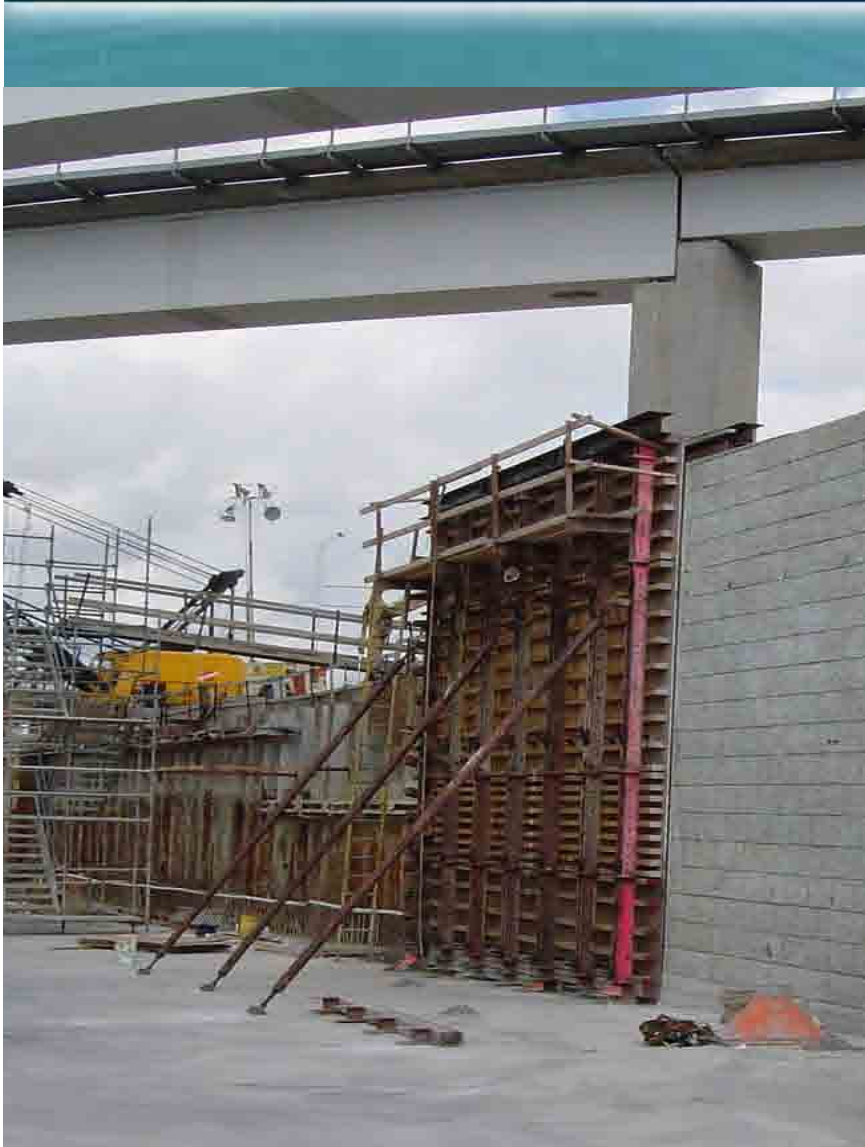
Wall Construction



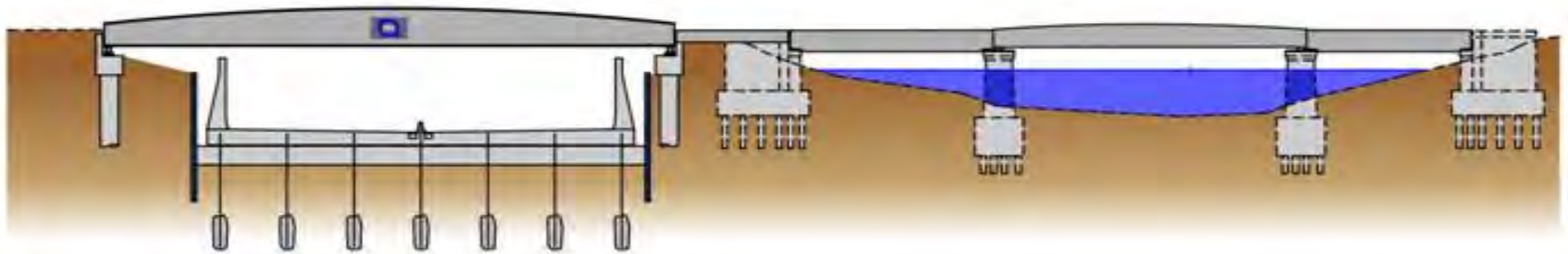
Wall Construction



Wall Construction



FEC Railroad



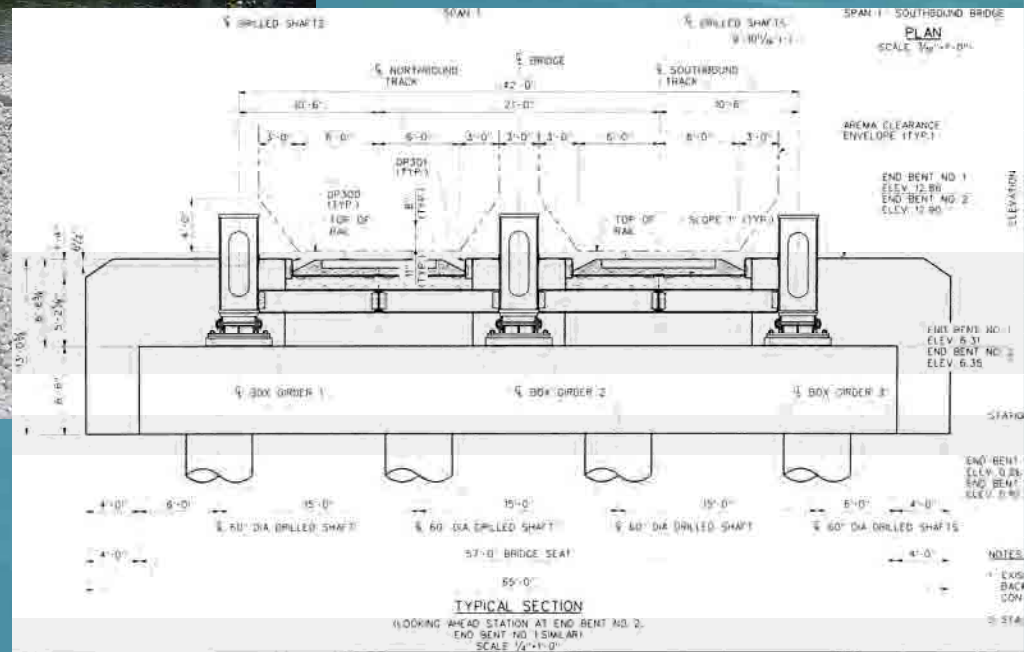
FEC Railroad

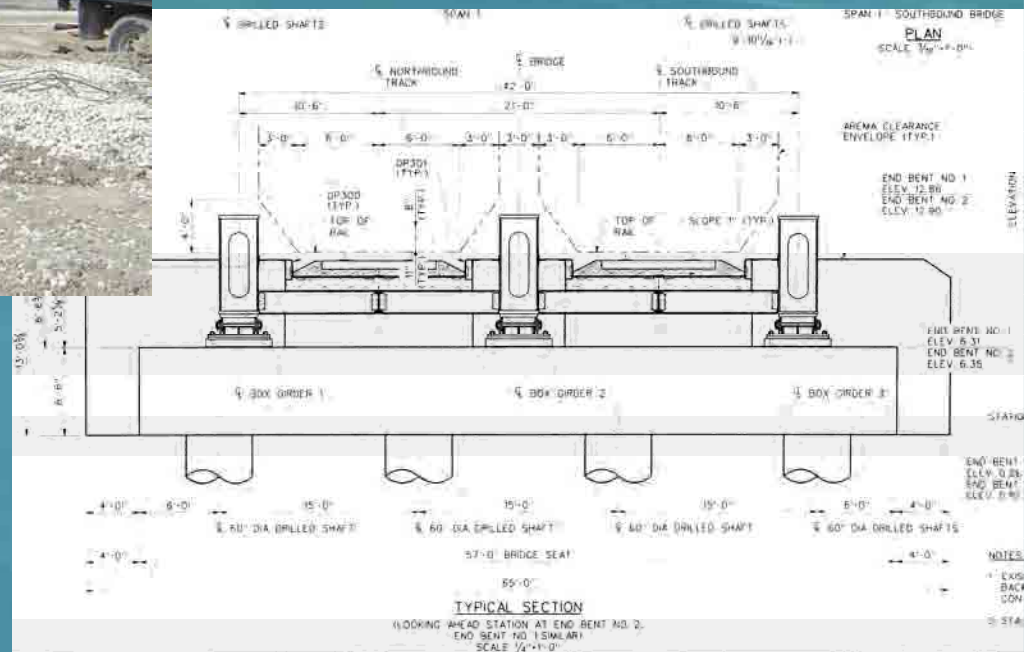




CELL 4

FEC Railroad





FEC Railroad



FEC Railroad



FEC Railroad



FEC Railroad



RR Bridge Erection
May 7, 2006



Before & After Photos



Before

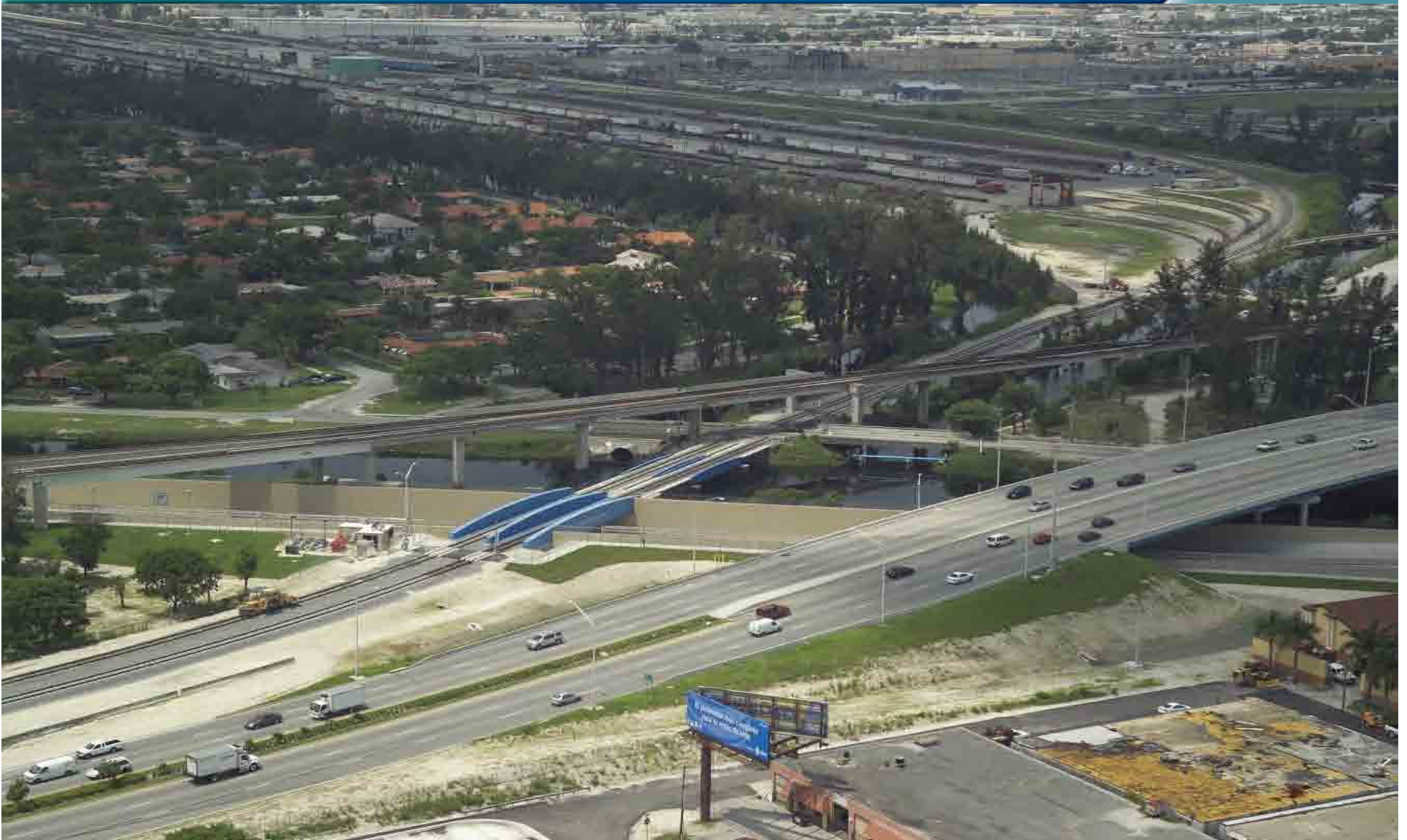


After

Project Photos



Project Photos



Project Photos



Project Photos



Project Awards

2007 Florida Transportation Builders Association's (FTBA) Design-Build Project of the Year.



2008 Grand Award, FICE Engineering Excellence Awards Program

2008 Technical Achievement Award, Florida Engineering Society, Miami-Dade Chapter

Candidate for the 2008 Grand Conceptor Award, FICE Engineering Excellence Awards Program

Thank you! ... Questions?

