The Metropolitan

Water Reclamation District

of Greater Chicago

WELCOME

TO THE FEBRUARY EDITION

OF THE 2013

M&R SEMINAR SERIES

BEFORE WE BEGIN

- SILENCE CELL PHONES & SMART PHONES
- QUESTION AND ANSWER SESSION WILL FOLLOW PRESENTATION
- PLEASE FILL EVALUATION FORM
- SEMINAR SLIDES WILL BE POSTED ON MWRD WEBSITE (www. MWRD.org: Home Page ⇒ Reports ⇒ M&D Data and Reports ⇒ M&R Seminar Series ⇒ 2012 Seminar Series)
- STREAM VEDIO WILL BE AVAILABLE ON MWRD WEBSITE (www.MWRD.org: Home Page ⇒ MWRDGC RSS Feeds)

Brad Bacilek, PE

Current: Resident Project Manager, Alfred Benesch & Company, Chicago, IL

Experience: More than 15 years of construction engineering experience

Assistant Resident Engineer:

Wacker Drive I-290 and Congress Interchange

IDOT Reconstruction and widening of IL 59

Resident Engineer:

Several Wisconsin DOT local roads projects

Construction Manager/Resident Engineer, Denver , CO

A 170-foot, three span, post-tensioned twin bridge structure,

Widening of a mountain access road through a national forest

Several residential development projects

Education : B.S. in Civil Engineering, Bradley University, Peoria, IL

Professional: PE Licensed in Illinois, Wisconsin and Colorado

A registered member of the Illinois Society of Professional Engineers.

WACKER DRIVE
CONGRESS PARKWAY
INTERCHANGE

MWRD RELOCATION

CDOT
CHICAGO DEPARTMENT OF TRANSPORTATION

benesch
engineers · scientists · planners

REVIVE
WACKER DRIVE

Project Funding

CDOT

Illinois Department of Transportation

Federal Highway Administration

Project Management Team

Transystems

HW Lockner

Construction Engineer Team

Benesch

Apex

Ardmore

Civcon

GSG

PMCS

Prime Contractor

FH Paschen/Cabo Joint Venture

Subcontractors

Edward E. Gillen

Aldridge Electric

Gateway/Old Chicago Steel

Omega Demolition

S & J Construction

Highway Safety

Roberts Environmental Control

Countryside

Western Utility

Industrial Fence

Metromex

Western Remac

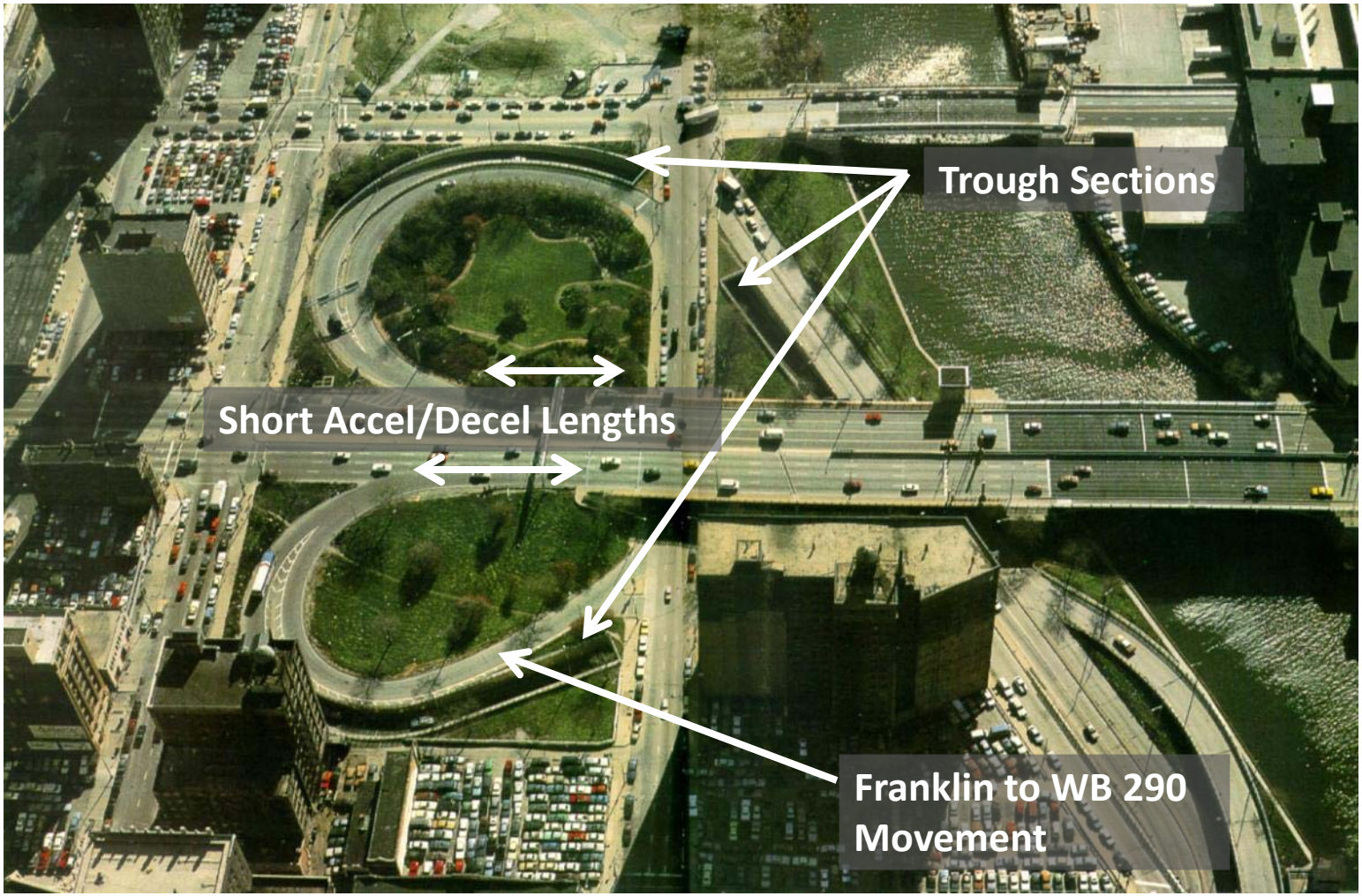
Chadwick

Allied Waterproofing

Atlantic Painting

Project Location

Existing Interchange Configuration



PROPOSED PLAN

DOG FRIENDLY AREA

AT-GRADE NORTHERN GATEWAY PARK LAWN AREA

GATEWAY PARK LAWN NORTH

SHRUB PLANTED SLOPE

LOW MAINTENANCE LAWN AREA, TYP.

WILDFLOWER / PRAIRIE GRASS MEADOW, TYP.

WELLS STREET SHADED SIDEWALK NORTH

ACCENT WALLS

GATEWAY GREEN - SHRUB / PERENNIAL / SEASONAL ANNUAL PLANTING ZONE

GATEWAY PARK LAWN SOUTH

RAMP AND STAIR CONNECTION TO SOUTHERN GATEWAY PARK LAWN AREA

WILDFLOWER / PRAIRIE GRASS MEADOW

WELLS STREET SHADED SIDEWALK - SOUTH

ILLUSTRATIVE ELEVATION A-A
NTS

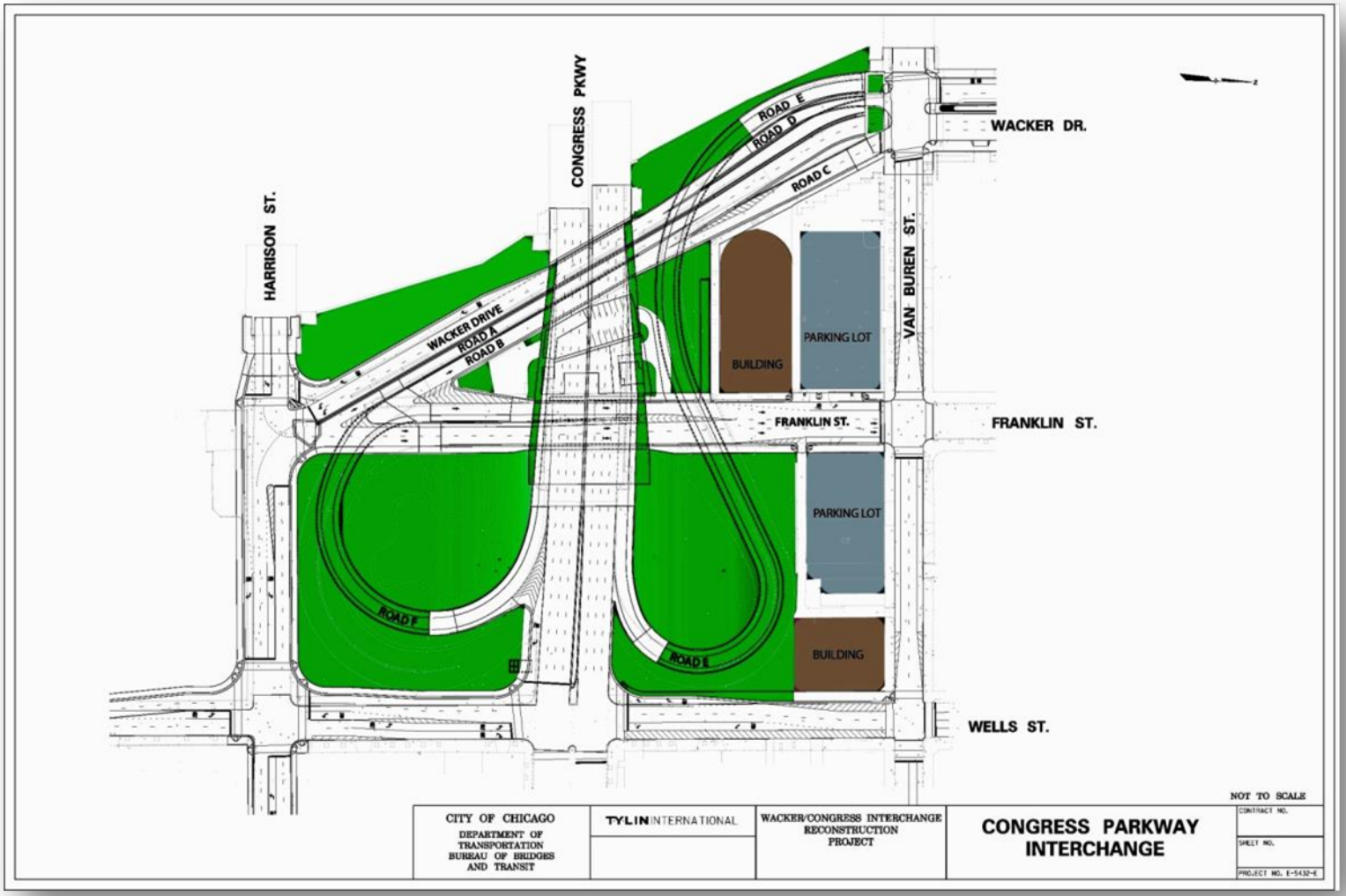
ILLUSTRATIVE ELEVATION B-B
NTS

NOTE:
NORTHERN AREA OF GATEWAY PARK = 1.53 ACRES
SOUTHERN AREA OF GATEWAY PARK = 2.08 ACRES
DOG PARK AREA = .28 ACRES

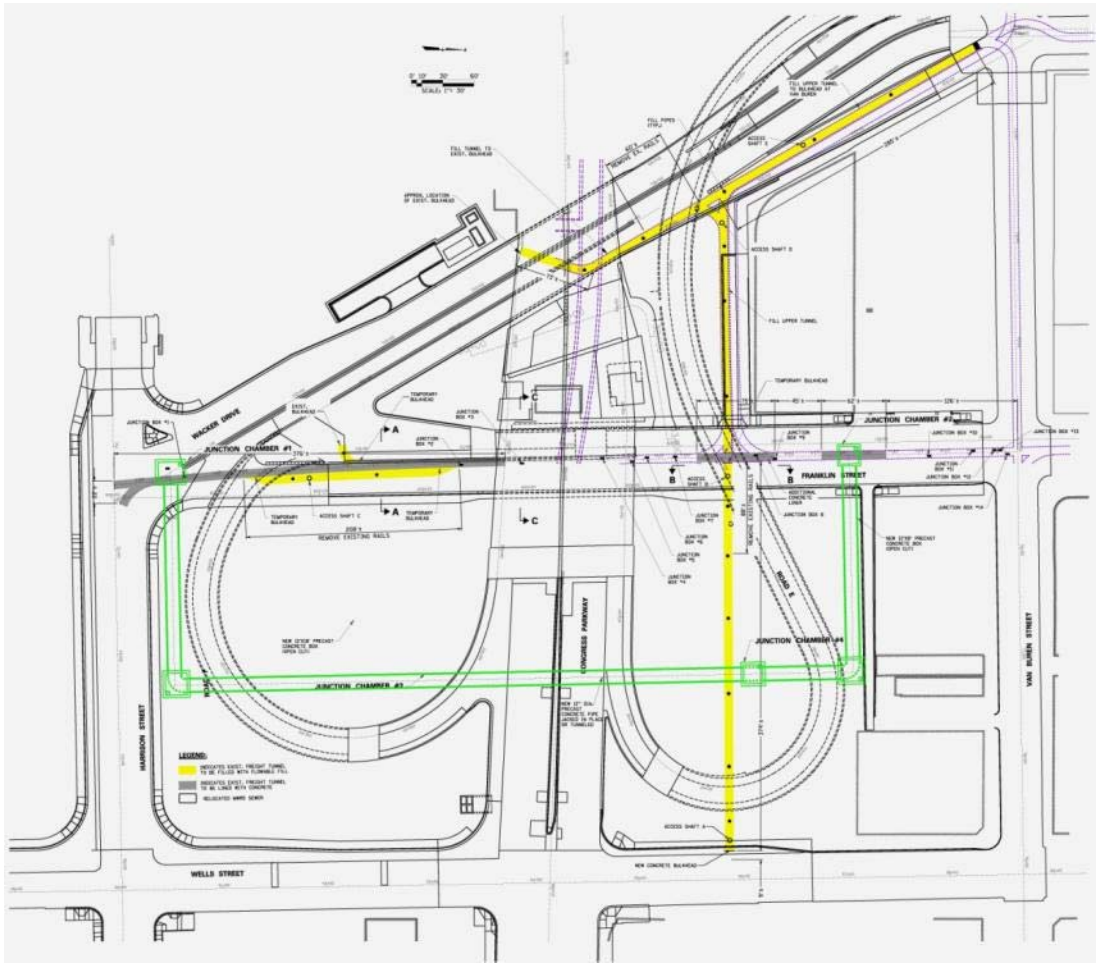
WACKER GATEWAY PARK - SITE LANDSCAPE CONCEPT

Wacker Drive Interchange - Landscape Architectural Presentation

North-South Wacker Drive: Proposed Interchange Improvements

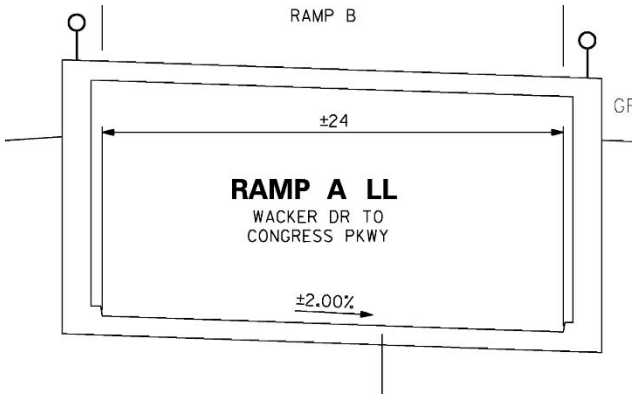


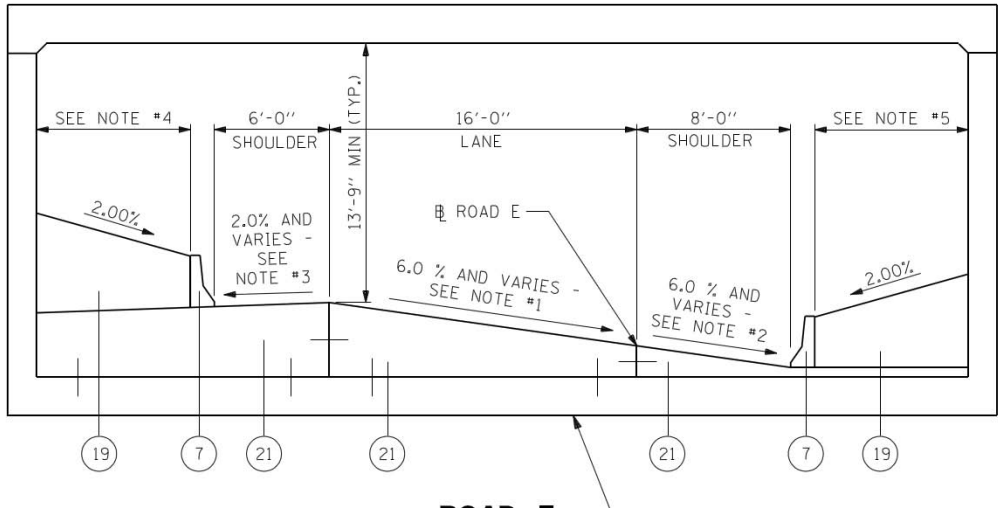
North-South Wacker Drive: Design Challenges



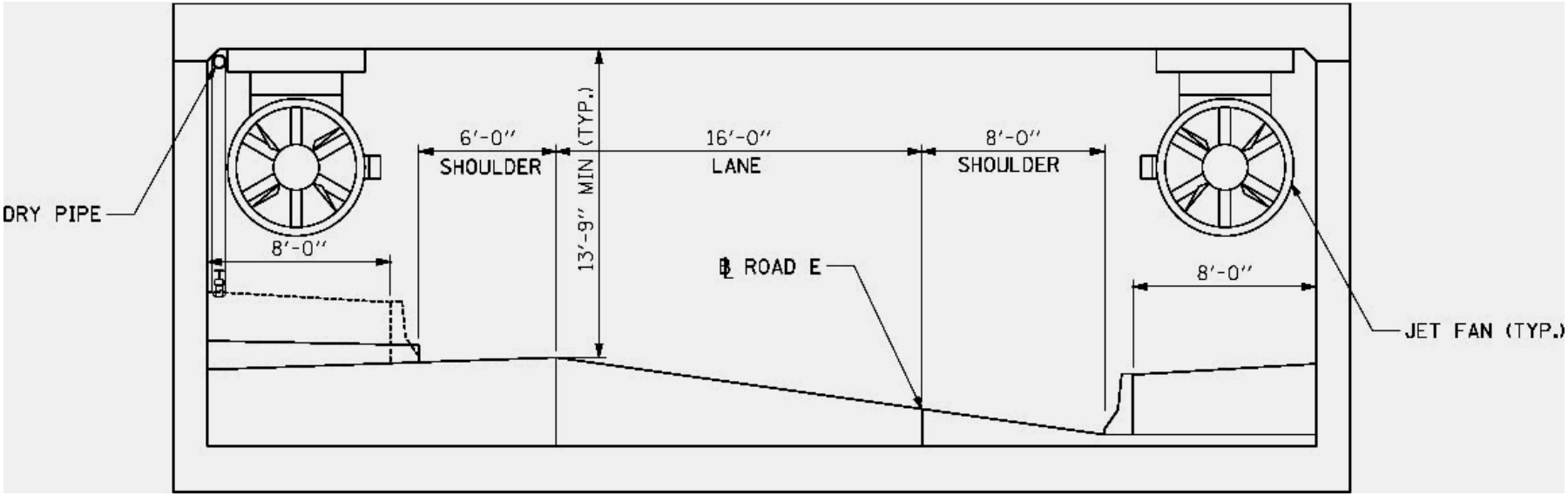
Major Underground Elements

Existing Tunnel VS Proposed





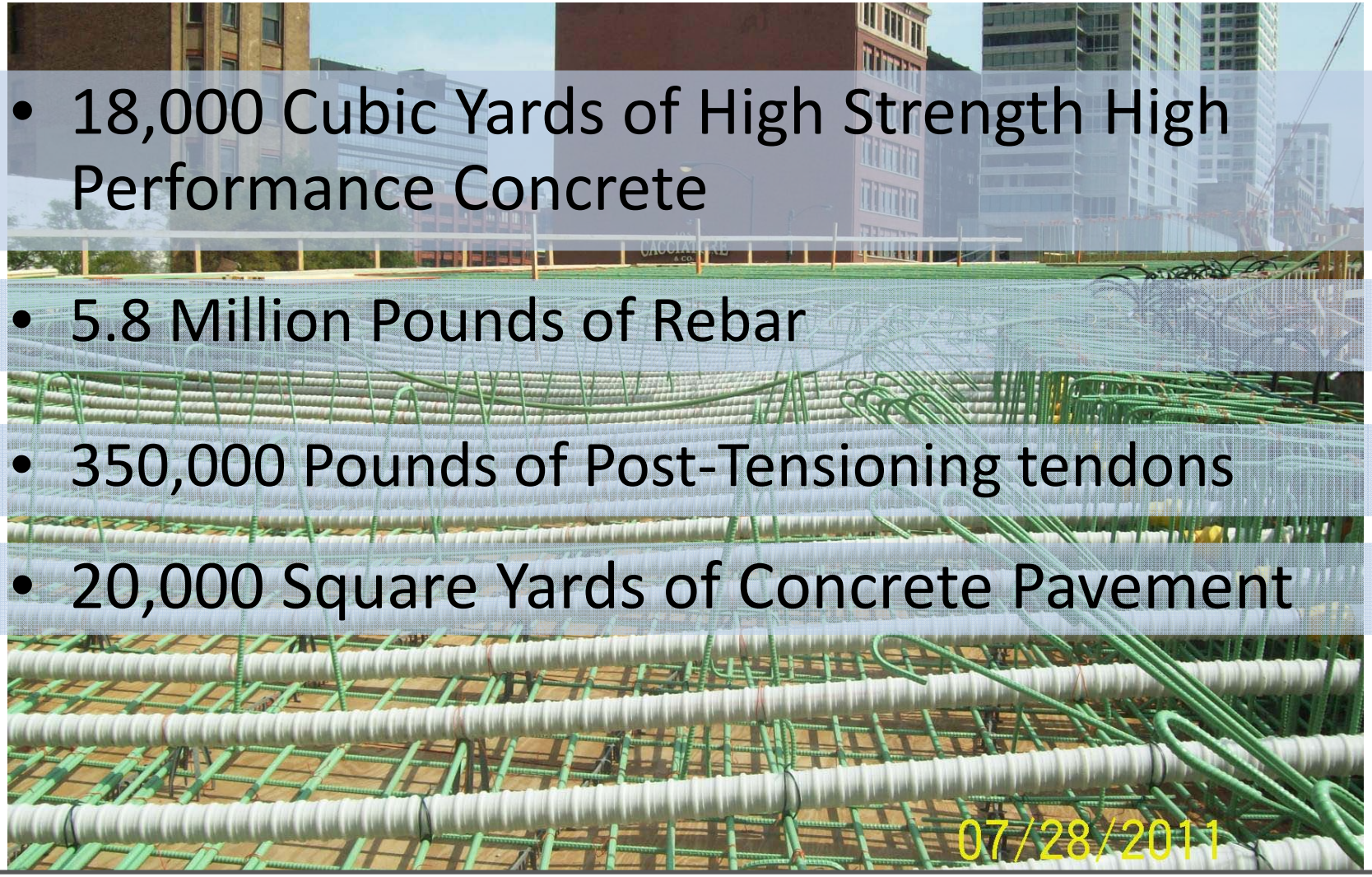
North-South Wacker Drive: Design Challenges



NFPA Code Compliance

Tunnel E / MWRD Construction

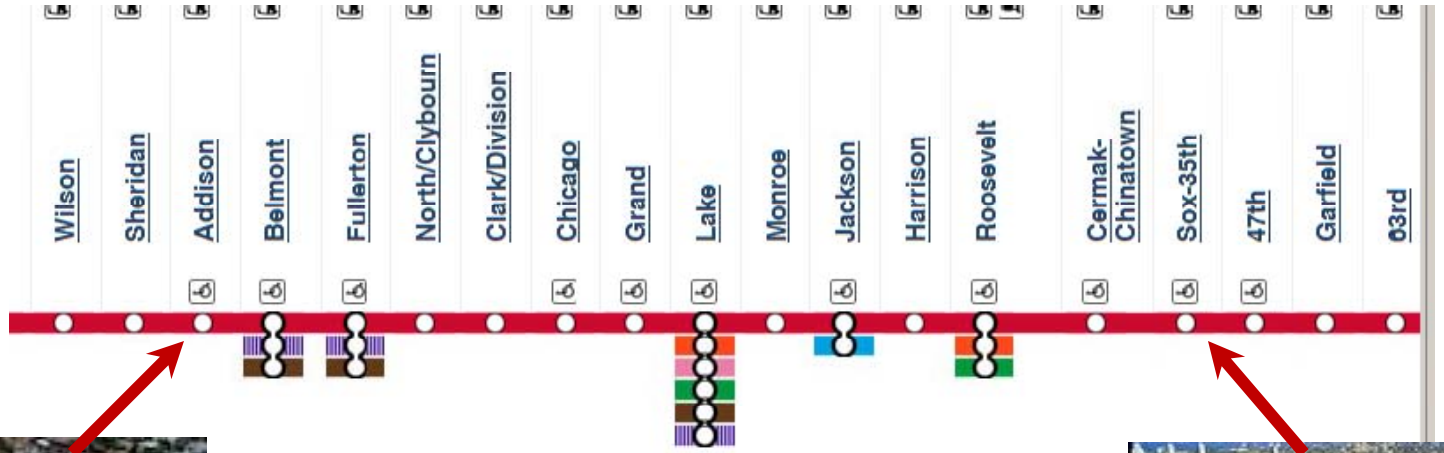
Project Scale



- 18,000 Cubic Yards of High Strength High Performance Concrete
- 5.8 Million Pounds of Rebar
- 350,000 Pounds of Post-Tensioning tendons
- 20,000 Square Yards of Concrete Pavement

Project Scale – Deep Foundations

- 592 H-piles / Average Length of 84 Feet



Project Scale – Deep Foundations

- 168 Total Caissons Used – Majority in Tunnels

- 192 Total Caissons used in the Burj Khalifa in Dubai, U.A.E.

Tunnel E / MWRD Construction

Tunnel E Caissons

Tunnel E Excavation

Tunnel E Rebar

Tunnel E Base Slab

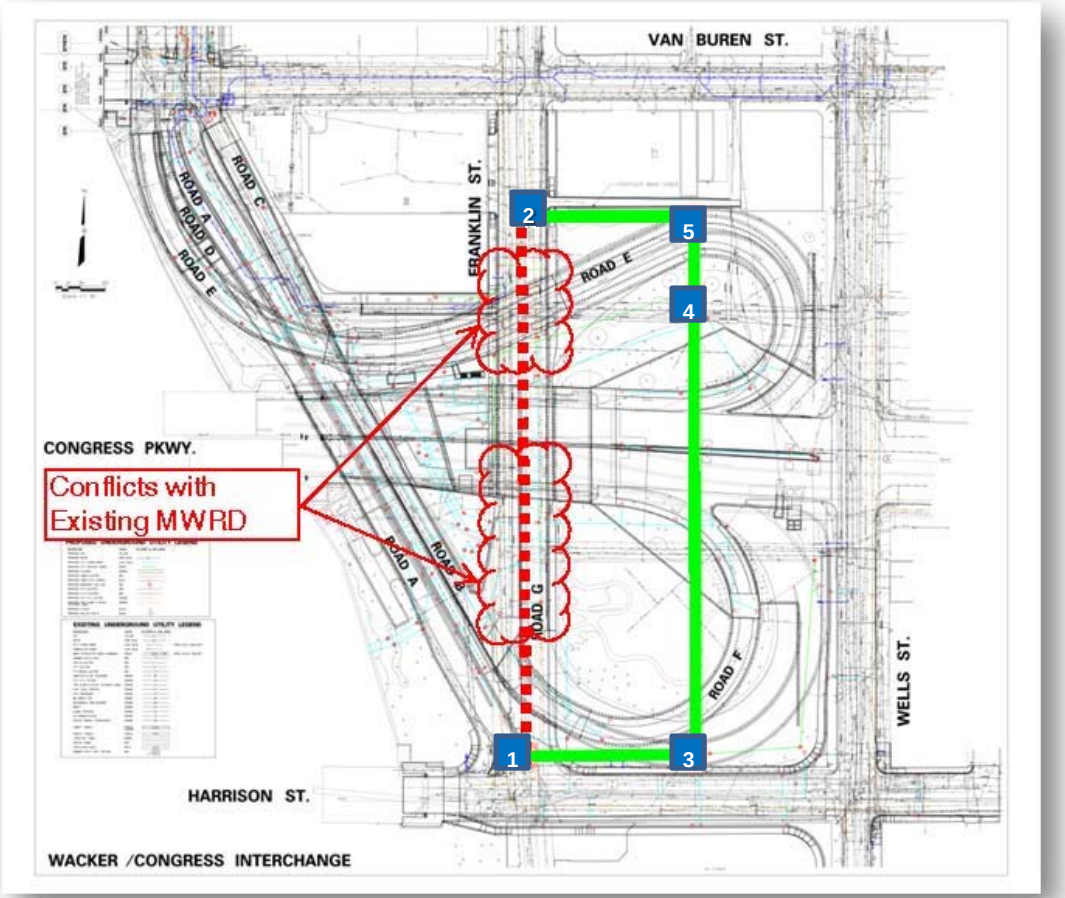
Tunnel E Framing Walls

Tunnel E Roof Rebar and PT Installation

Tunnel E Roof Pour

Tunnel E Waterproofing

MWRD Relocation



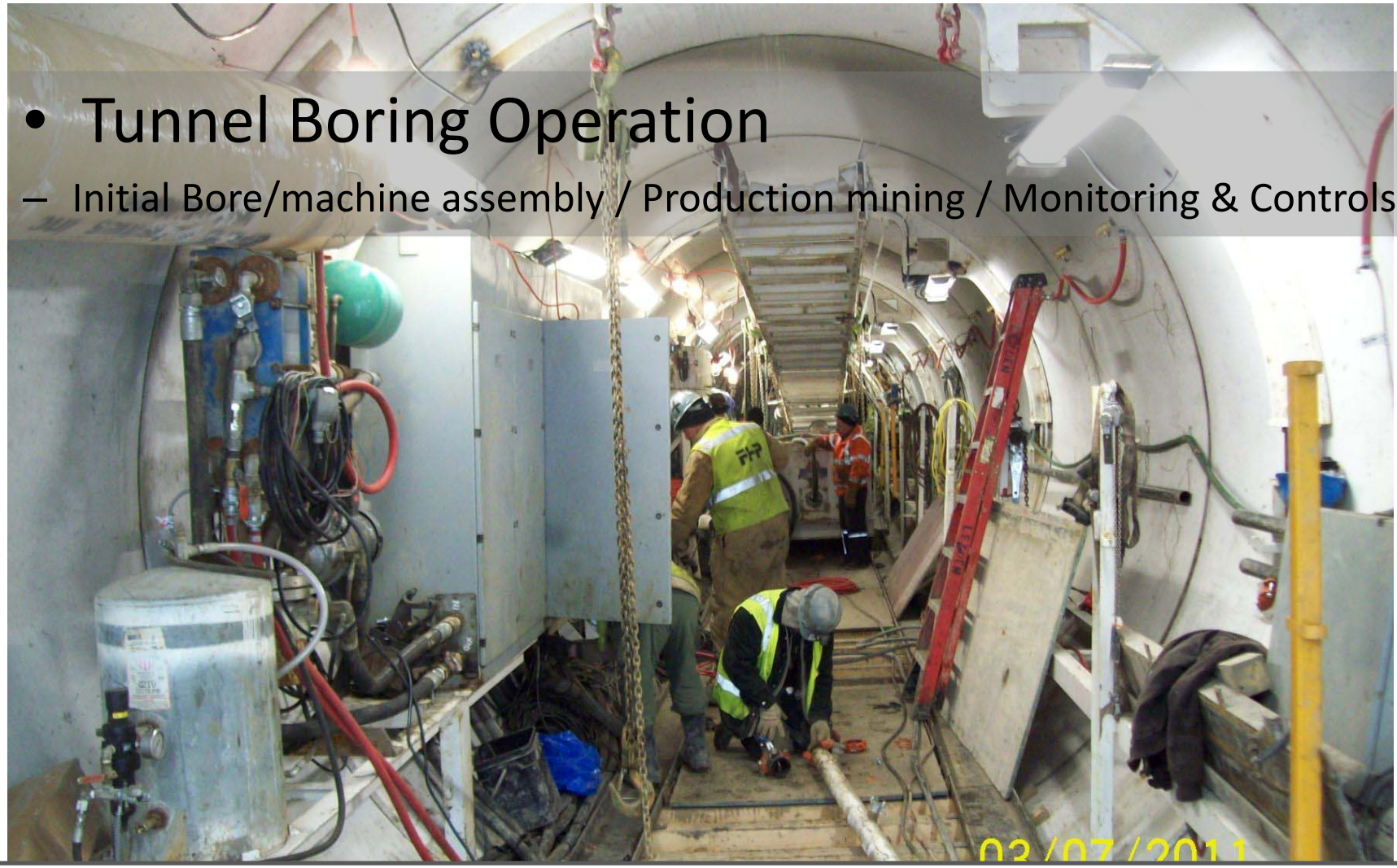
MWRD Relocation

- Junction Chamber / Jacking Pit Construction

MWRD Relocation

- Earth Pressure Balance Tunnel Boring Machine

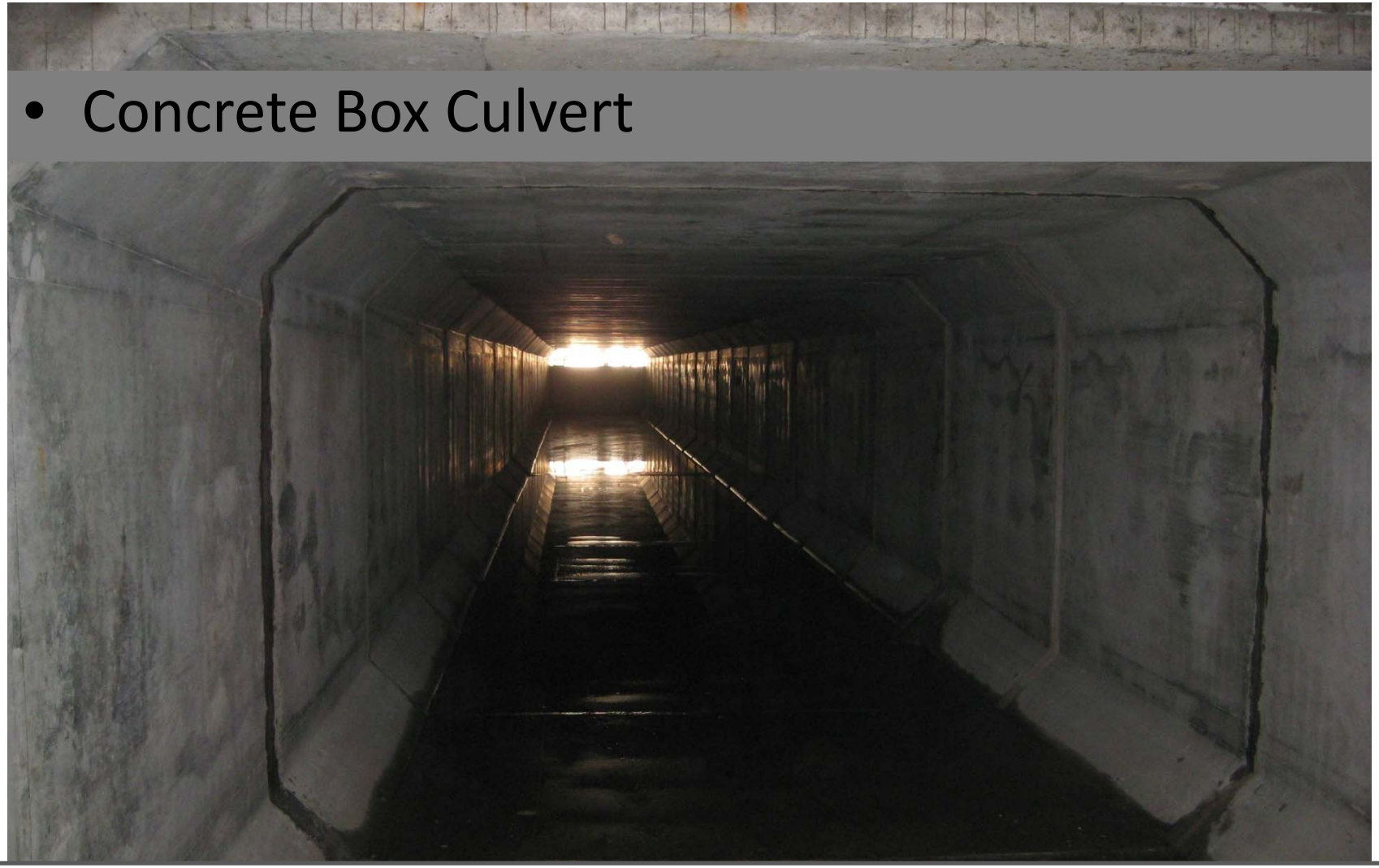
MWRD Relocation



- Tunnel Boring Operation
  - Initial Bore/machine assembly / Production mining / Monitoring & Controls

MWRD Relocation

- Concrete Box Culvert



MWRD Relocation

- Tie-in Procedure

MWRD Relocation

- Issues and Lessons Learned

Tunnel Boring Operation

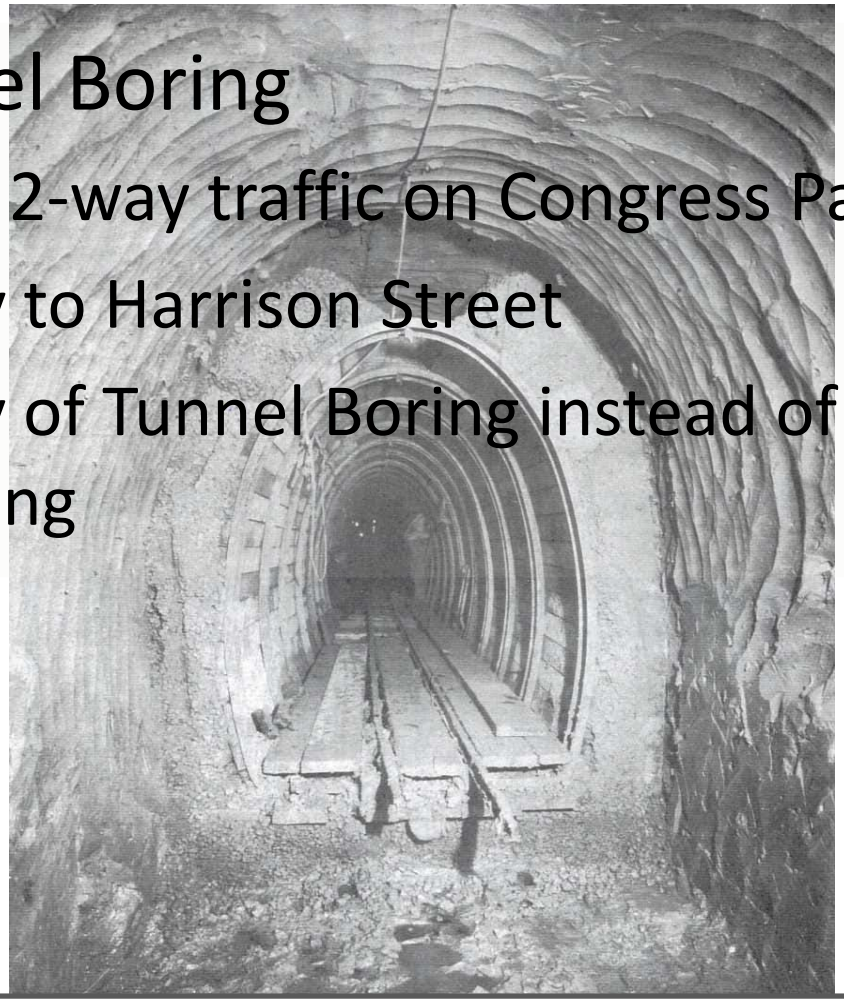
- Why Tunnel Boring
  - Maintain 2-way traffic on Congress Parkway

Tunnel Boring Operation

- Why Tunnel Boring
  - Maintain 2-way traffic on Congress Parkway
  - Proximity to Harrison Street

Tunnel Boring Operation

- Why Tunnel Boring
  - Maintain 2-way traffic on Congress Parkway
  - Proximity to Harrison Street
  - Efficiency of Tunnel Boring instead of hand mining and shoring



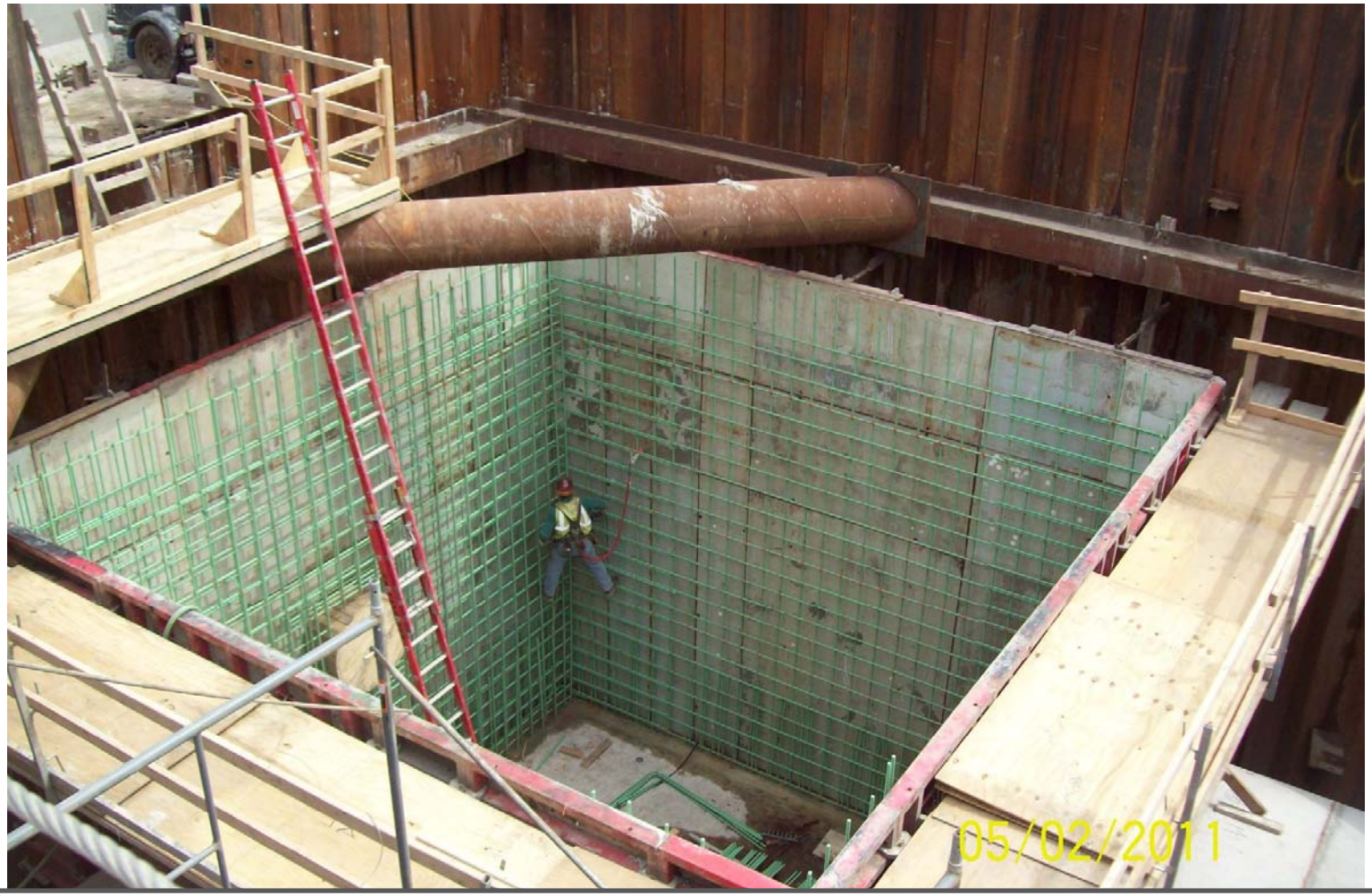
Junction Chamber/Jacking Pit

- Base Slab / Rails / Portal

Junction Chamber/Jacking Pit

- Thrust Block

Junction Chamber/Jacking Pit



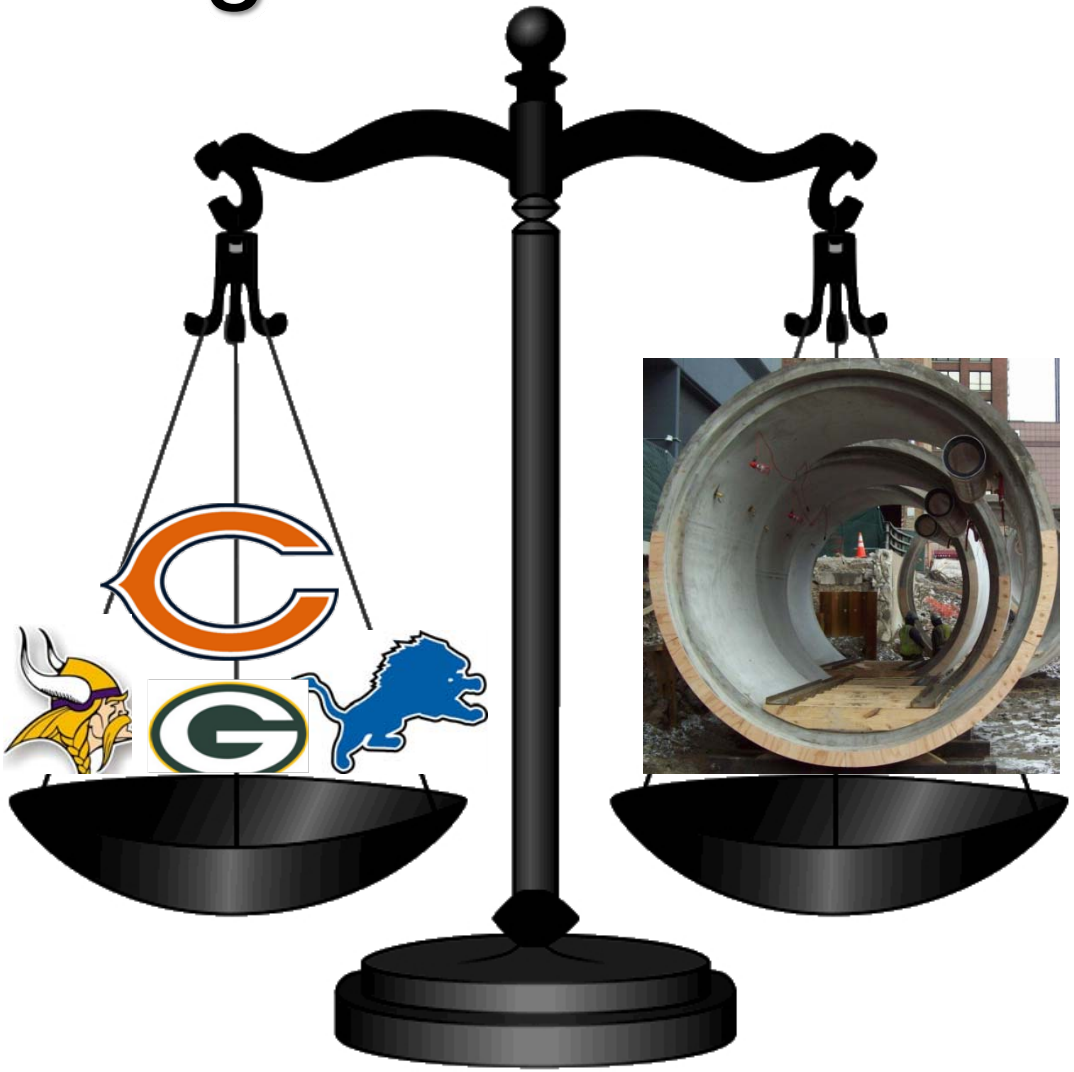
Concrete Pipe Segments

- 12’ ID Reinforced Concrete Pipe
- 91 EA 8’ Segments Used
- 12 CY Concrete / Section
- 500 LB of WWM / Section
- Fc = 7000 psi @ 28 days
- Anticipated Jacking Force = 2500 psi

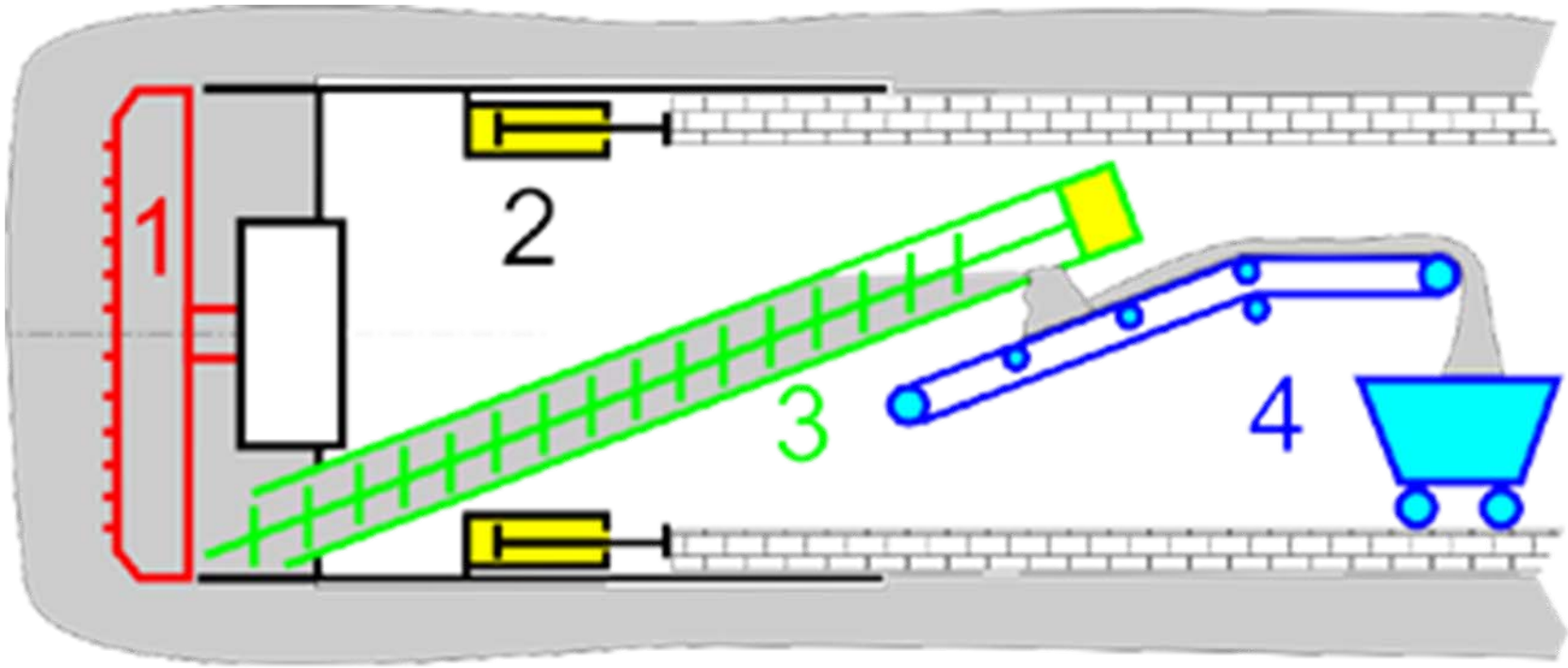
Concrete Pipe Segments

49,000 LB per Section

= Total weight of every football player in the NFC North



EPBTBM
(Earth Pressure Balance Tunnel Boring Machine)



Earth Pressure Balance Tunnel Boring Machine

Hydraulic Ram

Cutting Head

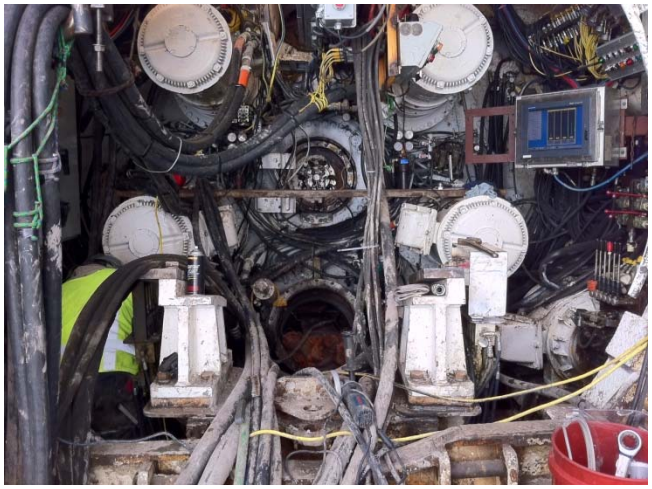
Lead TBM Section

Middle TBM Section

Earth Pressure Balance Tunnel Boring Machine

Computer Aided Guidance

Hydraulic Pressure Controls

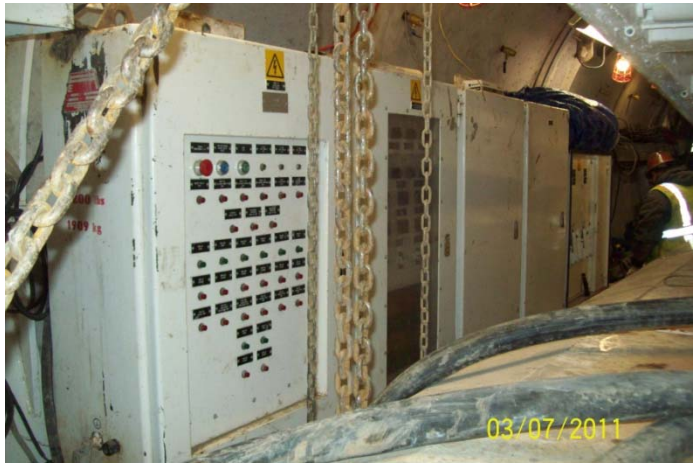


Main Bearing and Mechanics

Drive Motors

Earth Pressure Balance Tunnel Boring Machine

Transformer



Control Cabinets

Electrical Assembly

Conveyor

Tunnel Boring Production

Remove Clay

Setting Pipe Sections

Restore All Connections

Jack Pipe

Tunnel Boring Production – Turn at JC 3

Entry to Junction Chamber 3

Drive TBM into Junction Chamber 3

Turning TBM to E-W Alignment

Begin Western Bore

Tunnel Boring Production – Completion at JC 1

Entry to Junction Chamber 1

Split Sections in Junction Chamber 1

Extracting Equipment from Receiving Pit

Cutting Head and Lead Section

Constructing Junction Chambers 3 & 4

Base Slab in Junction Chamber

Wall Steel and Formwork

Stripped Junction Chamber

Roof Steel

12’ x 8’ Concrete Box Culvert

- **31 – 8’ Segments of 12x8 CBC**
- **Installed in Open Cut Trench**

Installing Box Culvert

Seated CBC with Skid Loader

Internal Gasket

External Sealing Wrap

Backfilled

Cut-over Procedure

1. Transition flow through JC 1 area while JC 1 is constructed
2. Construct JC 1 to spring line (top of bench)
3. Bulk head end of box culvert
4. Release flow into new alignment by bypassing pumping JC 2
5. Construct JC 2 and complete JC 1 up to top of walls
6. Remove bulk heads and bypass pumping equipment
7. Pour roof slabs on JC 1, 2 and pour risers and caps

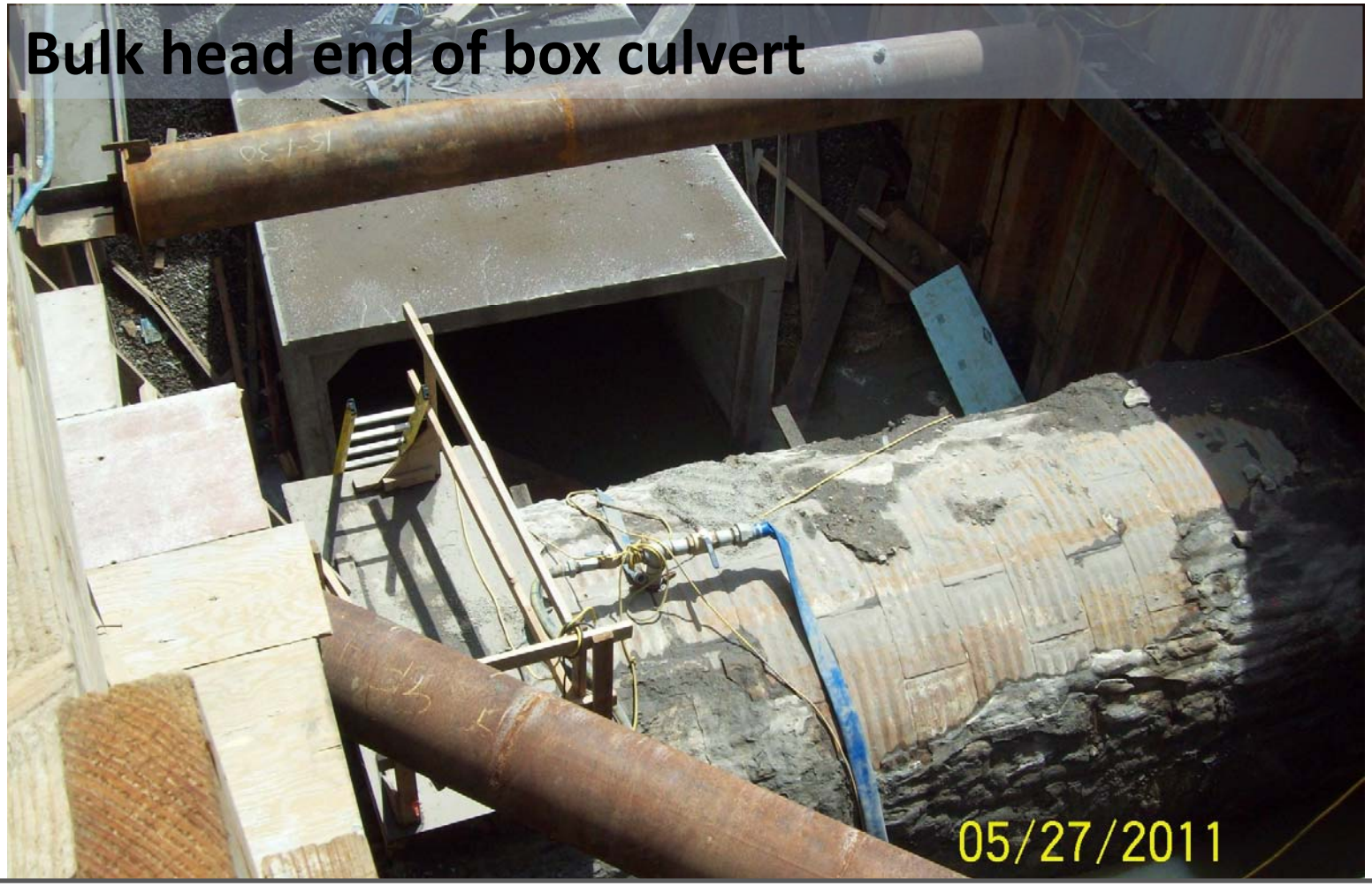
Cut-over Procedure - Step 1

1. **Transition flow through JC 1 area while JC 1 is constructed**

Cut-over Procedure - Step 2

Construct Junction Chamber 1 to spring line

Cut-over Procedure - Step 3

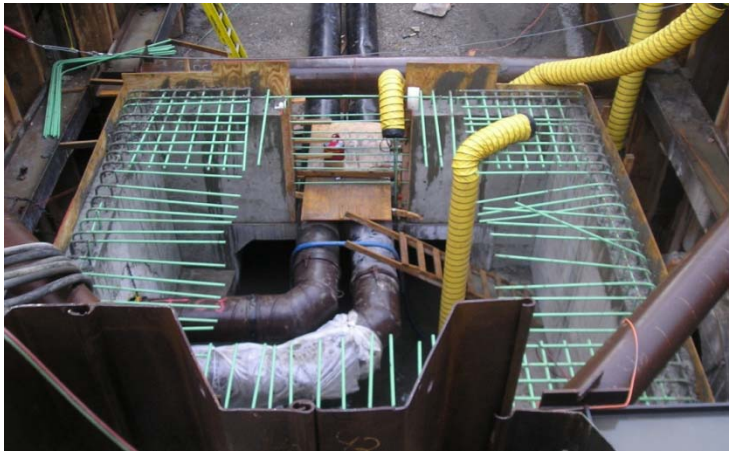


Cut-over Procedure - Step 4

Release flow into new alignment by bypassing pumping JC 2

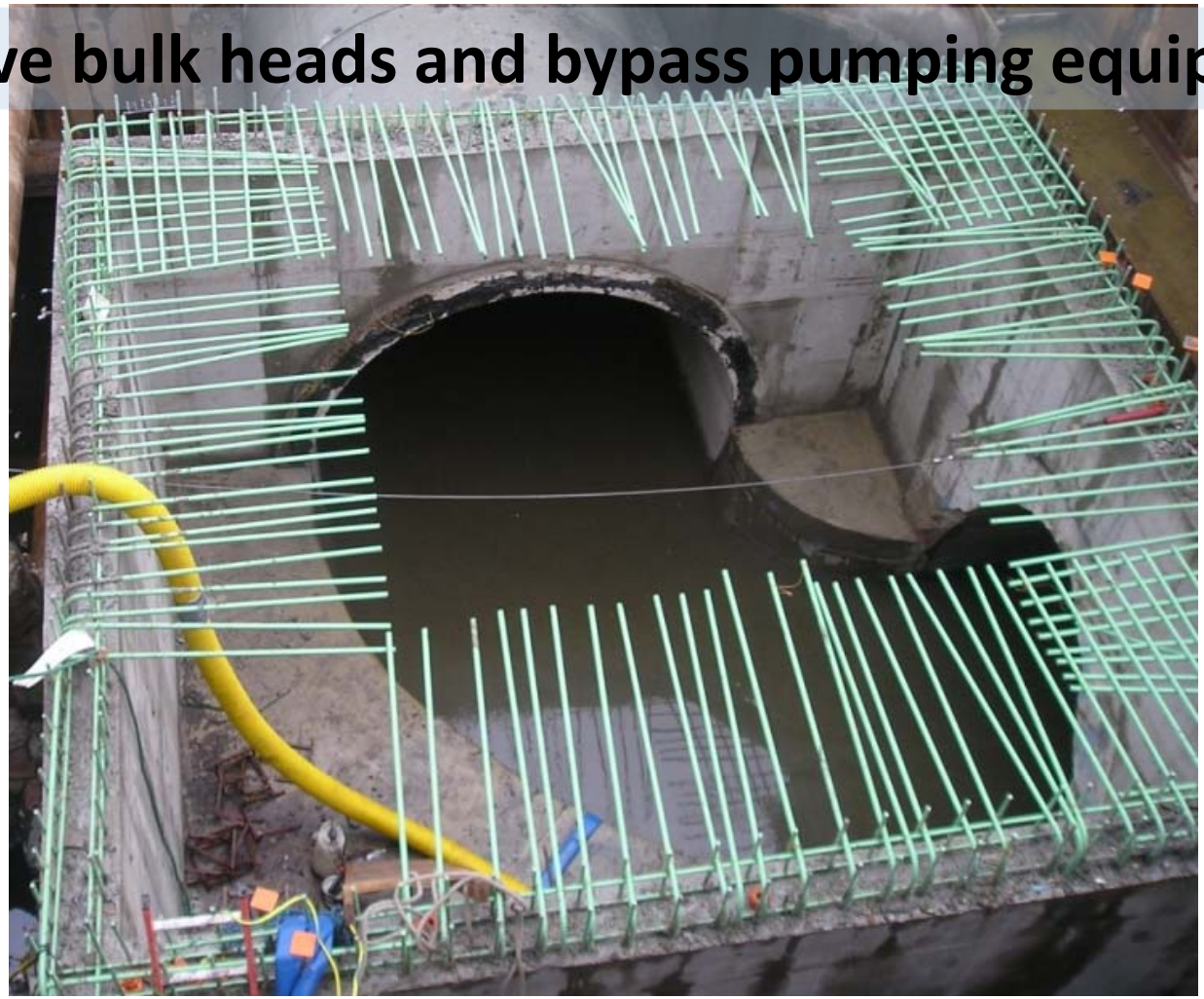
Cut-over Procedure - Step 5

Construct JC 2 base slab, walls and channelization



Cut-over Procedure - Step 6

Remove bulk heads and bypass pumping equipment



Cut-over Procedure - Step 7

Pour roof slabs on JC 1, 2 and pour risers and caps

Issues and Lessons Learned

Issues and Lessons Learned

Questions?

CDOT
CHICAGO DEPARTMENT OF TRANSPORTATION

REVIVE
WACKER DRIVE