



Jane Byrne INTERCHANGE

Formerly known as Circle Interchange



www.circleinterchange.org

The Jane Byrne (Circle) Interchange: Overview & Highlights

By: Brian Kuttub P.E. & Eric Ray P.E.
September 26, 2018 – Moline , Illinois

Presentation Overview

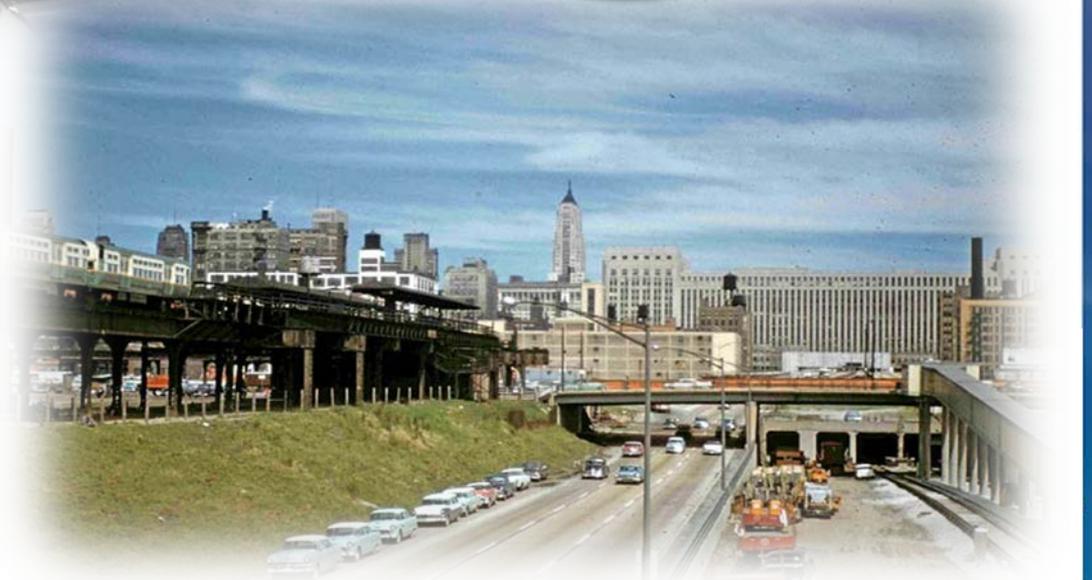
- *Project Background & History*
- *Design Features ,Challenges & Geotechnical Considerations*
- *Project Status & Upcoming Contracts*
- *Construction Features & Challenges*
- *Current Construction Activities*
- *Questions & Answers*

History & Overview

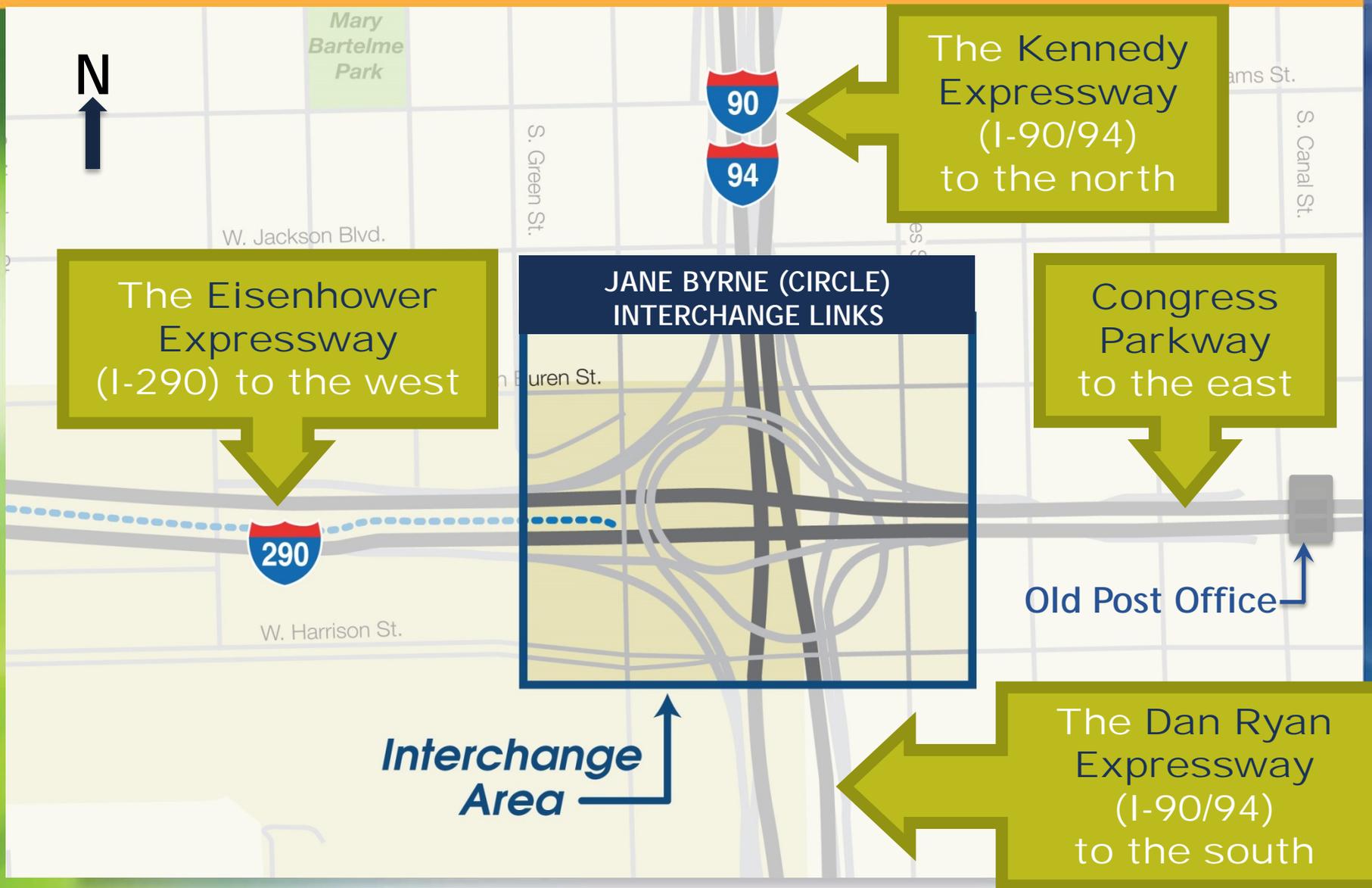


*Late 1950's
early
1960's*

*The facility is
in need of
major repair
and
reconstruction*



Project Location



History & Overview

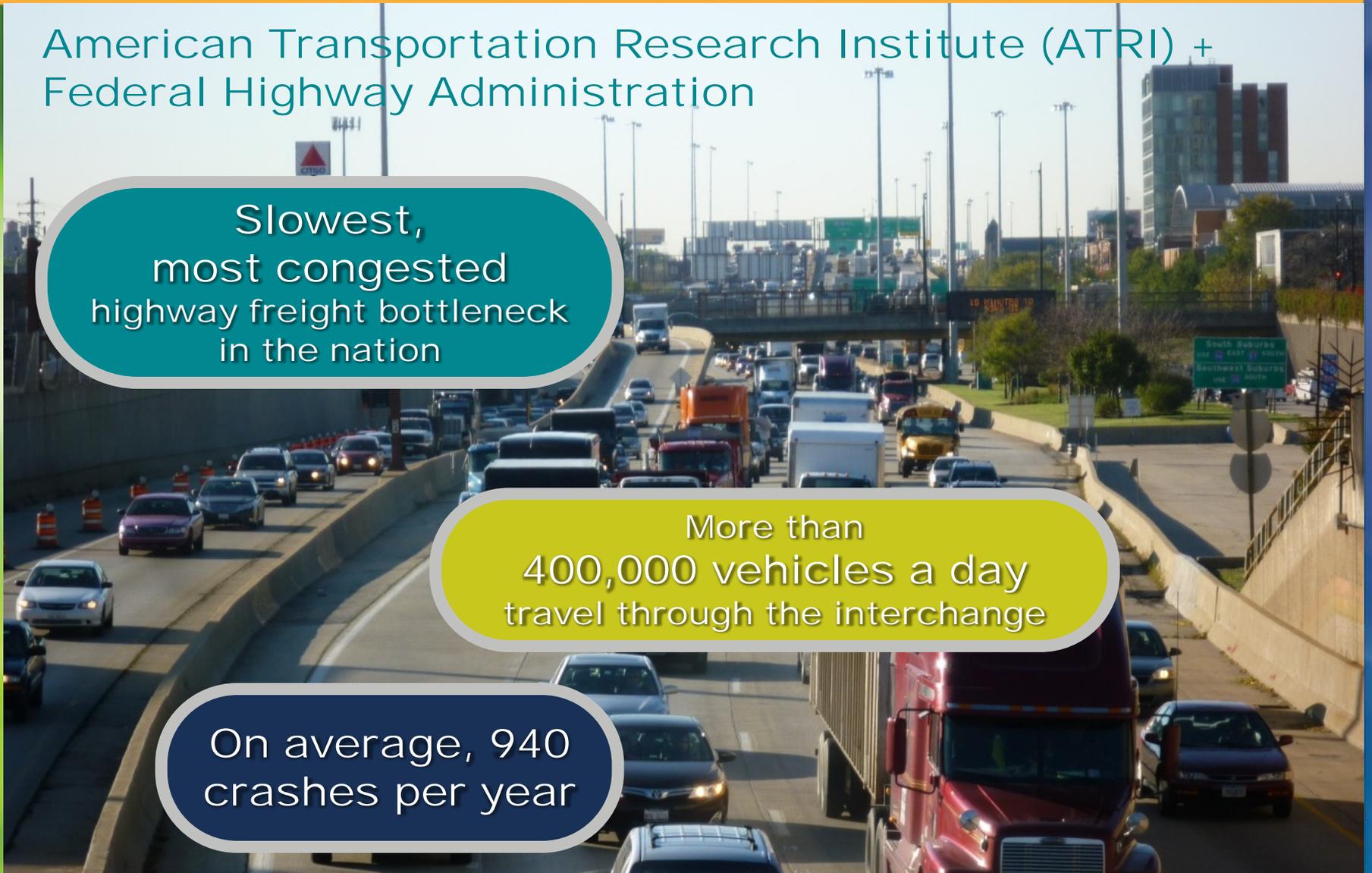


American Transportation Research Institute (ATRI) +
Federal Highway Administration

Slowest,
most congested
highway freight bottleneck
in the nation

More than
400,000 vehicles a day
travel through the interchange

On average, 940
crashes per year



Proposed Improvements

- Improve the safety and mobility

- Improve the bridges, roadway, & drainage system

- Minimizes environmental impacts

- Enhances community connectivity on the local street network



Project Key Features



- 4 Lanes I-90/94

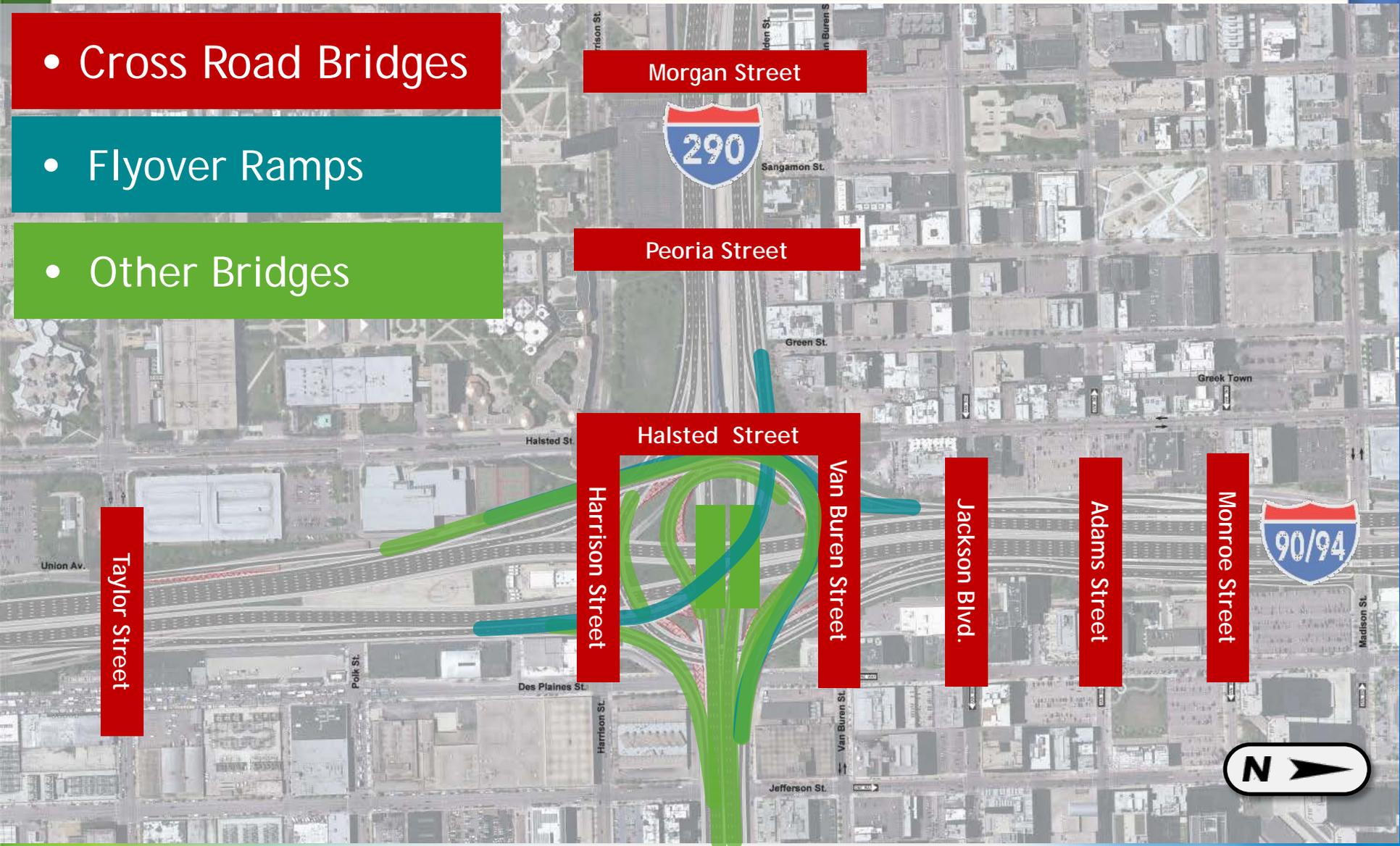
- New 2 Lane ramps
 - East to North (EN)
 - North to West (NW)

Project Key Features

- Cross Road Bridges

- Flyover Ramps

- Other Bridges



BEFORE



AFTER

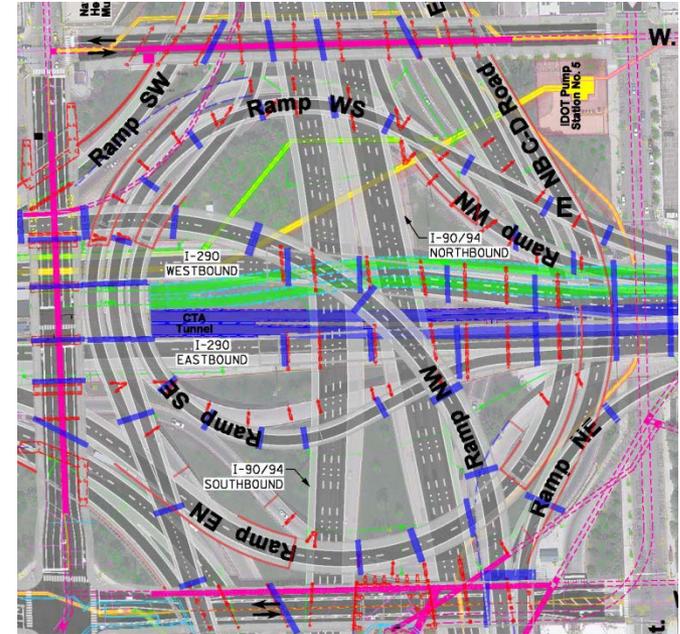


Jane Byrne
INTERCHANGE
Formerly known as Circle Interchange



Unique Features/Challenges

- Only Drilled Shaft (Caissons) as Foundation option - No Steel Piles due to Vibration Concerns
- Poor Soils
- Existing and Future CTA tunnels
- Contractors' Overlaps within Constrained Project Site
- Complex Staging while maintaining large ADT's

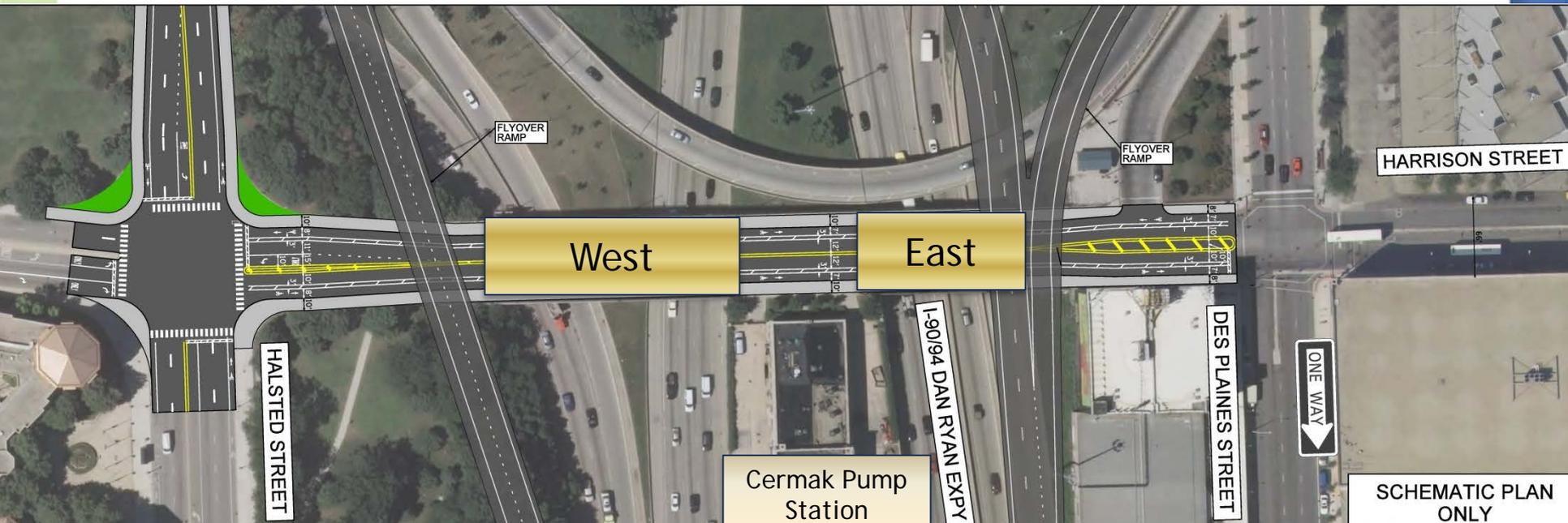


www.circleinterchange.org



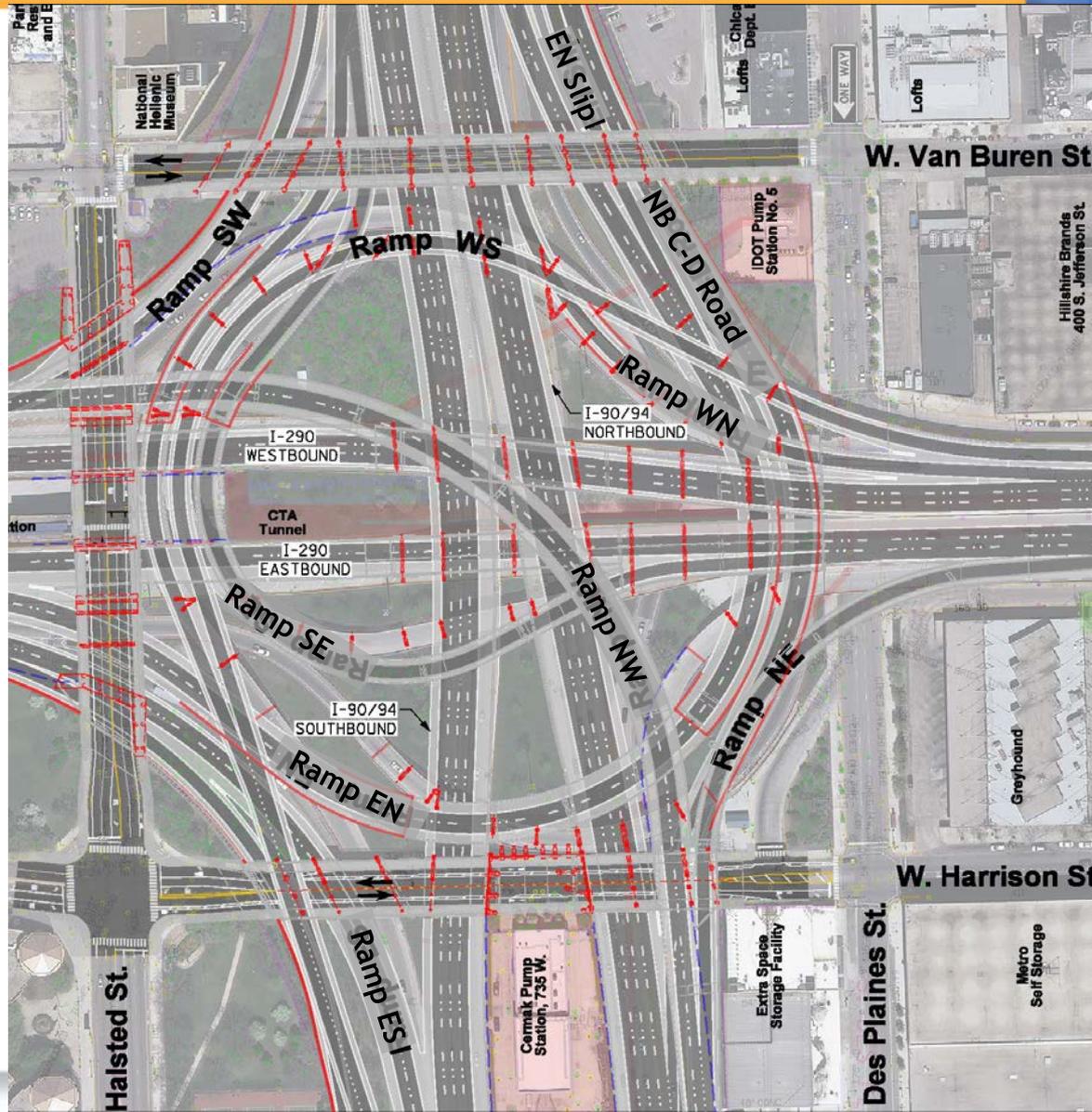
Unique Features/Challenges

- Coordination with CDOT, CTA, Chicago Department of Water Management
Several Neighborhoods and Adjacent Properties, including UIC and Greektown
- Access to Cermak Pump Station needed at all times



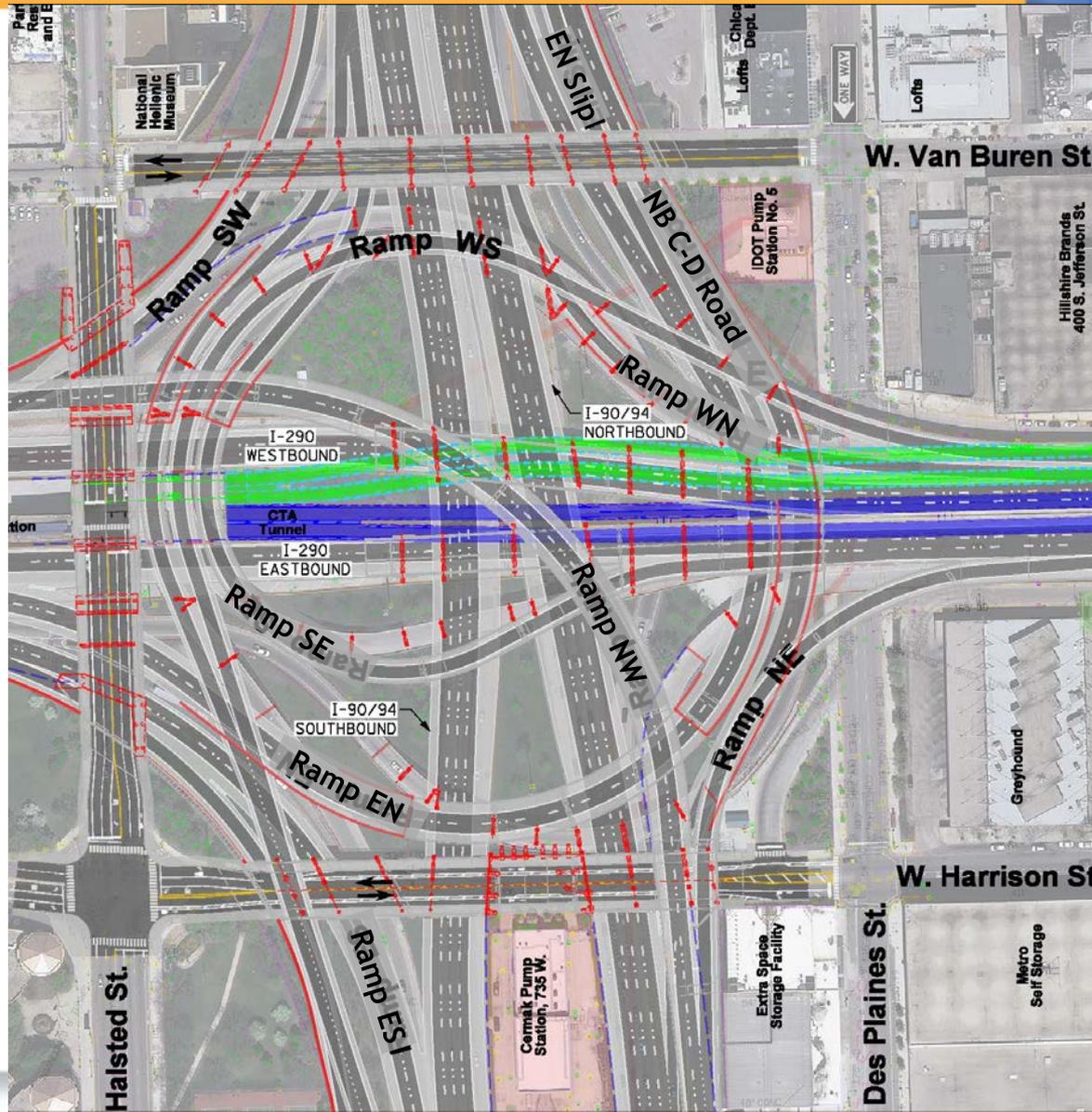
Unique Features/Challenges

- Existing Piers and Foundations



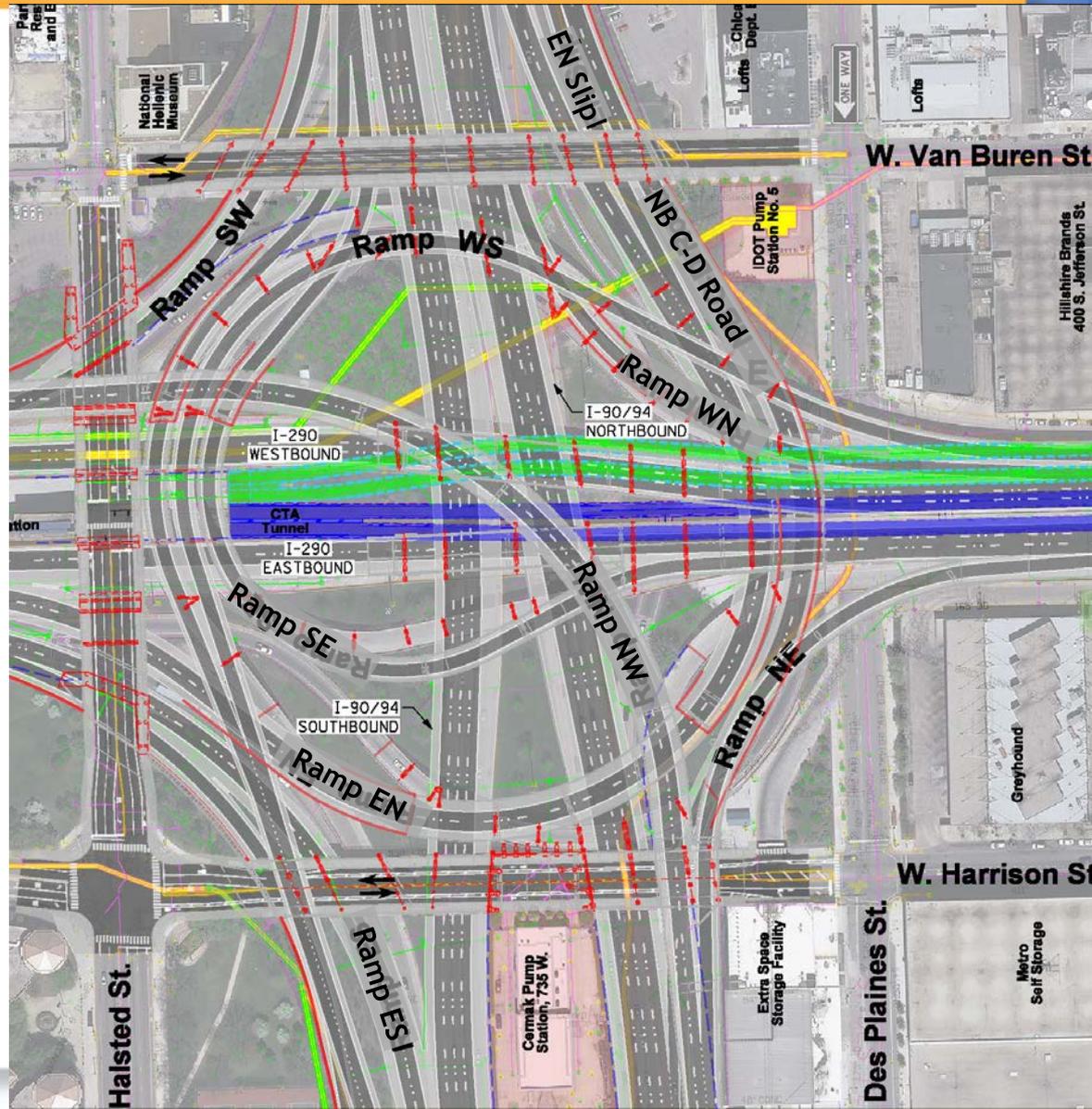
Unique Features/Challenges

- Existing Piers and Foundations
- Existing and Future CTA Tunnels



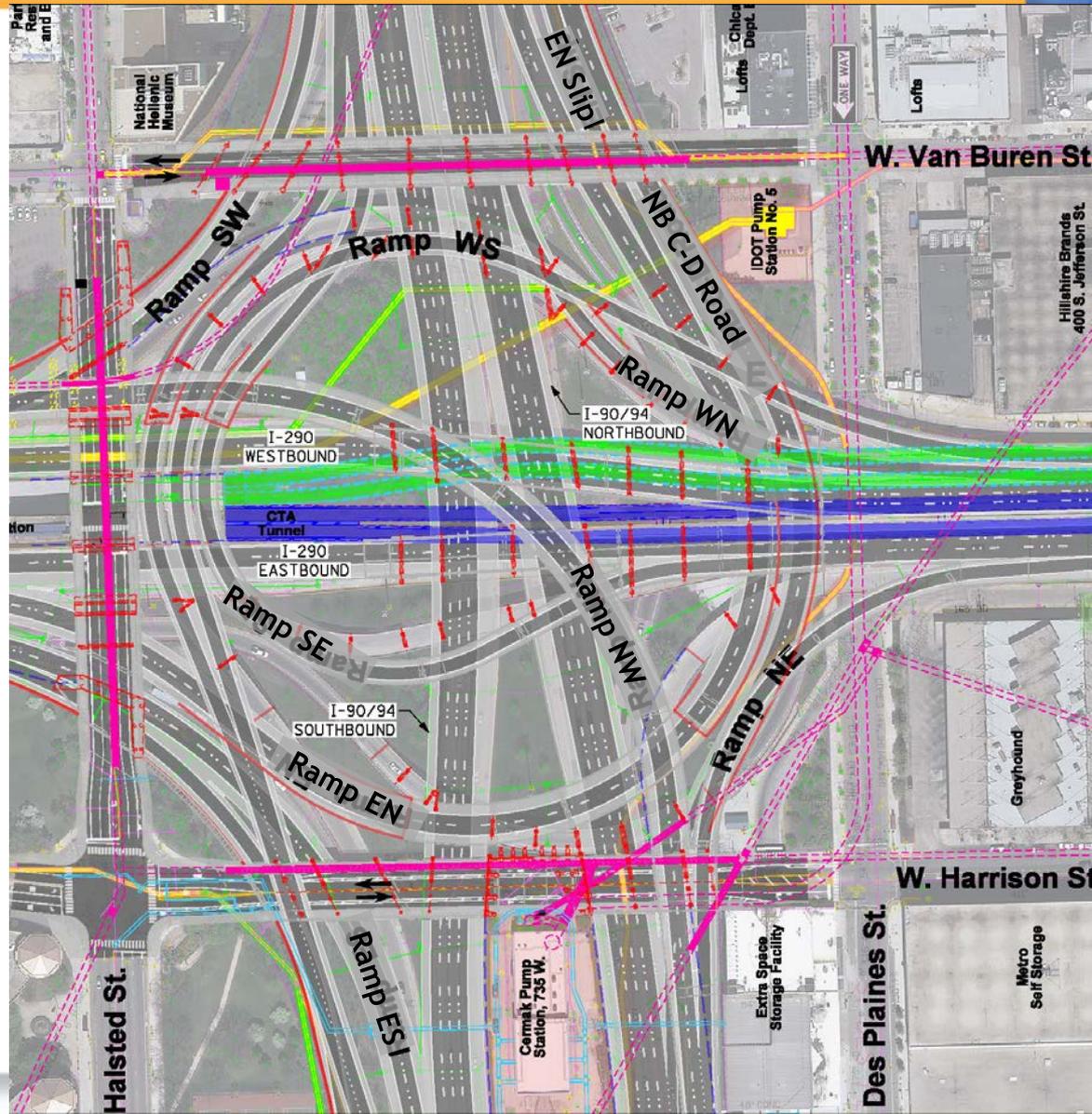
Unique Features/Challenges

- Existing Piers and Foundations
- Existing and Future CTA Tunnels
- Existing and Proposed Main Drain Sewers



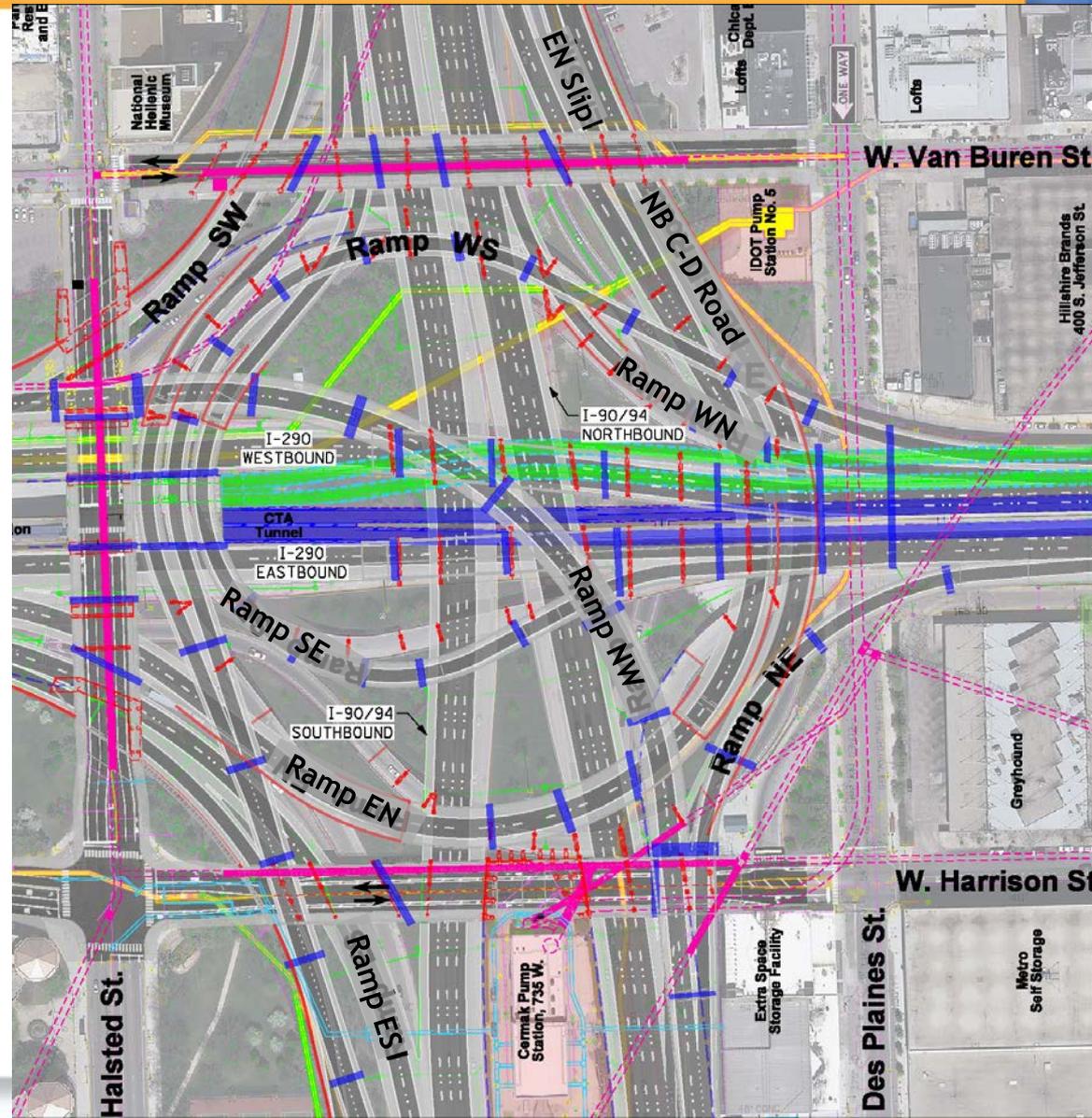
Unique Features/Challenges

- Existing Piers and Foundations
- Existing and Future CTA Tunnels
- Existing and Proposed Main Drain Sewers
- Watermain Tunnel Bulkheading



Unique Features/Challenges

- Existing Piers and Foundations
- Existing and Future CTA Tunnels
- Existing and Proposed Main Drain Sewers
- Watermain Tunnel Bulkheading
- Proposed Bridge Piers and Foundations



Corridor Soils Profile

- The JBI General Soil Profile:
 - Granular Urban fill w/ med. to stiff clay crust: 10'
 - Very soft to stiff gray clay (aka: Chicago Blue Clay): 50'
 - Stiff Clay/hard silty clay loams (aka: Chicago Hardpan): 10'
(resting on top of the Silurian age dolostone with the granular deposits; water bearing & under pressure)
 - Dolomitic Limestone bedrock at about 80 feet total depth
 - Perched groundwater table within the granular fill & lower groundwater table in the sand & gravel above bedrock.



DEFLECTION CRITERIA FOR SOIL RETENTION SYSTEMS /Chicago

- Max. deflection of perm. SRS: **1%** of retained Ht. (H) not exceeding **1** in.
- Max. deflection of temp. SRS: **1.5%** of retained Ht. (H) not exceeding **2** in.
- Excavation (Temp. or Perm.) within:
 - 1:1 (V:H) of a structure - deflection limited to 0.25"
 - 1:1.5 (V:H) of a structure - deflection limited to 0.50"
 - 1:2 (V:H) of a structure - deflection limited to 1.00"



GEOTECHNICAL DESIGN CONSIDERATIONS

- Bridge foundations:
 - Drilled Shafts/Caissons/Soldier Piles/Belled Caissons/Micropiles
- Ground Improvements:
 - Stone Columns
 - Geofoam Blocks
 - Lightweight Cellular Concrete Fill
 - Ground Anchors



OTHER CONSIDERATIONS

- Predrilled shafts not driven due to vibrations
- Drilling with oscillators
- Casing left in place due to soils movements
- Ground Water Monitoring
- CSL testing of Shafts
- Slopes Inclinometers
- Vibrations Monitoring
- Plaxis Modeling
- Deflection Criteria



DESIGN CHALLENGES

Due to the presence of 50' of soft clays below the expressway elevations & structures & utilities:

- Designing soldier pile walls for no more than 0.25" of lateral deflection & settlement
- Designing MSE walls for no more than 1 inch of settlement: many embankments & MSE walls supported on aggregate columns of lightweight cellular concrete fill
- Designing roadway pavements over the very soft subgrade by using geogrid reinforced aggregates to reduce undercuts
- Designing various drainage systems & other utilities within the very soft clay layer.



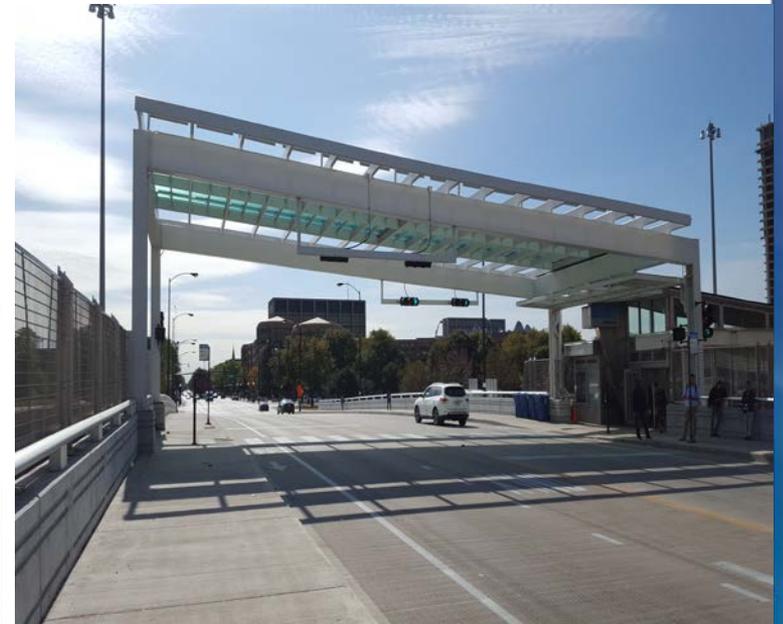
DESIGN CHALLENGES

- **Due to the water bearing granular layers:**
- Drilled shafts socketed in bedrock w/o perm. casing
- Determining presence of large boulders on top of bedrock.
- Determining water head pressure through the use of ground monitoring wells for shafts installation - wet method.



Project Status

- *Total Construction Cost: \$680 Million*
- **16** *Contracts “Substantially” Complete (\$250 M)*
- **8** *Contracts Under Construction (\$160 M)*
- **11** *Contracts Remain (\$270 M)*
- *Design : 70% Complete*
- *Construction : 68% Complete*



Construction Completed



Ongoing Construction Work

- 1. WB I-290 Mainline (60X77)*
- 2. Jackson Boulevard Utility Relocation (62A75)*
- 3. Ramp NE (62B76)*
- 4. Water Main Relocation/Rehab. @ Cermak PS*
- 5. Van Buren Street Bridge (60X99)*
- 6. Monroe St. (60X95)*
- 7. EB I-290/Congress Parkway Bridges (60X75)*
- 8. EB I-290 Mainline Reconstruction (60X76)*

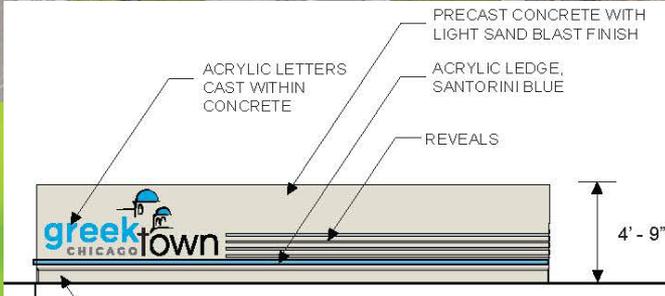


Ongoing Construction Work



Van Buren Street – Elysian Field

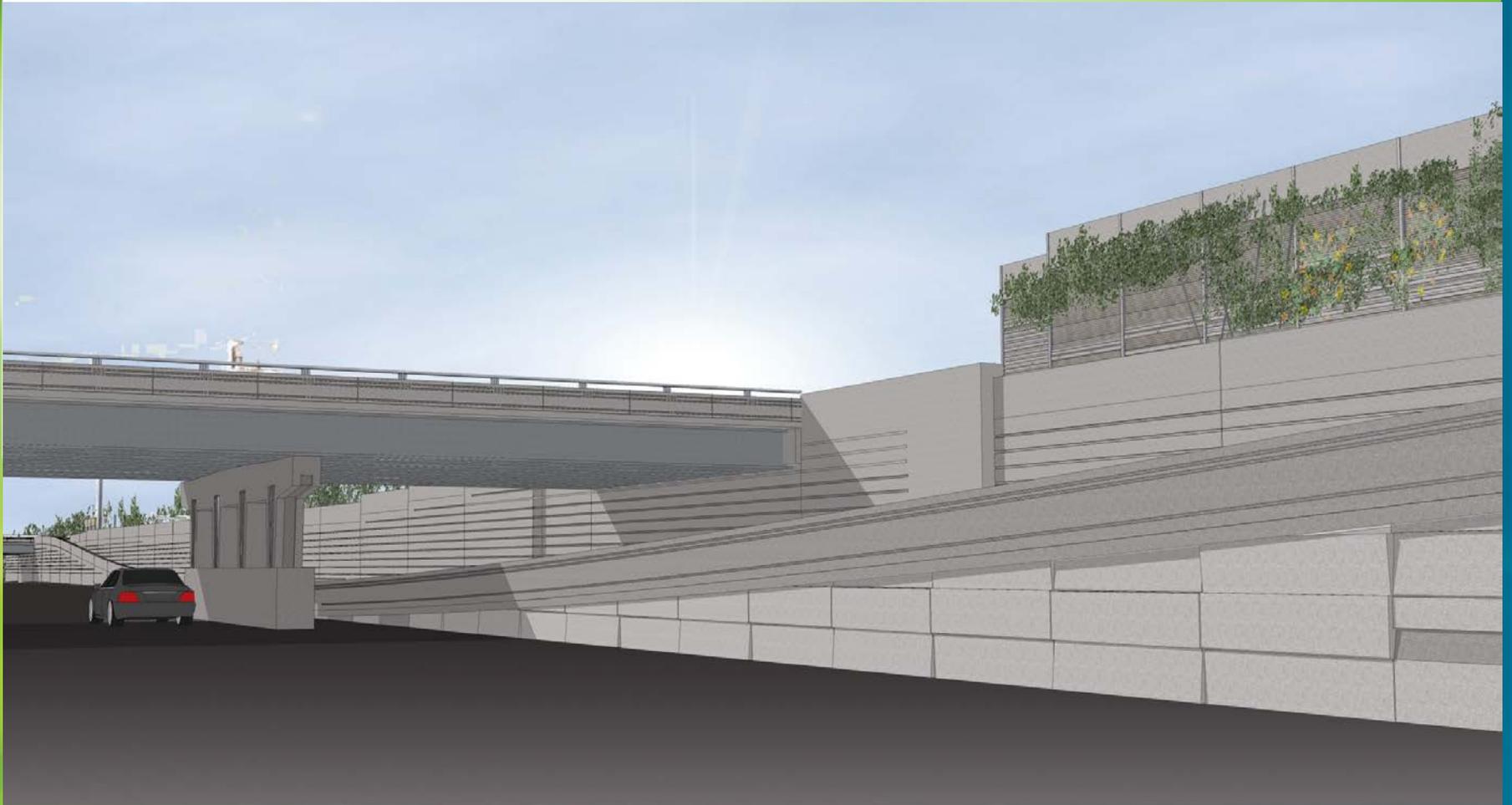
- Southeast corner of Halsted Street and Van Buren Street
- Coordinated Design with Greektown Branding and Signage
- Relocated Greektown Monument and Artificial Turf Green Space



Flyover Pier



Retaining Walls



Halsted Street Bridge Reconstruction

Existing/Before View Looking South



www.circleinterchange.org



Halsted Street Bridge Reconstruction

Proposed View Looking South



www.circleinterchange.org



Proposed Plan - Peoria Street



www.circleinterchange.org



Peoria Street (Looking North)



Major Upcoming Contracts

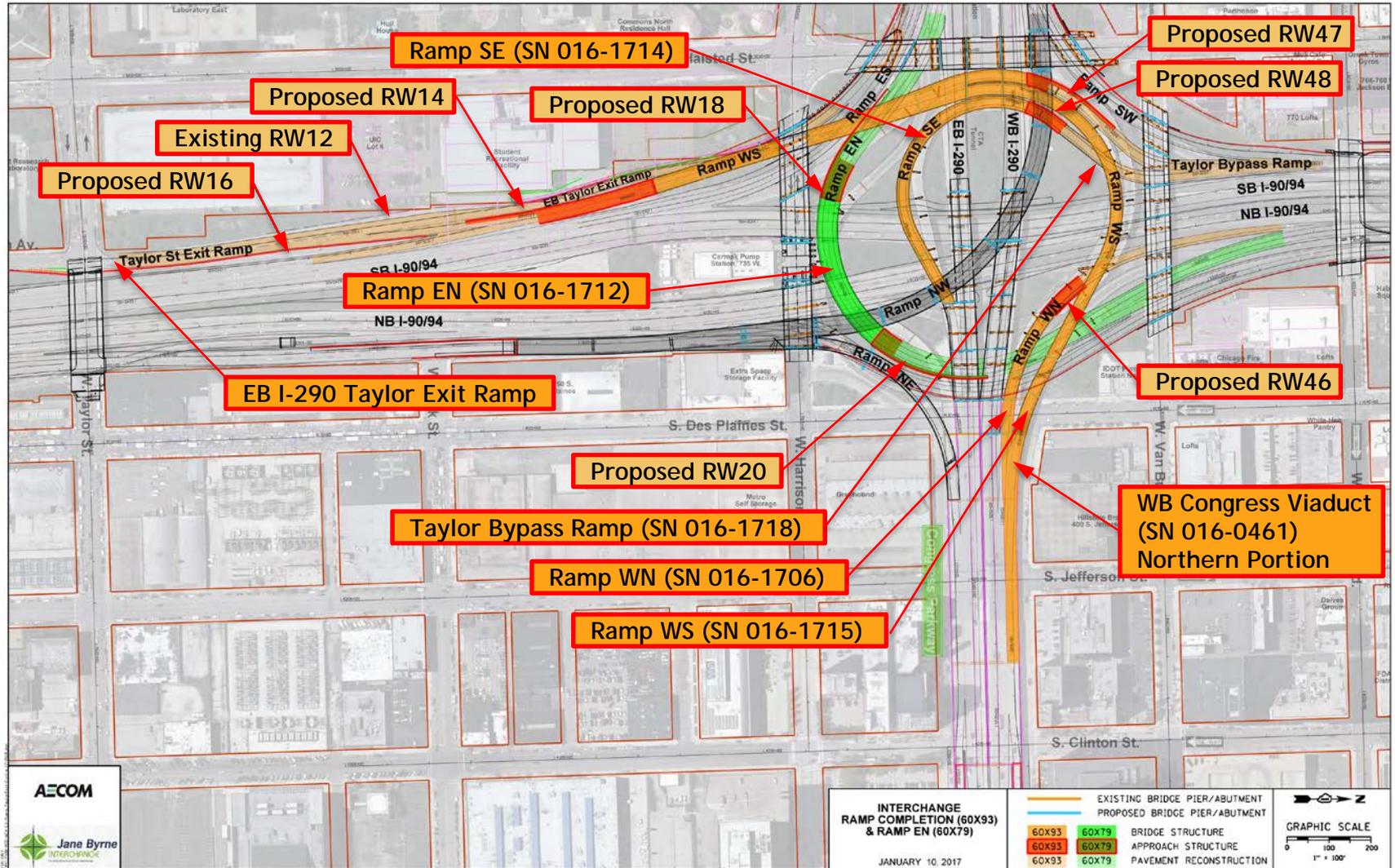
- Ramp EN-Letting 11/18 (*tentative*)
- Interchange Ramp Completion-Letting 11/18 (*tentative*)
- Congress Pkwy / Ida B. Wells Dr.-Viaduct Painting
- NB I-90/94 (Roosevelt to Lake St/Madison St)-JFK
- SB I-90/94 (Roosevelt to Lake St/Madison St)-JFK
- Interchange High Mast Lighting & ITS
- Adams Street over I-90/94
- Jackson Blvd over I-90/94
- Green Space/Landscaping & Aesthetics Contracts

2020 Anticipated Construction



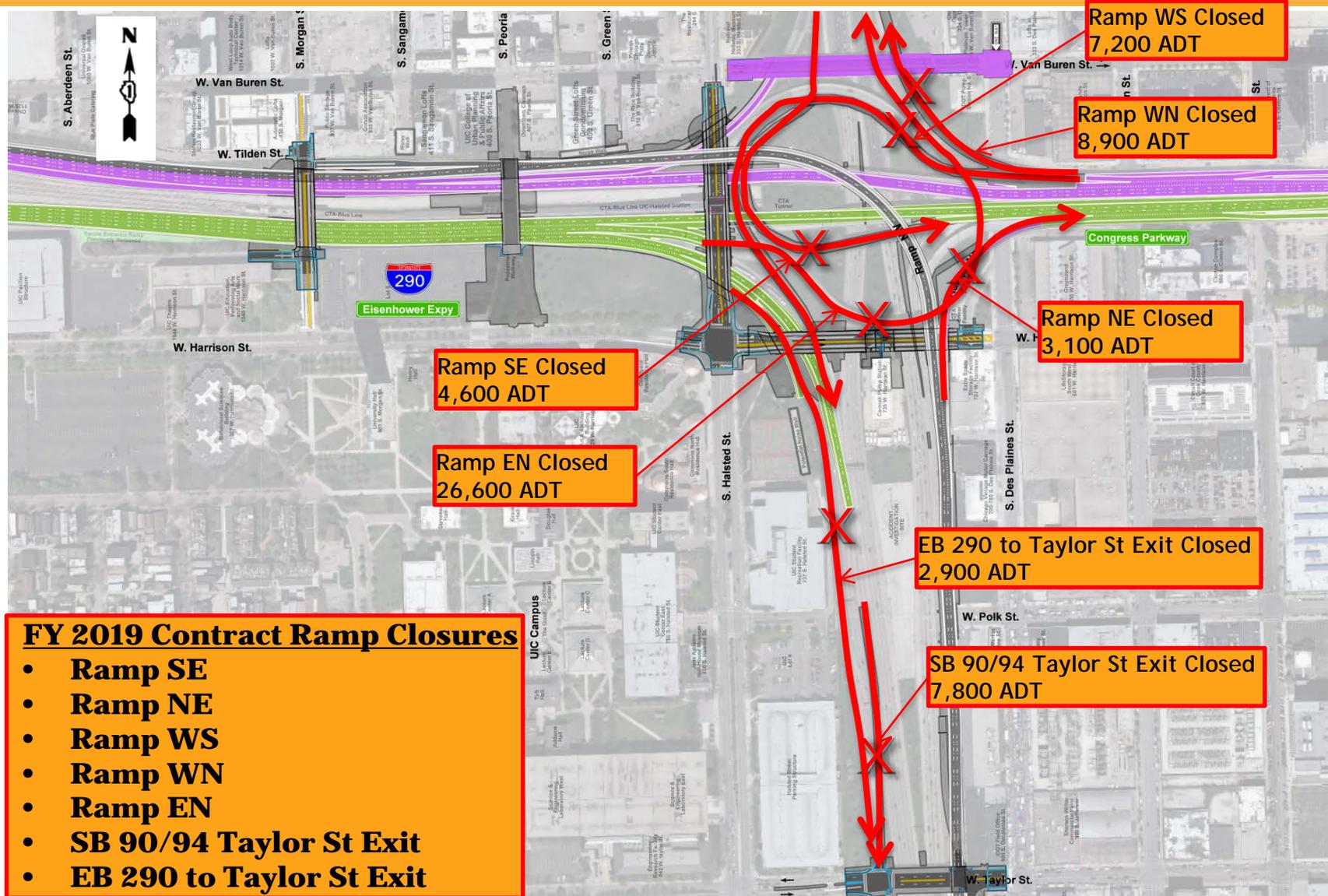
FY 19 Upcoming Work

Interchange Ramp Completions and Ramp EN



FY 2019 Contract Ramp Closures

Expressway Impacts



- FY 2019 Contract Ramp Closures**
- Ramp SE
 - Ramp NE
 - Ramp WS
 - Ramp WN
 - Ramp EN
 - SB 90/94 Taylor St Exit
 - EB 290 to Taylor St Exit

Project Benefits



The improvement will create a safer environment for the motoring public by reducing the predicted number of severe crashes by up to **25%**.



After Project Completion,
A **50% reduction in delay** for all vehicles over the course of the day.

- Reduction of up to **5 million hours annually** of drivers sitting in congested traffic.
- Savings of **\$185 million annually** in lost production from delayed travelers.
- Reduction in idle time resulting in nearly **1.6 million gallons annually**.
- Reduce greenhouse gas emissions by **one-third**.

Project Team – Phase II

LEAD AGENCIES



JOINT VENTURE
CONSULTANT TEAM



site design group, ltd.

www.circleinterchange.org



Construction Features & Challenges



Preconstruction



Rendering

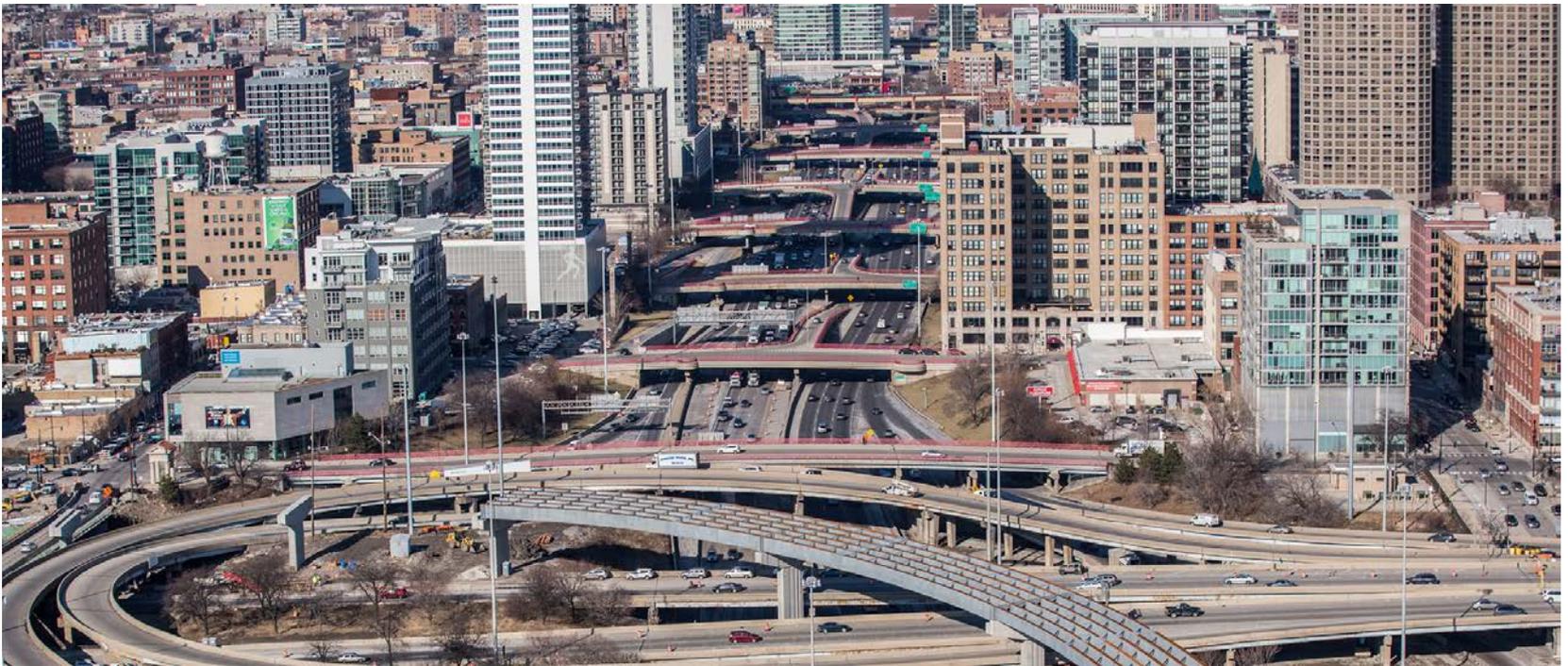


In-Progress



The 'Hood'

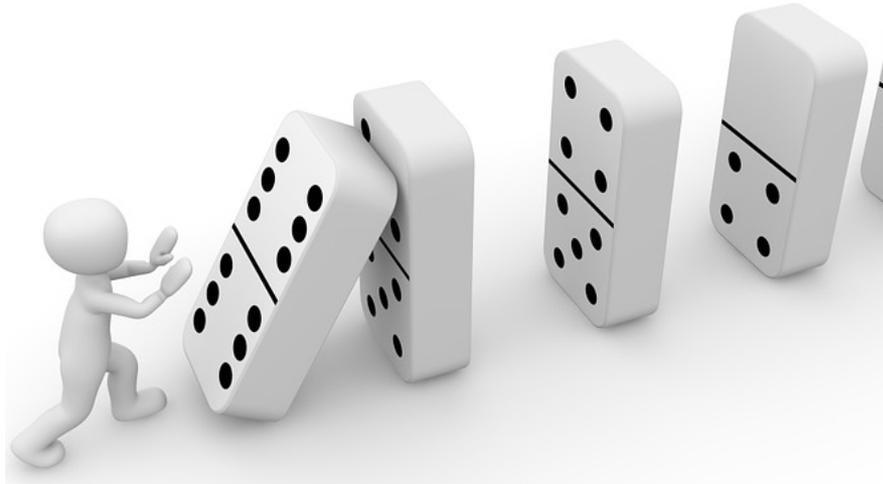
High density residential area



www.circleinterchange.org



Contract Administration



- Contractor coordination
- Traffic control coordination
- Special events
- Utilities
- CTA bus/rail
- City of Chicago
- Residents, businesses, stakeholders
- UIC



Traffic Control Coordination delays

- Stage changes
- Special events
- Extended closures

Solutions:

- ✓ Interim completion dates/liquidated damages
- ✓ Plan notes and special provisions
- ✓ Ongoing phase II and III coordination
- ✓ Weekly traffic coordination meetings



City of Chicago Coordination

- Office of Underground Coordination (OUC)
- Department of Water Management (CDWM)
- Office of Emergency Management (OEMC)
- Bureau of Electrical Operations (BEO)
- Department of Transportation (CDOT)

Solutions:

- ✓ Phase II coordination
- ✓ Phase III submittals (OUC and CDWM)
- ✓ Frequent and timely communication



www.circleinterchange.org



Other Utilities

- Communications
- Natural gas
- Electric
- Unknown/abandoned utilities?

Solutions:

- ✓ Phase II coordination (OUC and CDWM)
- ✓ Initial utility coordination meeting



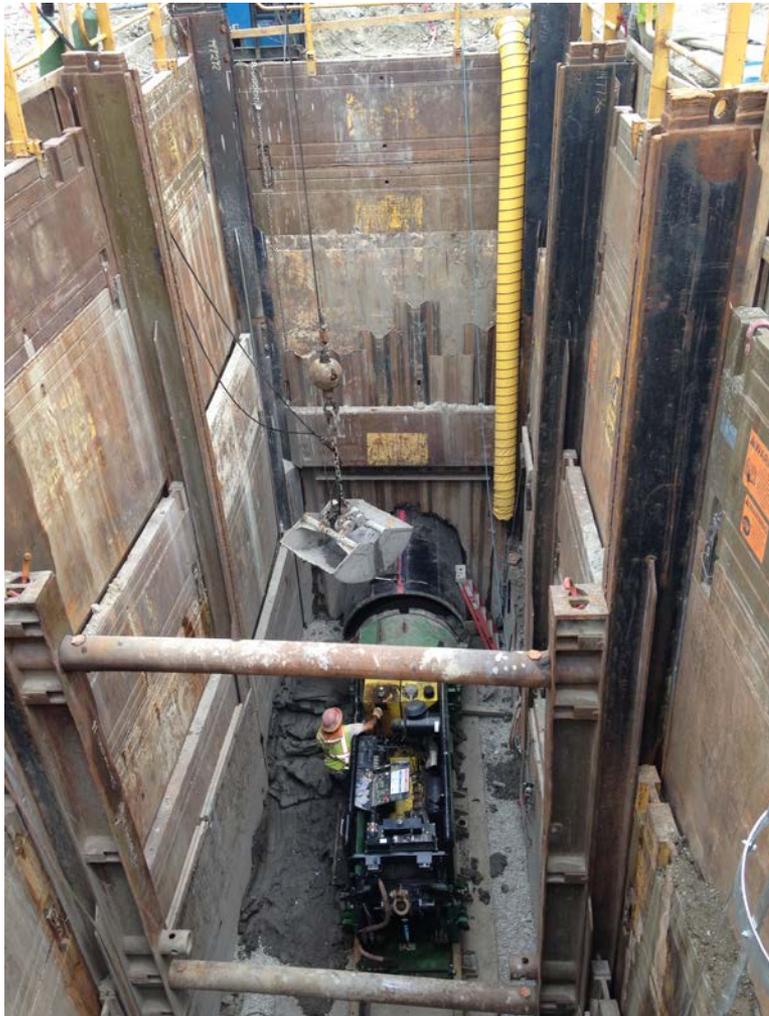
- Noise
- Dust
- Vibration
- Settlement!!!

Solutions:

- ✓ Minimize night demolition
- ✓ Give advance notice
- ✓ Air quality monitoring program
- ✓ Vibration and settlement monitoring special provisions



Soil Retention Systems



Slide rail soil retention system for jacking pit



Soil Retention Systems

Slide rail soil retention system for receiving pit



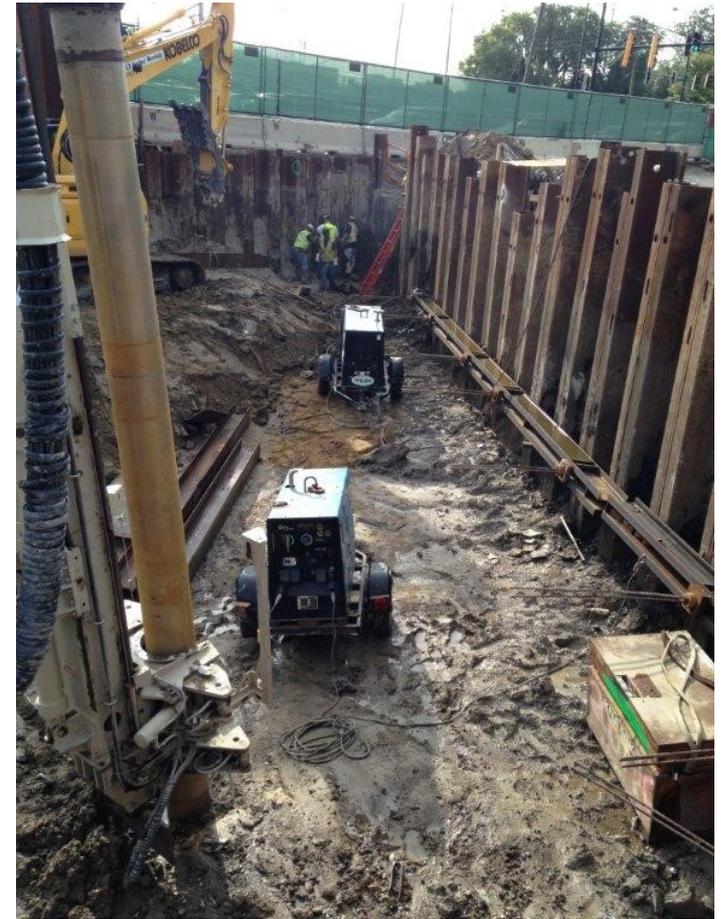
Sheeting used as soil retention



www.circleinterchange.org



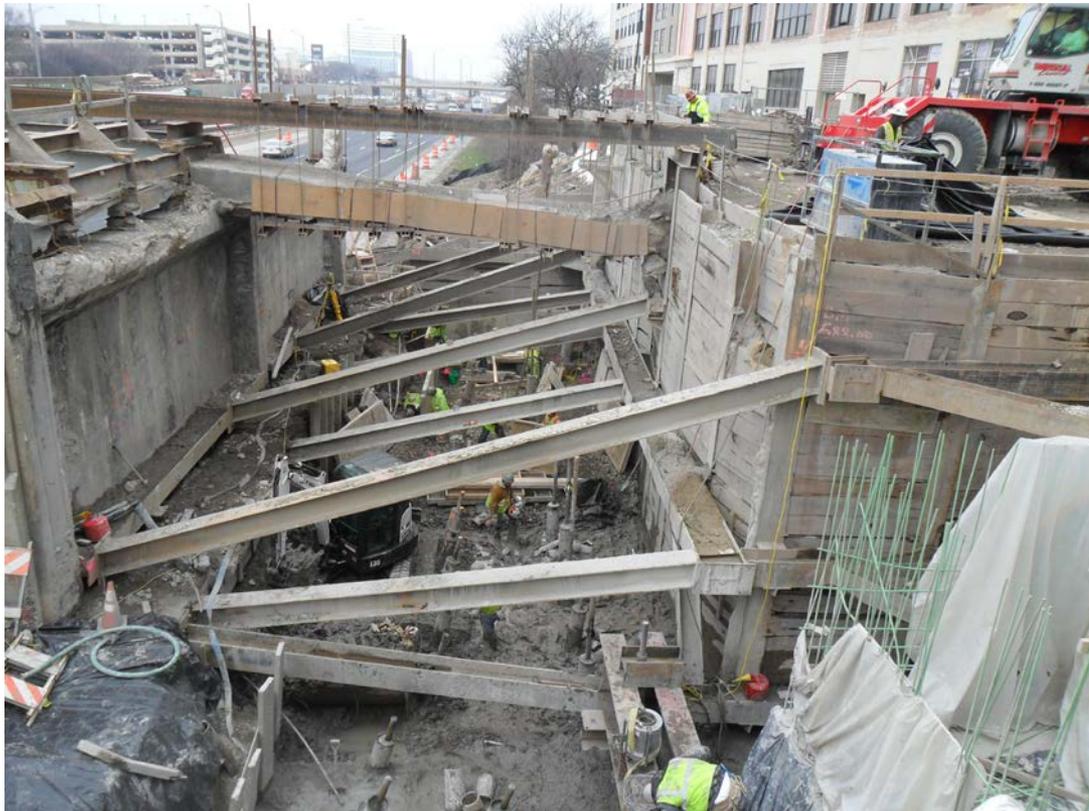
Soil Retention Systems



Tie-backs for sheeting



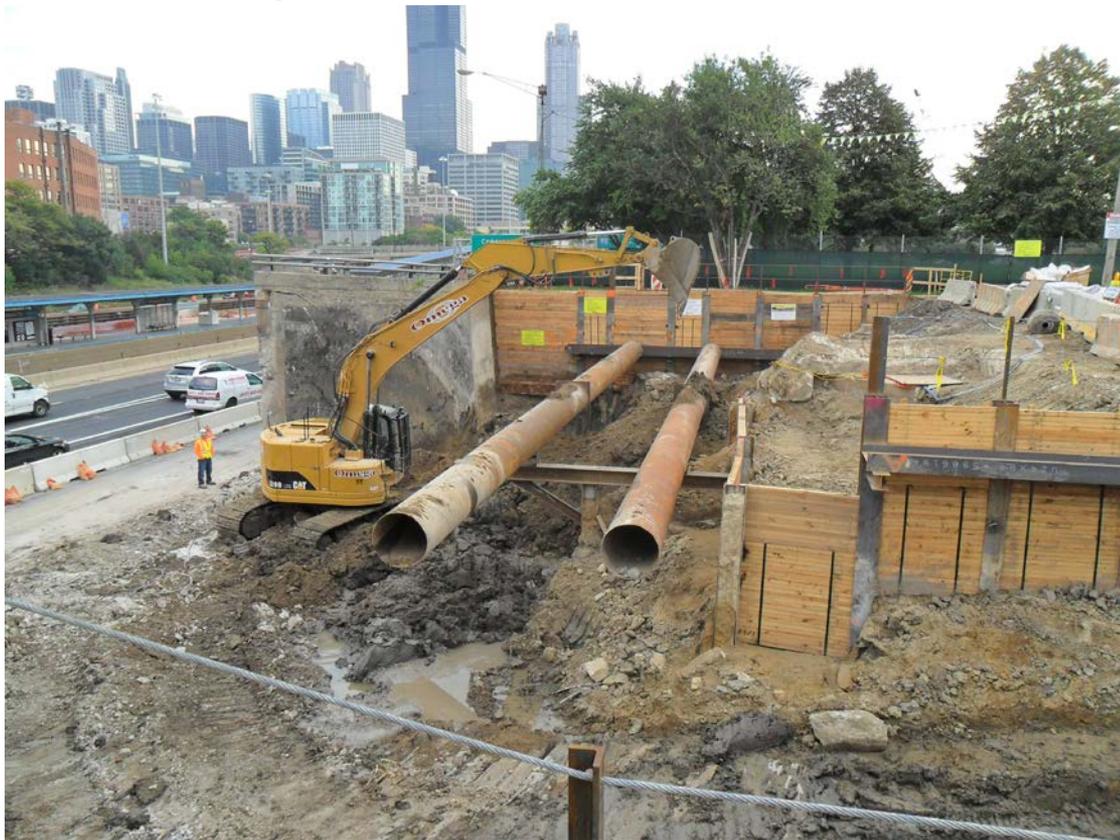
Morgan St. Bridge braced excavation



www.circleinterchange.org



Peoria St. Bridge braced excavation



www.circleinterchange.org



Soil Retention Systems

Peoria St. Bridge braced excavation



www.circleinterchange.org





Drilled shafts



www.circleinterchange.org



Drilled shafts



www.circleinterchange.org



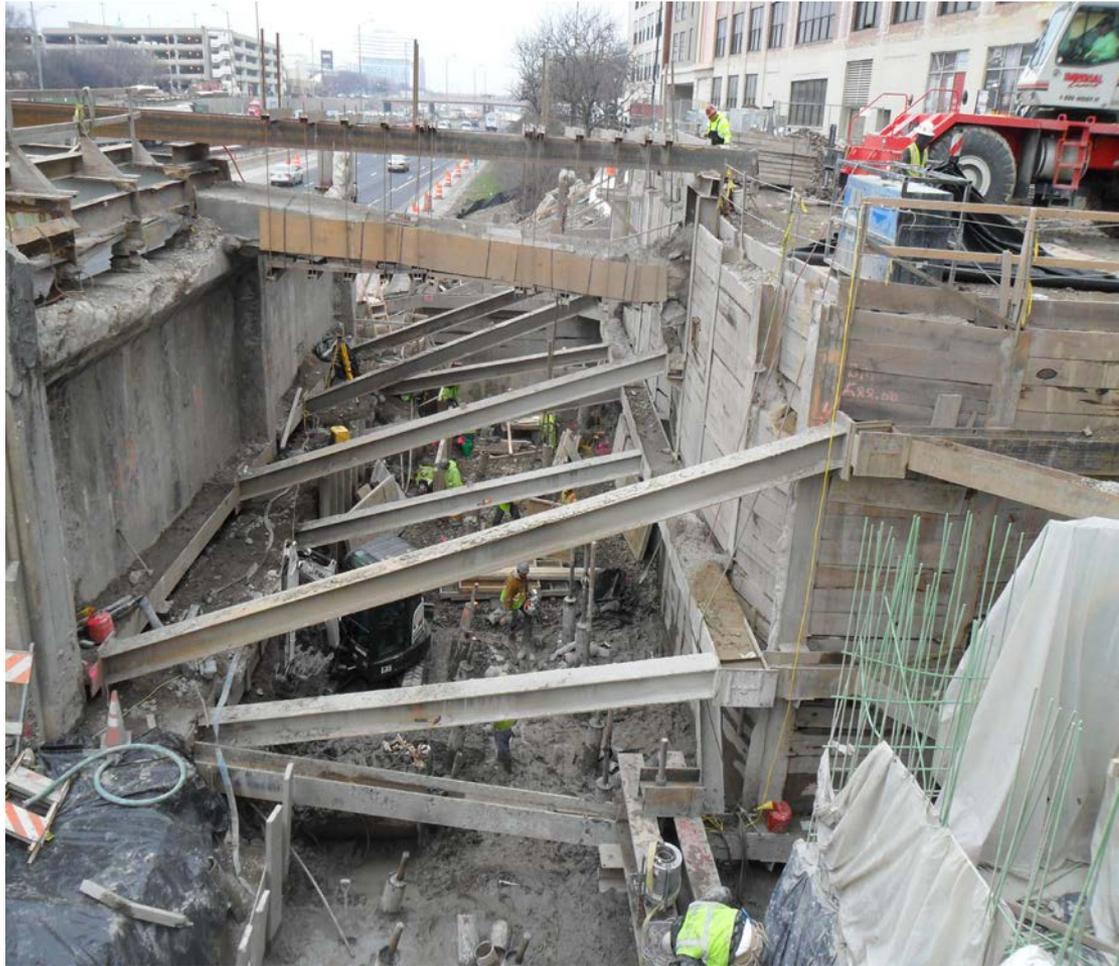
Foundations



Micropiles
(VE proposal)

www.circleinterchange.org

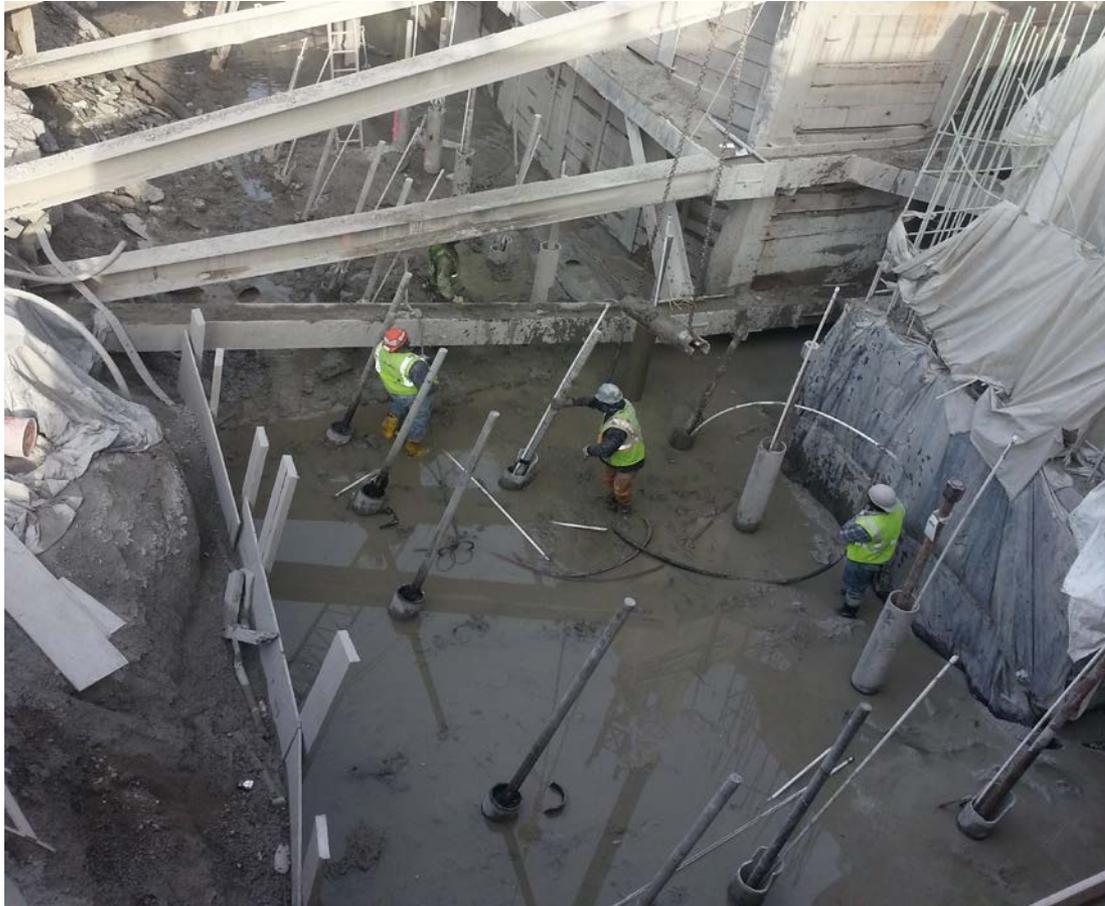




Micropiles

www.circleinterchange.org





Micropiles

www.circleinterchange.org



Soldier piles



www.circleinterchange.org



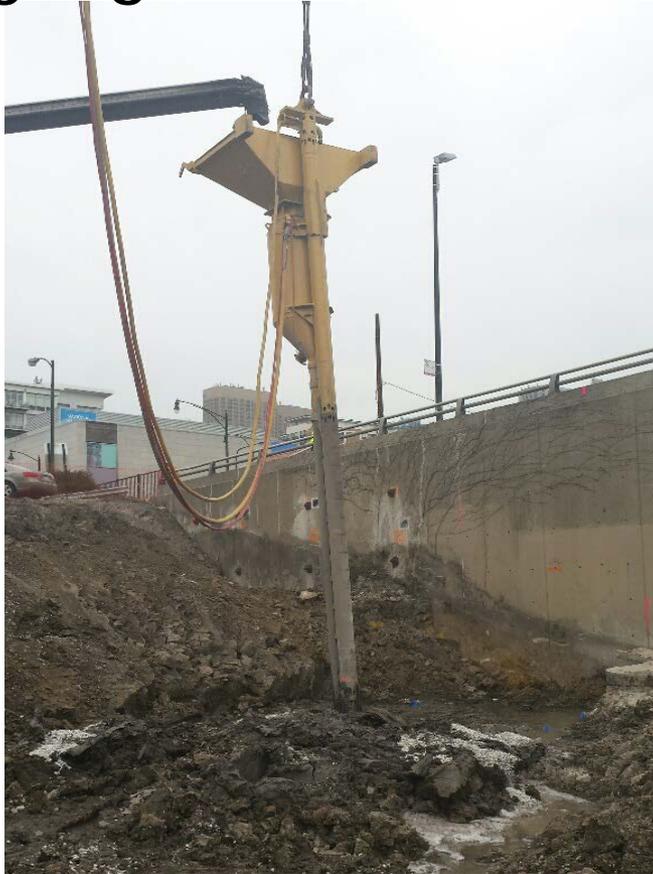
Aggregate stone columns



www.circleinterchange.org



Aggregate stone columns



www.circleinterchange.org



Foundations



Lightweight cellular concrete fill

www.circleinterchange.org



Foundations



Completed MSE wall for NW Flyover Ramp



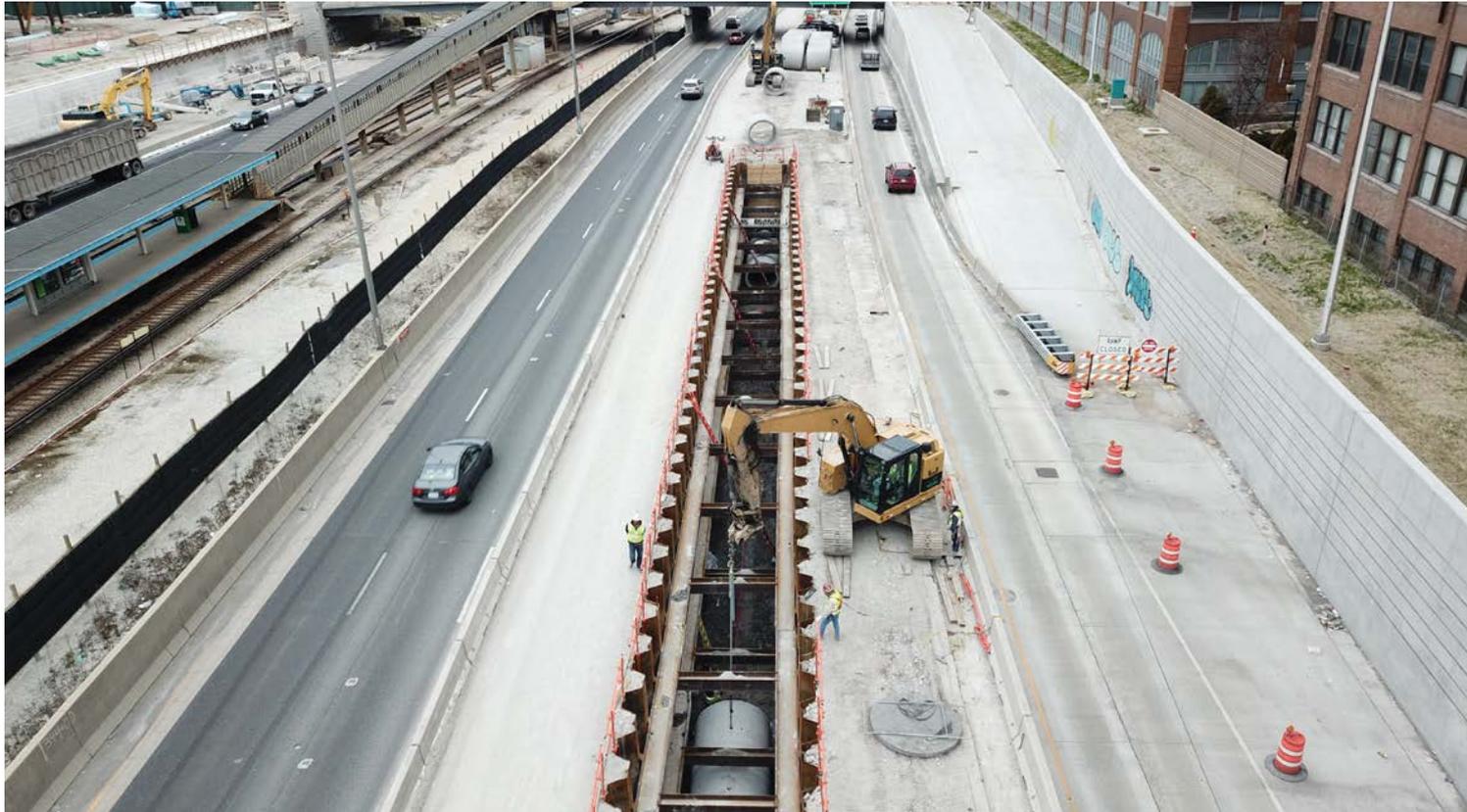
Soft clay



www.circleinterchange.org



Thixotropic soils



www.circleinterchange.org

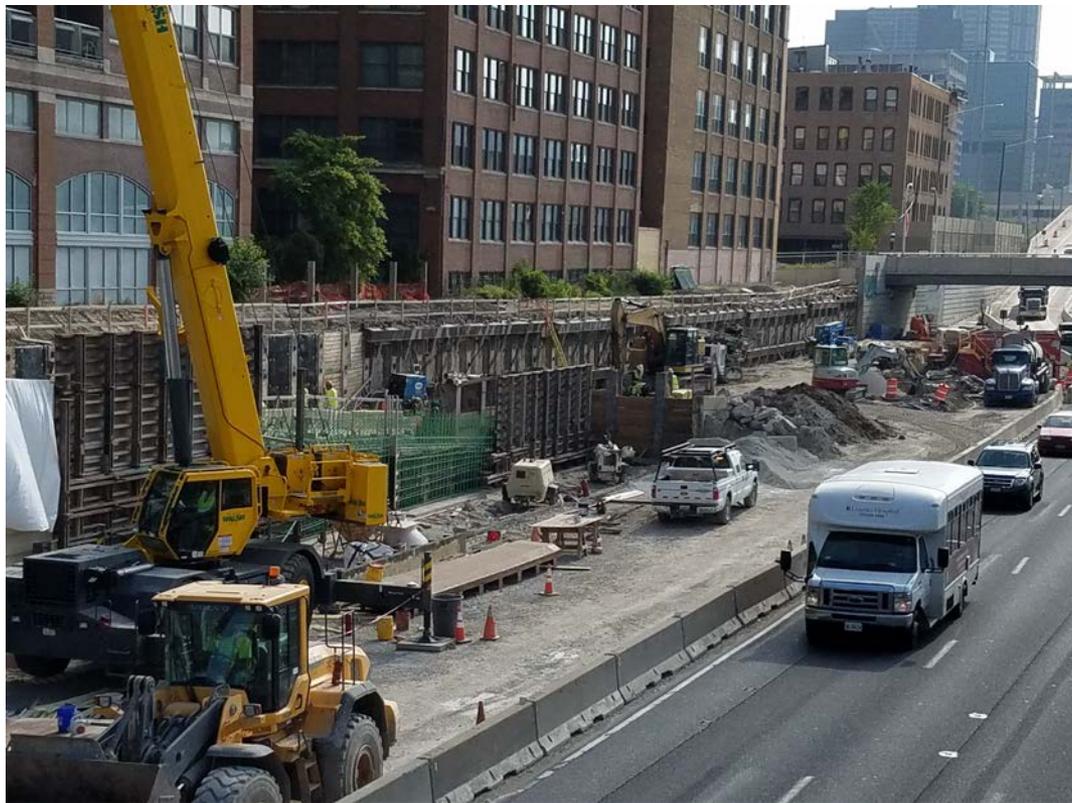


Other Foundation Issues

- Silt
- Sand
- Gravel
- Cobbles
- Boulders
- Timber piles
- Perched water
- Unknown utilities
- Concrete foundations
- Contaminated materials



Retaining Wall 6



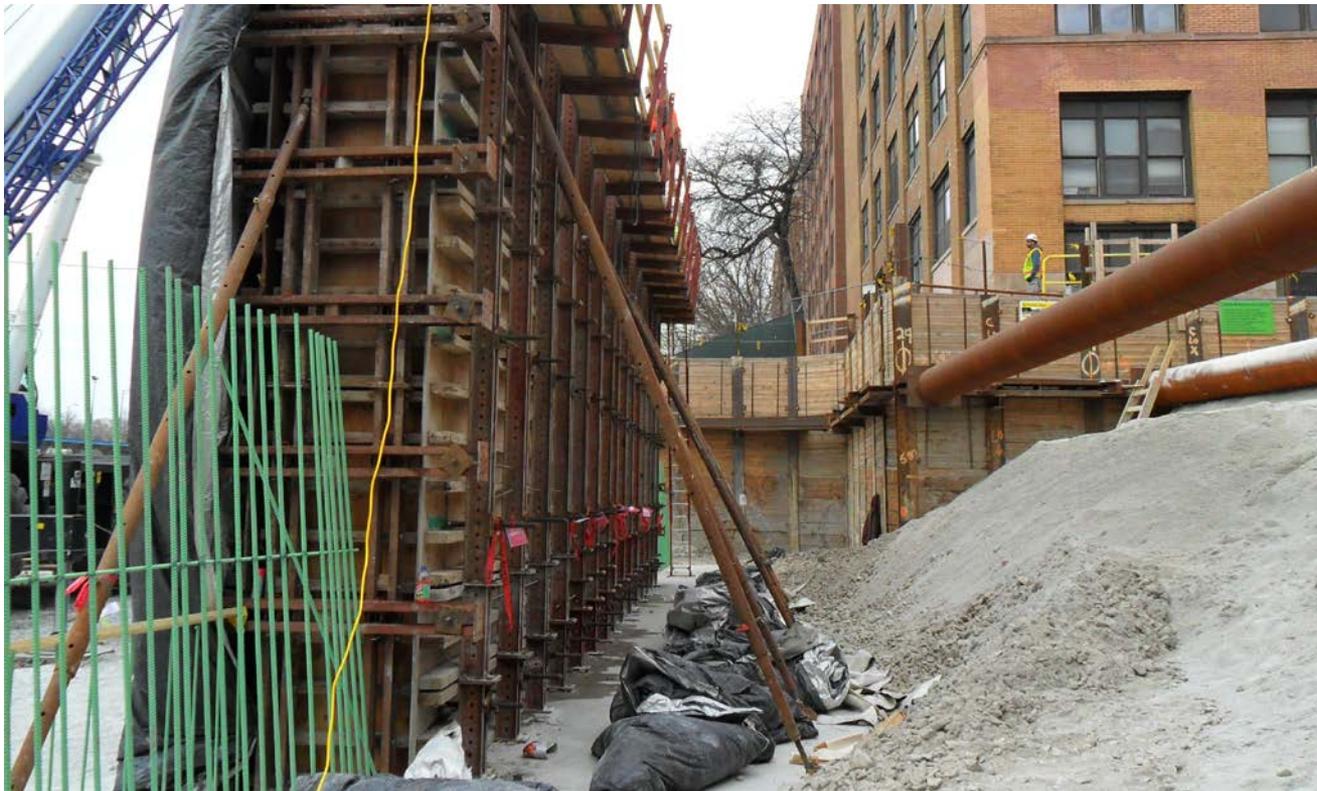
www.circleinterchange.org



Retaining Wall 6



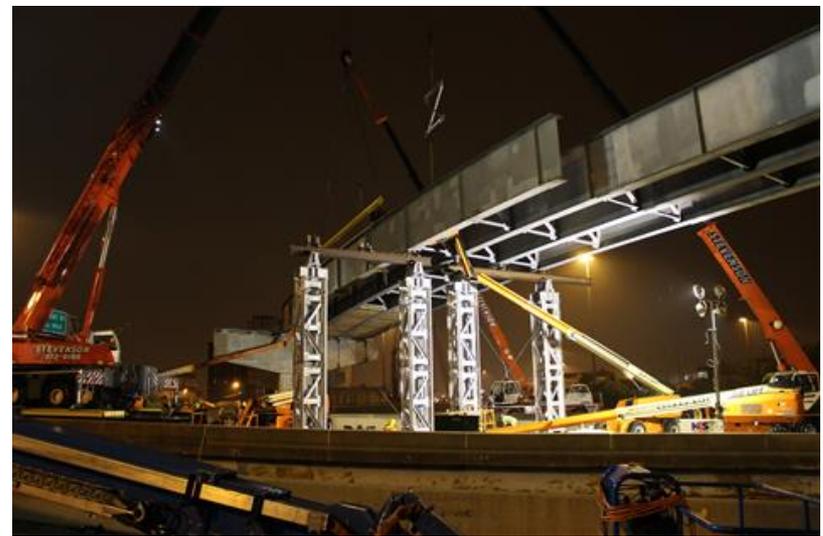
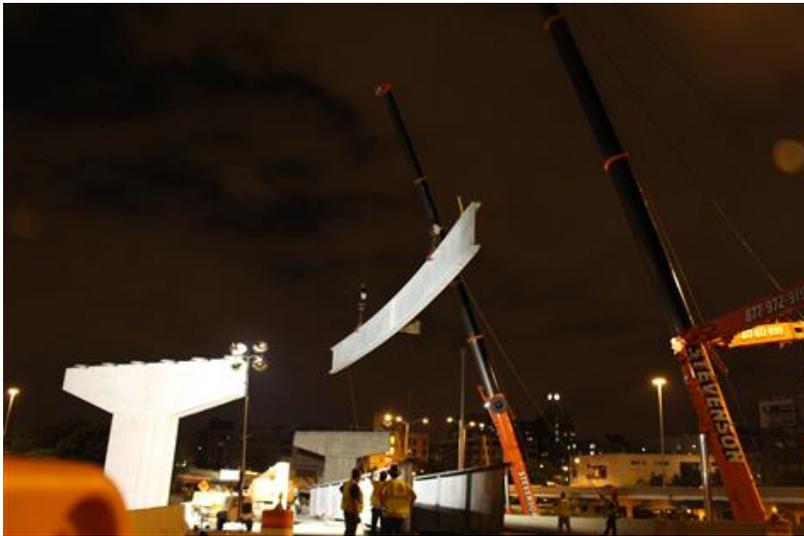
Peoria St. Bridge abutment TSRS



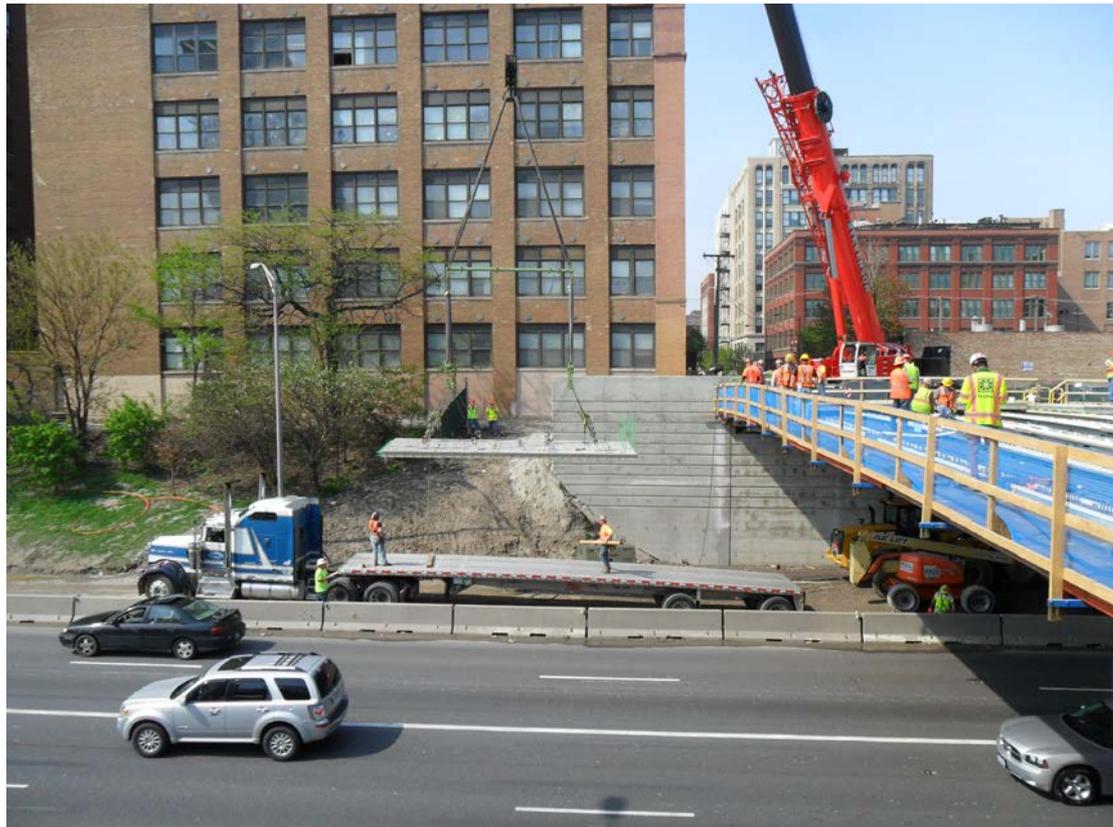
www.circleinterchange.org



Curved girder erection



Peoria St. Bridge precast deck panels

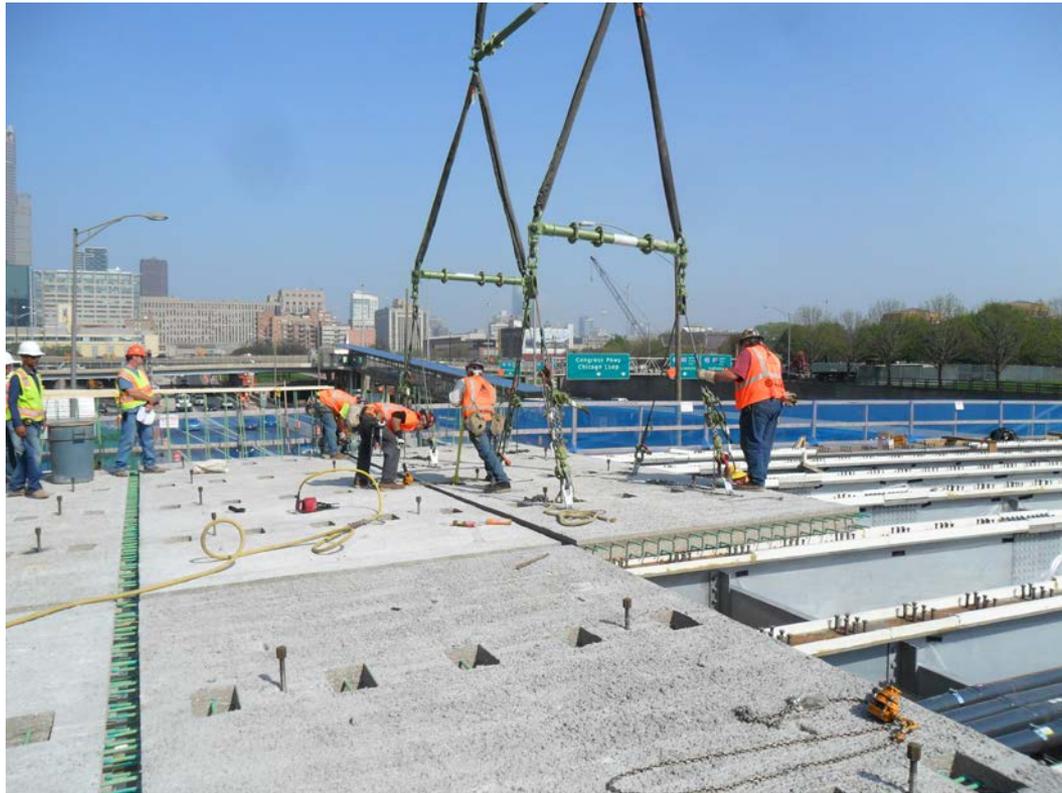


www.circleinterchange.org



Cool Construction Features

Peoria St. Bridge precast deck panels



www.circleinterchange.org



Boring machine for 84" storm sewer



www.circleinterchange.org



Cool Construction Features



CFRP water main lining

www.circleinterchange.org



Completed Work



60" storm sewer



Morgan St. Bridge



Completed Work



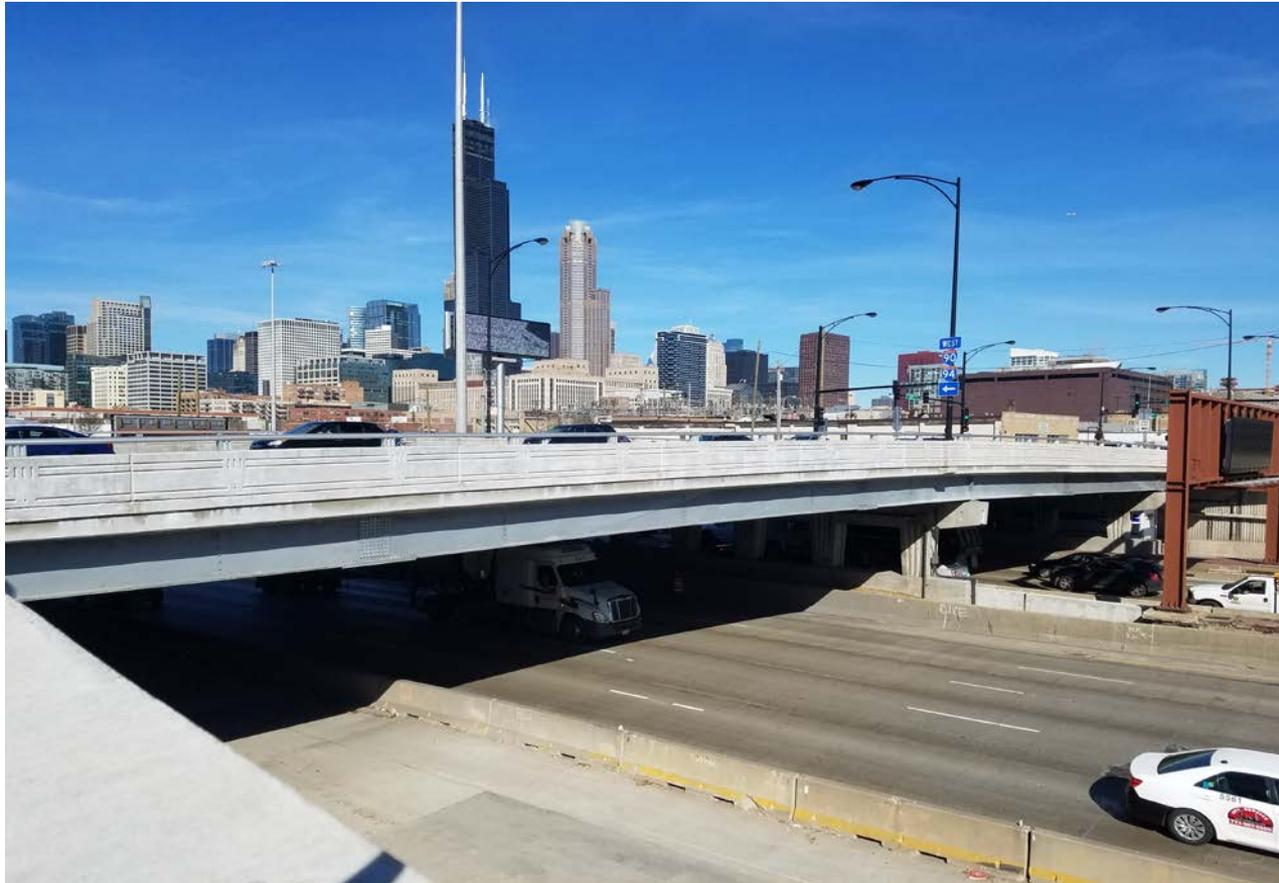
Peoria St. CTA station



www.circleinterchange.org



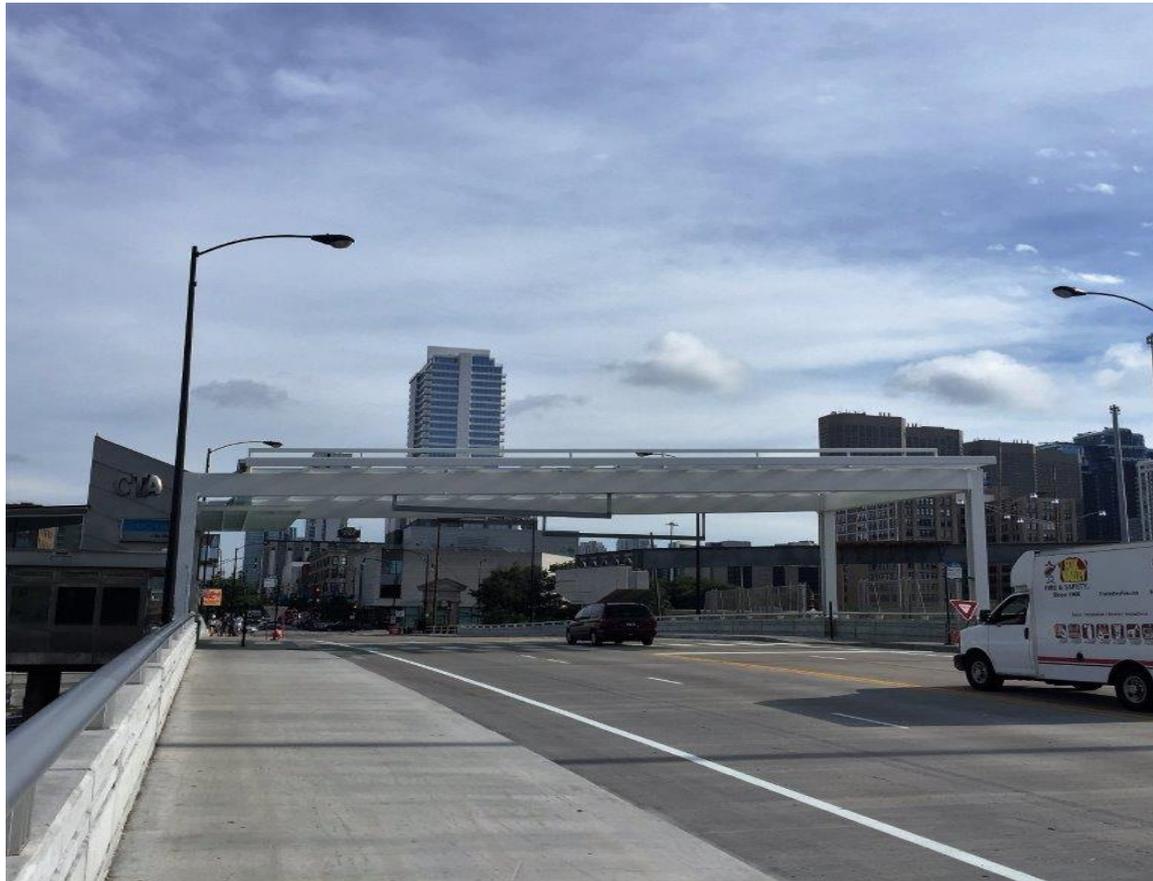
Taylor St. Bridge



www.circleinterchange.org



Halsted St. Bridge & CTA station



www.circleinterchange.org



Phase III Team

IDOT Phase III engineers:

- Shearrisa Phillips-Hatcher
- Patrick Walsh
- Holly Wilson
- Oscar Jimenez
- Connie Venegas
- Eric Ray
- Roman Meropolski
- Paul Gregoire
- Ryan Sheley

Phase III engineering firms:

- Bowman Barrett & Associates
- Burns and McDonnell
- Gonzalez Companies
- Knight E/A
- Omega & Associates
- Tecma Associates
- TranSystems



Questions / Comments



Thank You

www.circleinterchange.org

