Interstate 190 Project Overview and Cumberland Flyover

Serin Keller, PE – IDOT, D1
Irsilia Colletti, PE - HNTB
Don Wittmer, PE – HNTB
Matt Norup, PE - Stantec

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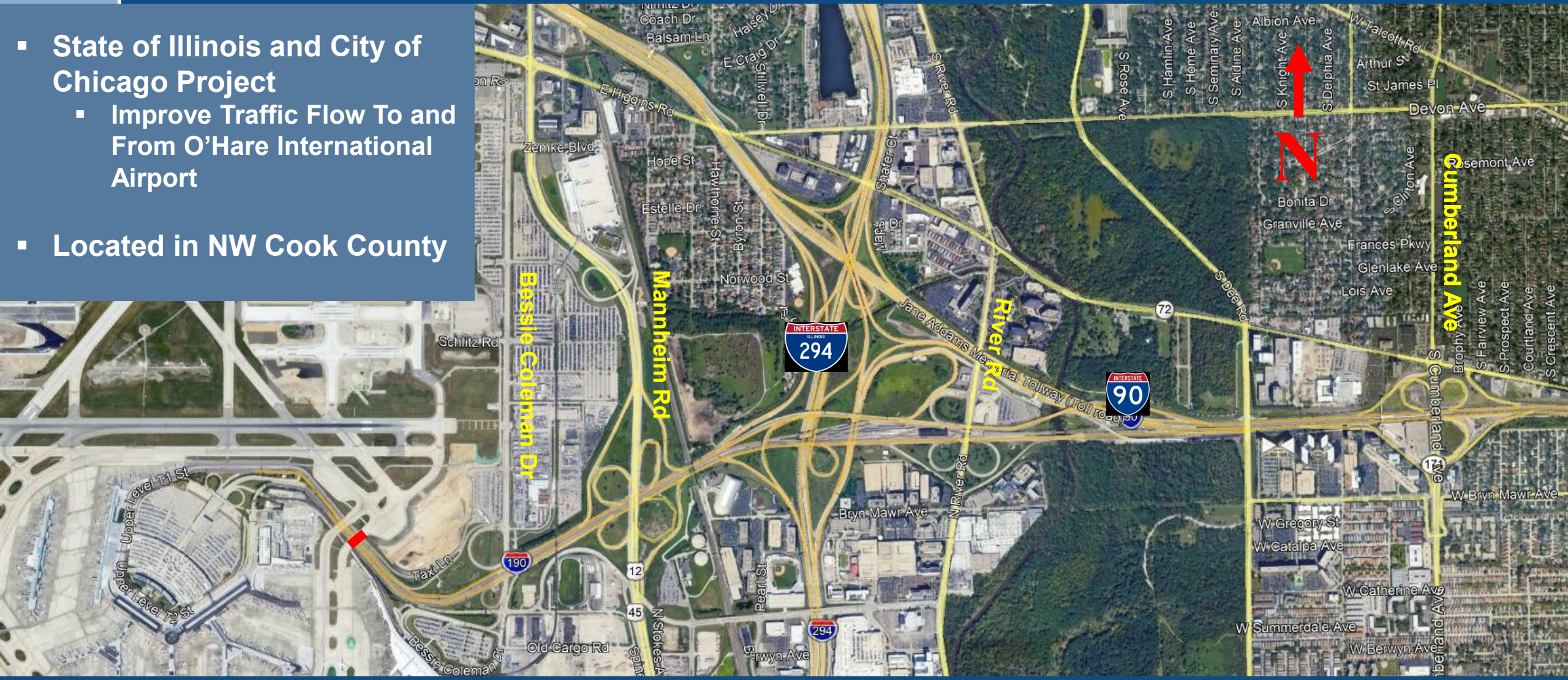
Interstate 190 Project Area

- State of Illinois and City of Chicago Project
  - Improve Traffic Flow To and From O'Hare International Airport
- Located in NW Cook County



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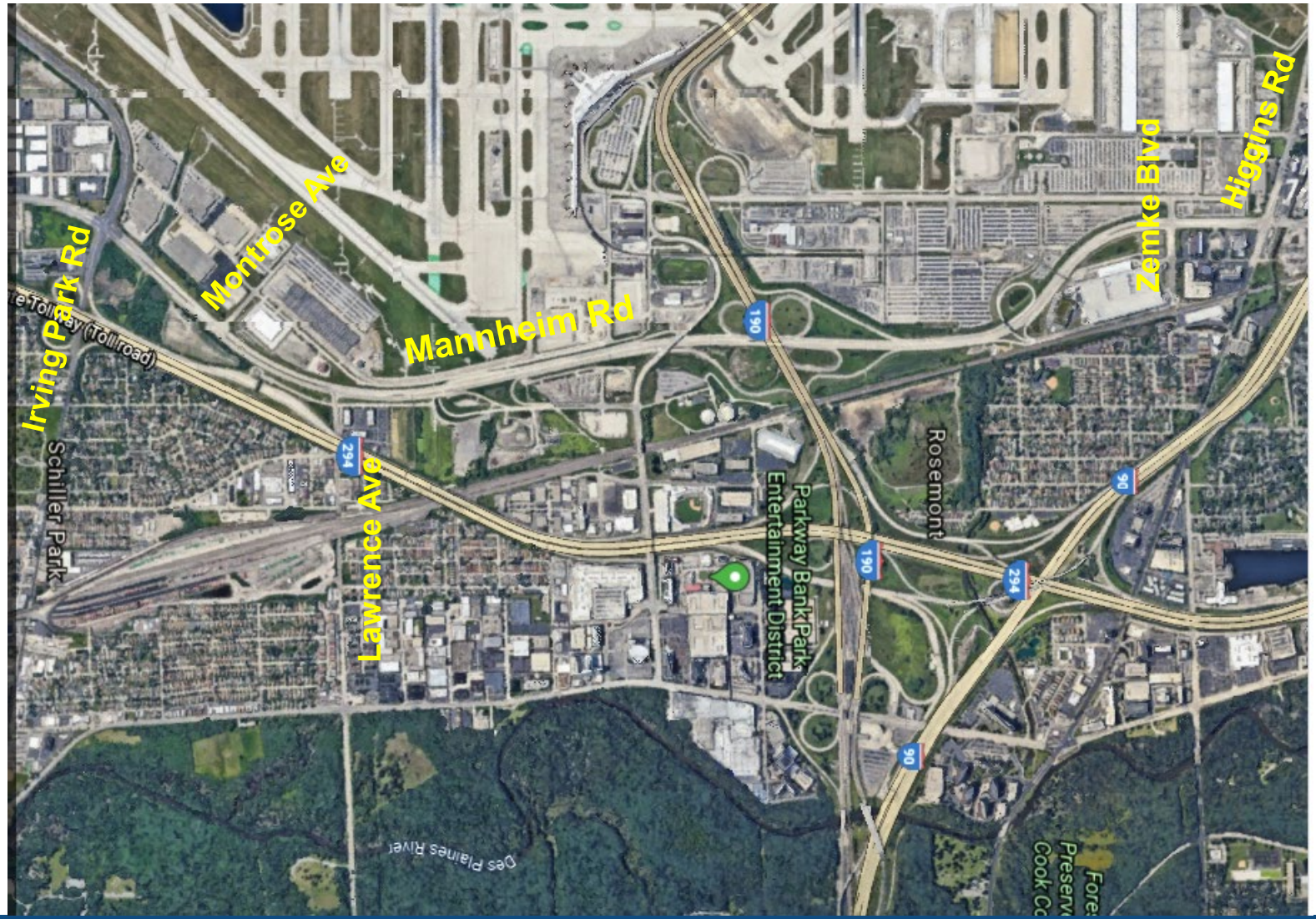
Interstate 190 Project Area



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Interstate 190 Project

Background

- Improve traffic flow to and from O'Hare International Airport
- Joint project between Illinois Department of Transportation (IDOT), Chicago Department of Transportation (CDOT), and Chicago Department of Aviation (CDA)

Project Purpose

- Improve Operations
- Improve Safety
- Improve Capacity
- Improve Linkage to Regional Transportation System
- Improve Modal Interrelationships

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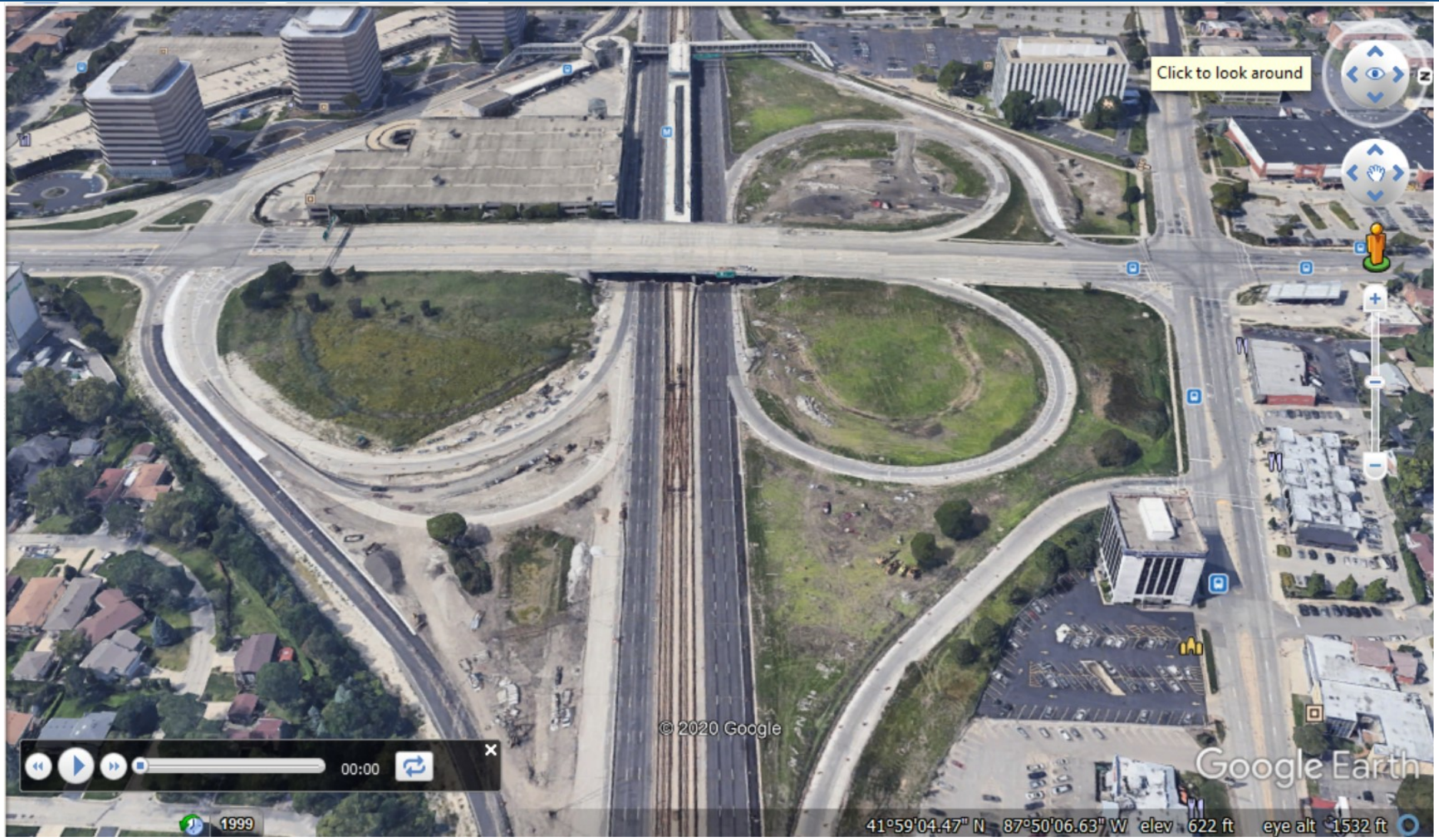
Aerial Fly Through of I-190 Corridor



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Looking East From Mannheim Road

- Primary Roadway Access to O'Hare
- 190,000+ Passengers Per Day
- 50,000+ O'Hare Employees
- I-190 - NHS Route
- Mannheim Road – SRA Route

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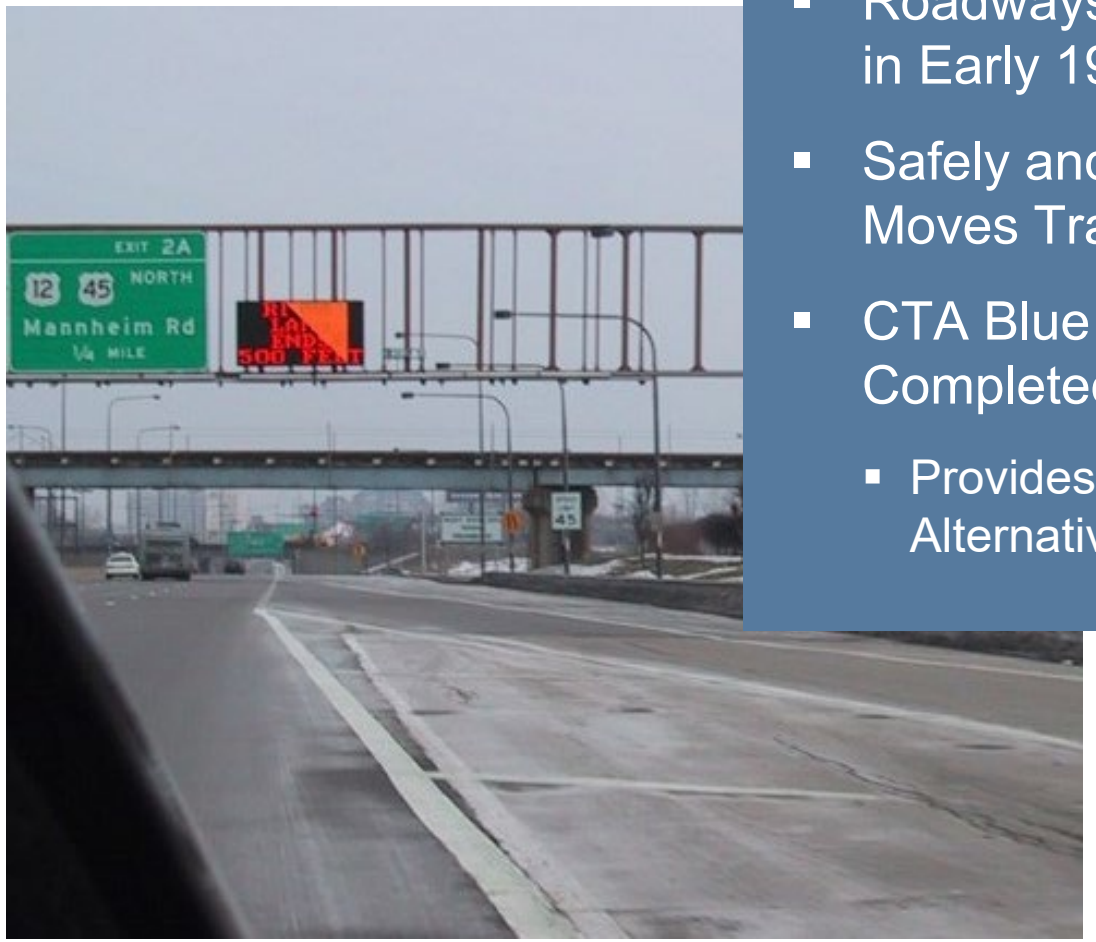
Looking East at East River Rd & Bessie Coleman Dr



- Roadways Constructed in Early 1960's
- Safely and Efficiently Moves Traffic
- CTA Blue Line Completed in 1984
  - Provides Transit Alternative

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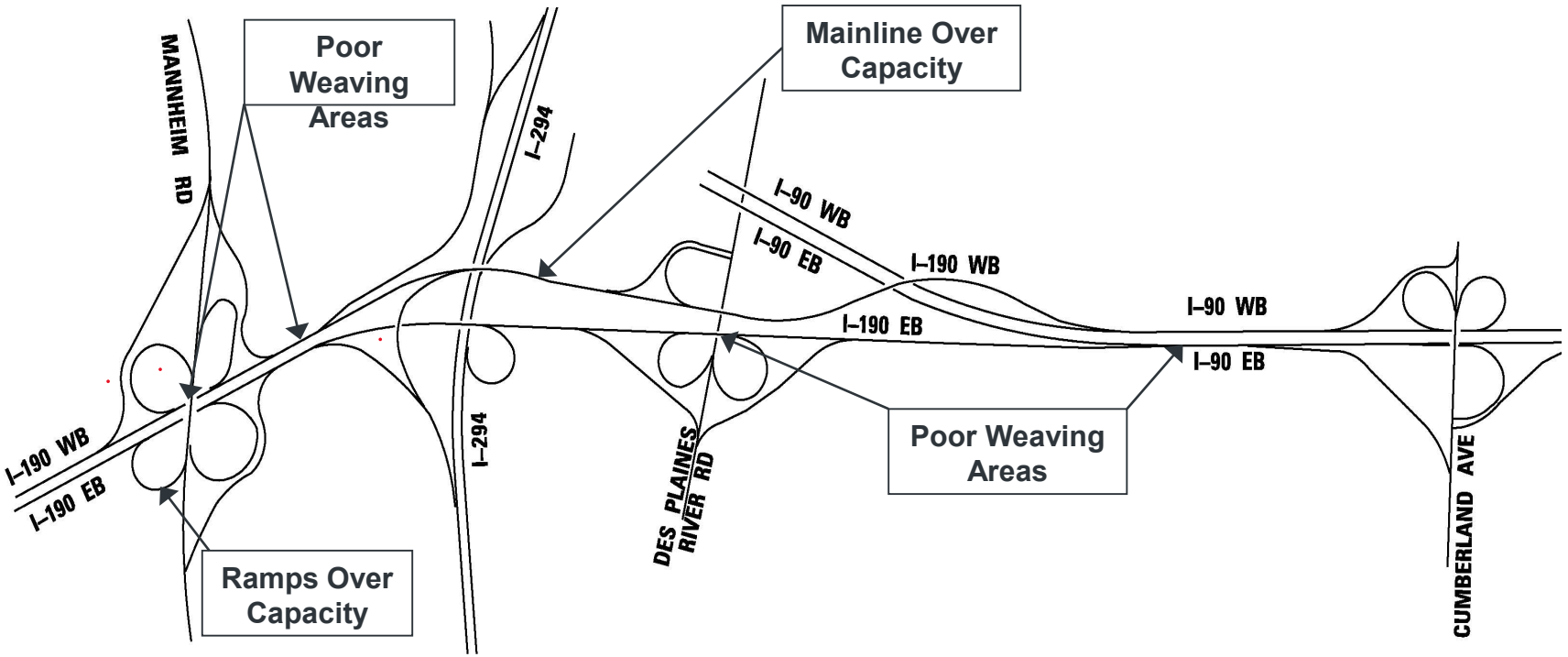
Interstate 190 Project

- Illinois Department of Transportation (IDOT)
- Chicago Department of Transportation (CDOT)
- Chicago Department of Aviation (CDA)
- Illinois Tollway
- Chicago Transit Authority (CTA)
- Federal Highway Administration (FHWA)
- Federal Aviation Administration (FAA)
- Chicago Department of Water Management (CDWM)
- Joint Action Water Agency (JAWA)
- Forest Preserve District of Cook County
- City of Rosemont
- Canadian National Railroad
- Metra
- Pace
- Des Plaines
- Schiller Park

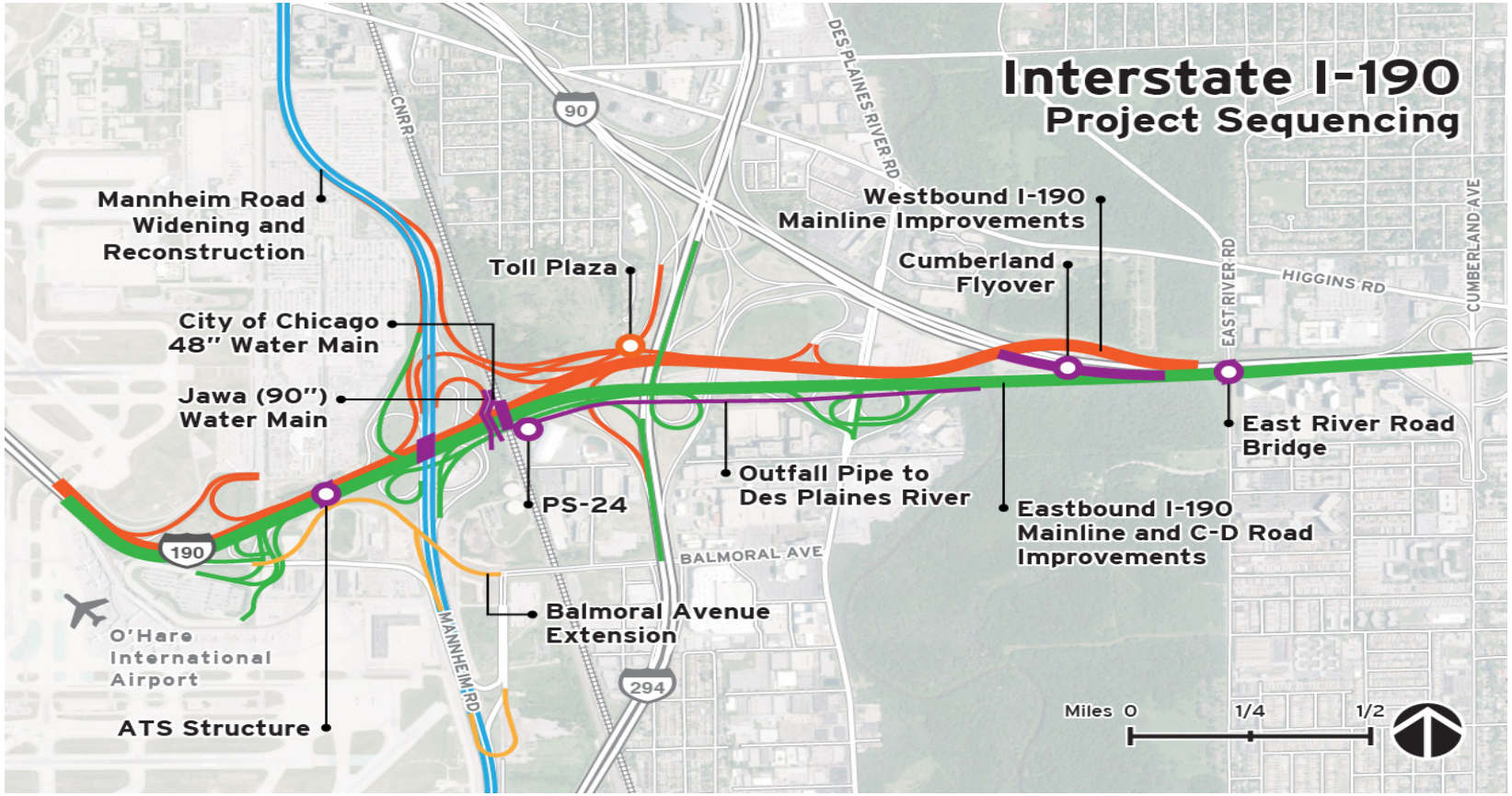
Current Situation

- Aging Pavement
- Interchanges Lack Capacity, Outdated Designs
- Insufficient Number of Traffic Lanes – More Capacity Needed!
- Five Interchanges and I-190 / I-90 Merge / Diverge in 3 Miles



I-190 Phase I Vision

- Pavement Reconstruction & Widening of I-190 and Mannheim Rd
- Interchange Reconstruction & Reconfiguration
- Construction of 20+ Bridges
- Balmoral Avenue western extension into Terminal 5



Proposed Improvements

- Over 70 Alternatives Originally Developed
- Reduced to 15 Alternatives
- Narrowed Down to 6 For Further Review and Evaluation
- 3 Alternatives To Be Carried Forward
- Best Components of the 3 - Preferred Alternative.

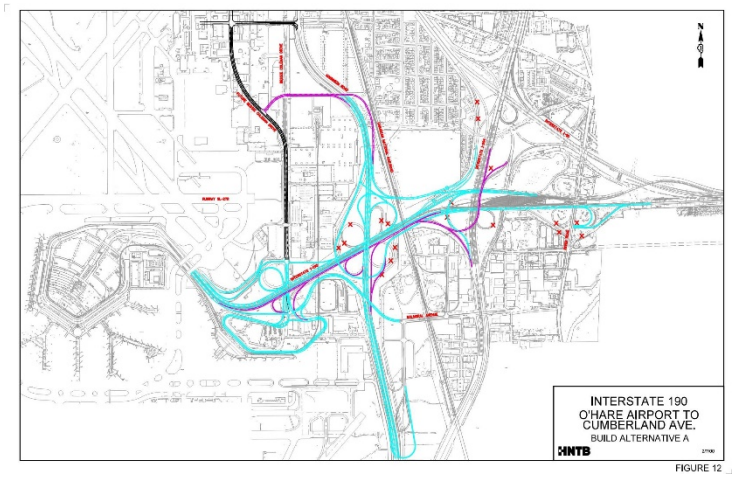


FIGURE 12

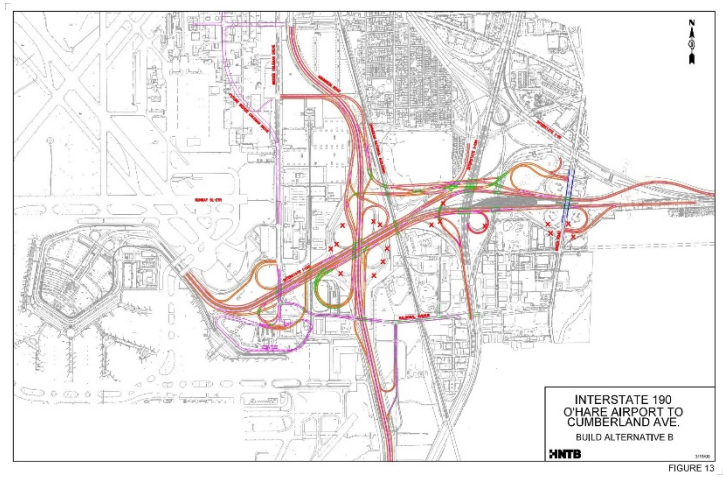


FIGURE 13

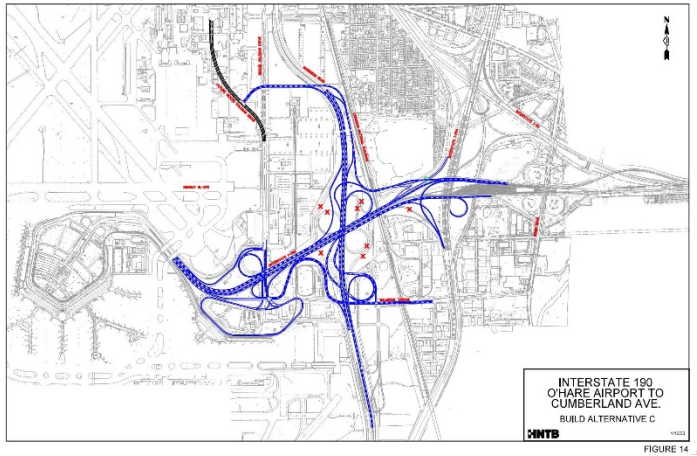


FIGURE 14

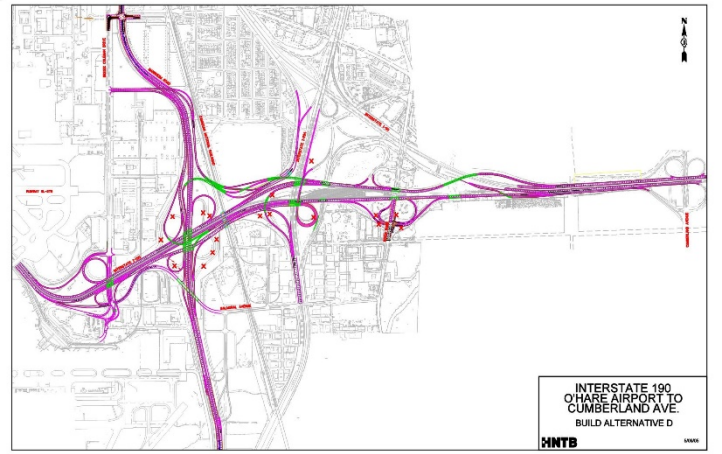


FIGURE 15

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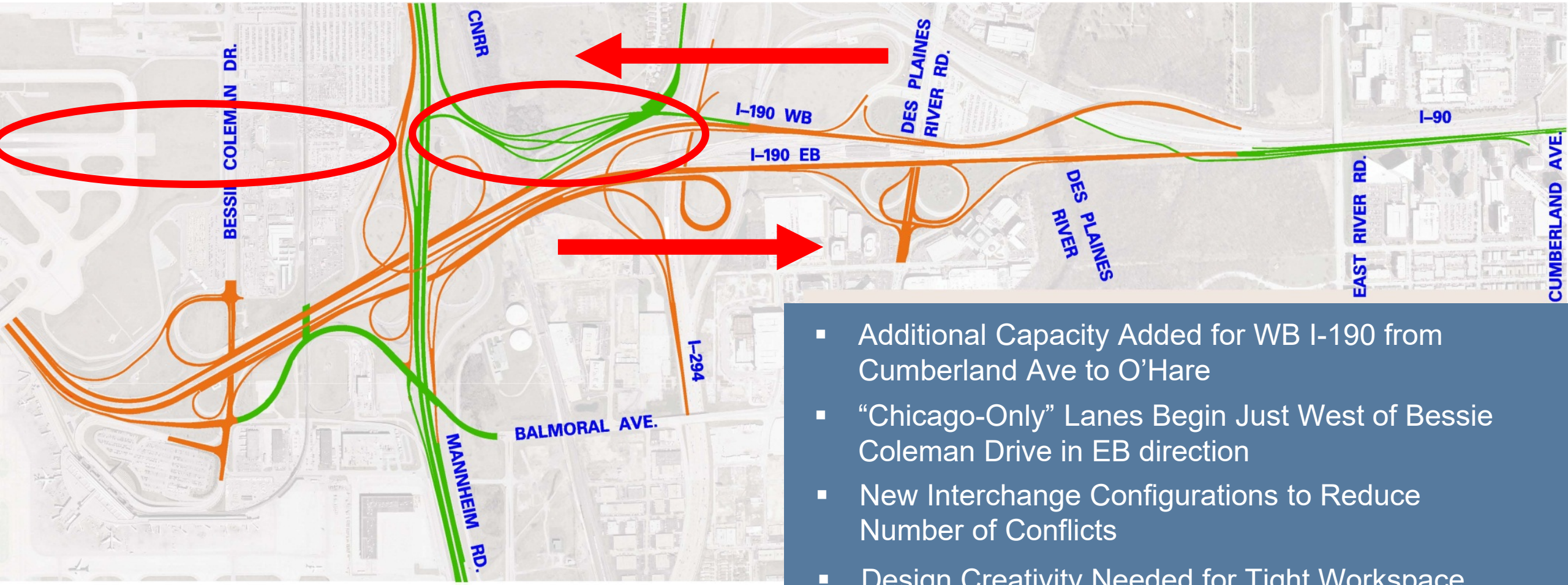
Proposed Improvements



- Additional Capacity Added for WB I-190 from Cumberland Ave to O'Hare
- "Chicago-Only" Lanes Begin Just West of Bessie Coleman Drive in EB direction
- New Interchange Configurations to Reduce Number of Conflicts
- Design Creativity Needed for Tight Workspace Areas

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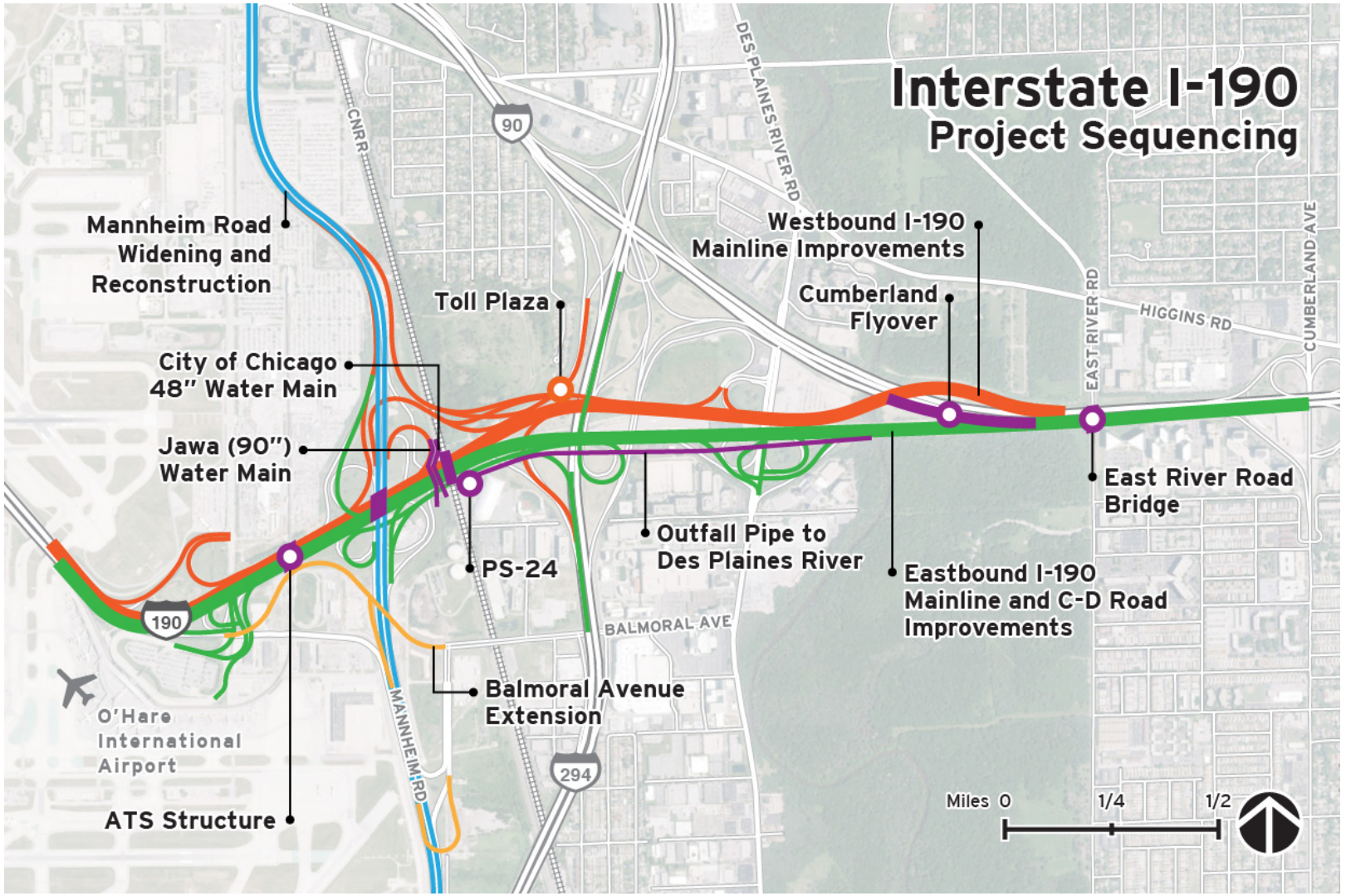
I-190 Major Deliverables



Advance Projects
CN Railroad Bridge

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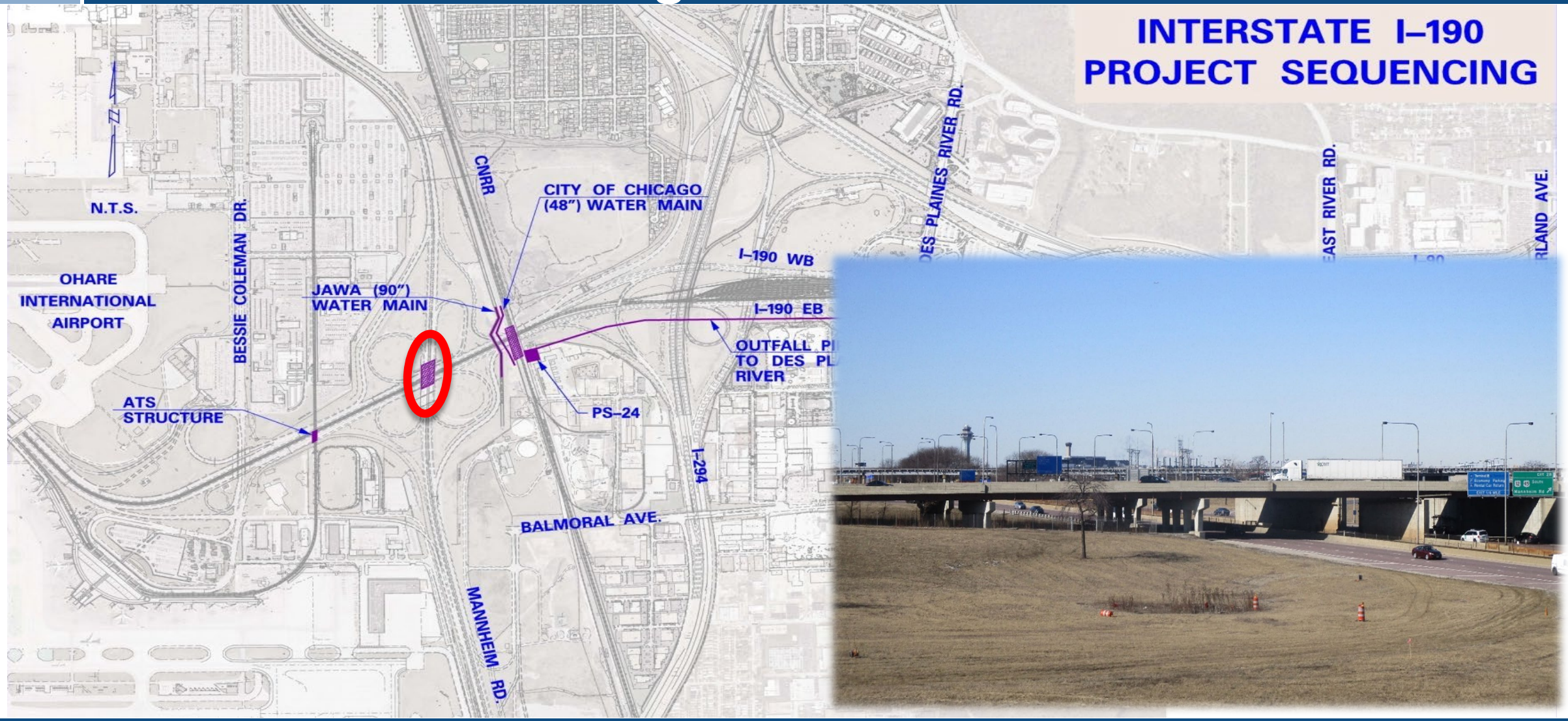
Advance Projects
Mannheim Road Bridge



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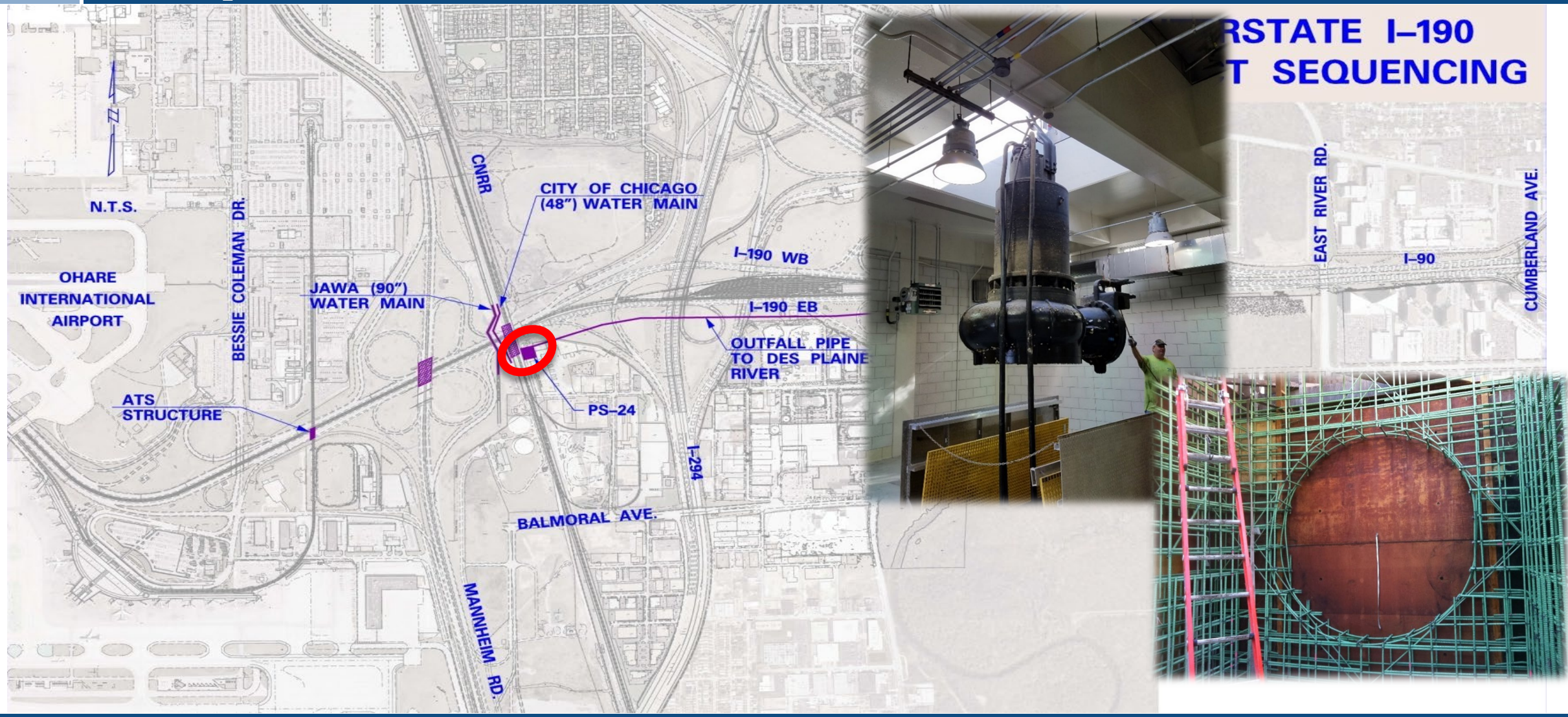
Advance Projects
Pump Station #24



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Advance Projects
Pump Station #24 Outfall Pipes

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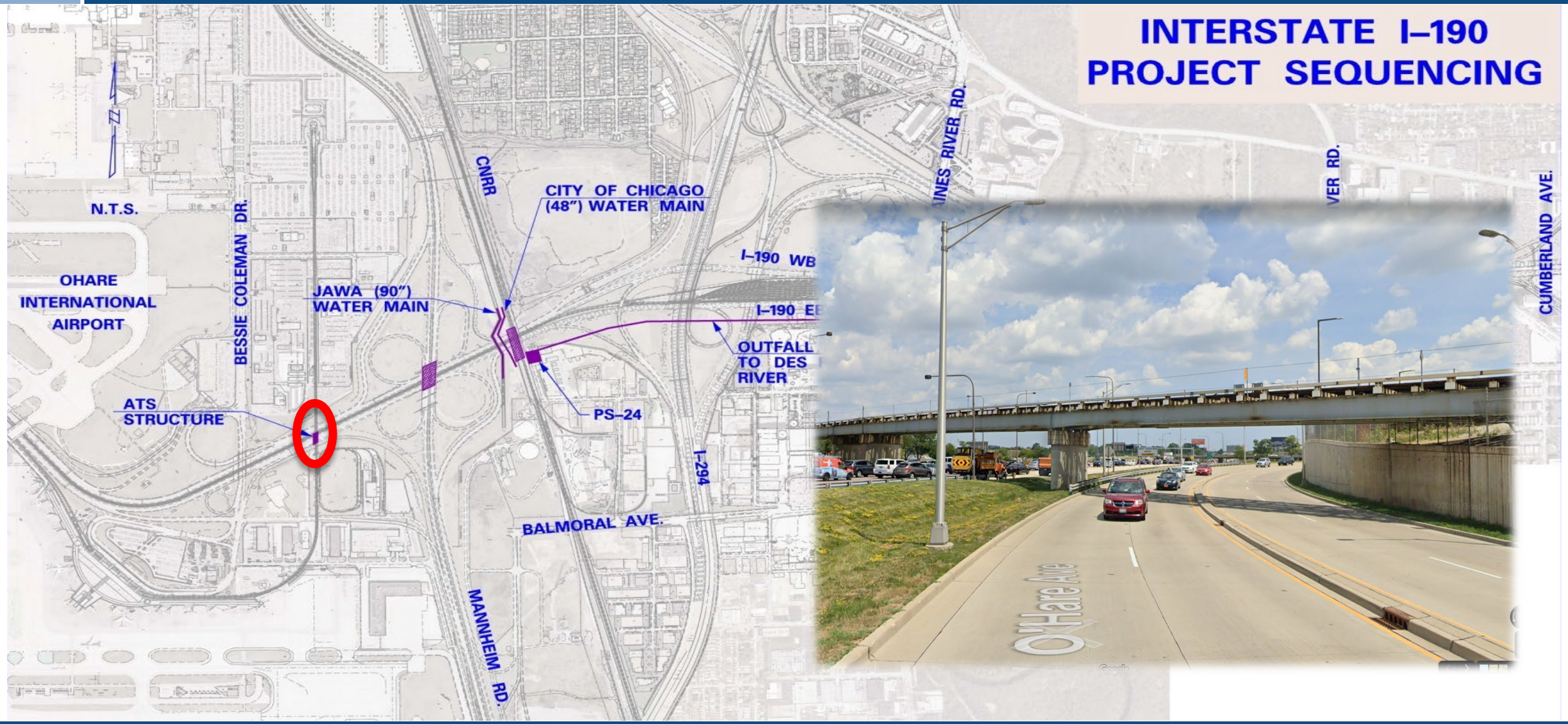
Advance Projects
ATS Pier & Abutment Relocation



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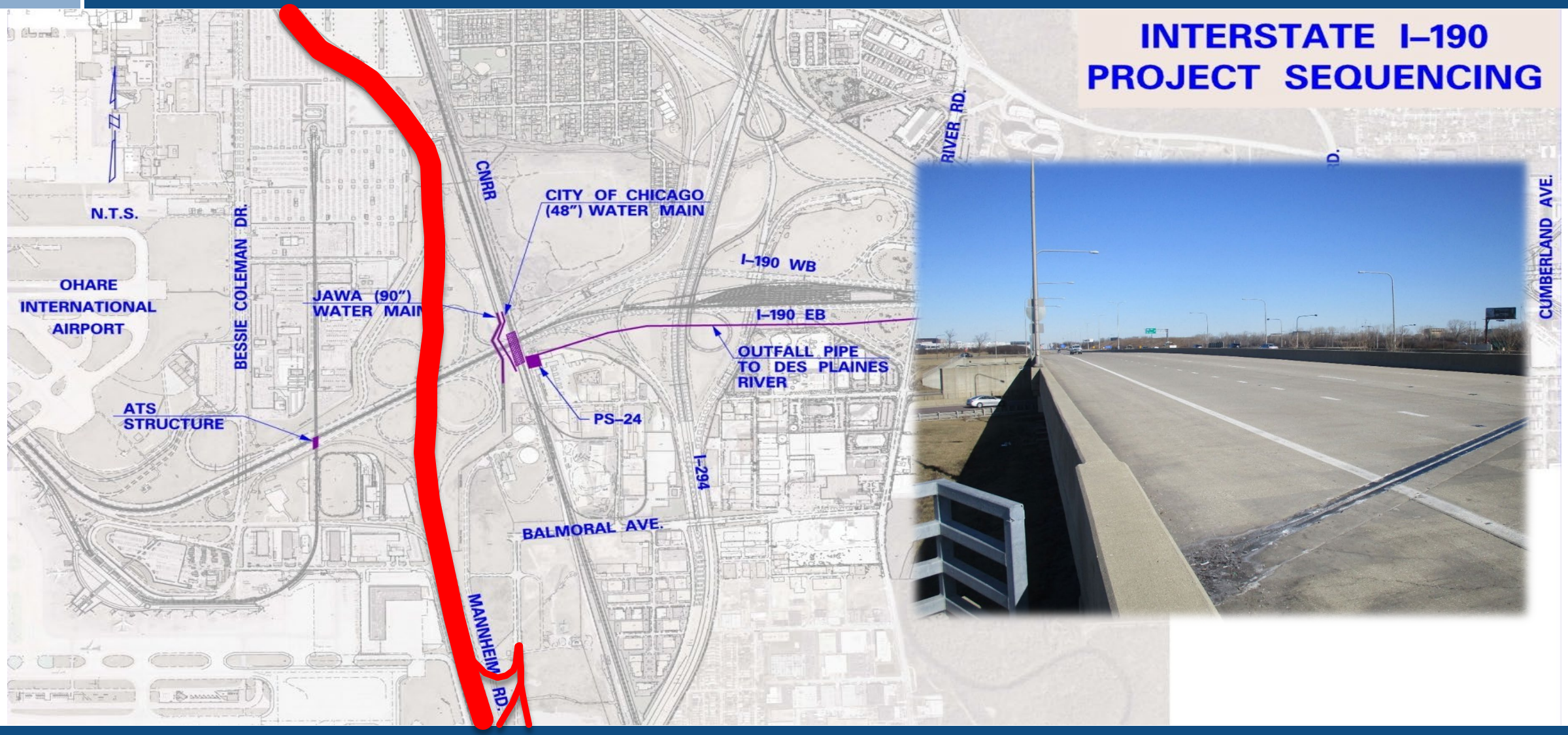
Advance Projects
Mannheim Road



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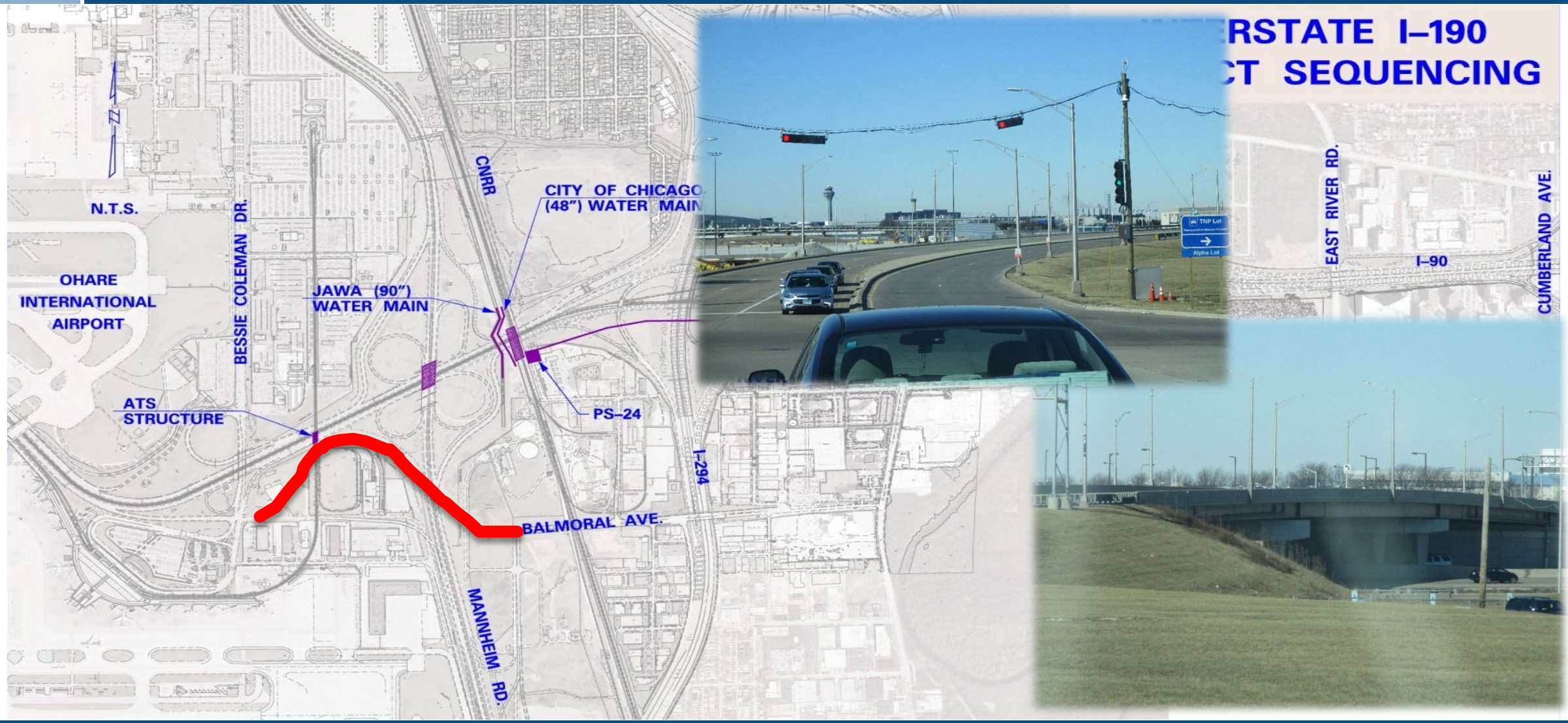
Advance Projects
Balmoral Avenue Extension



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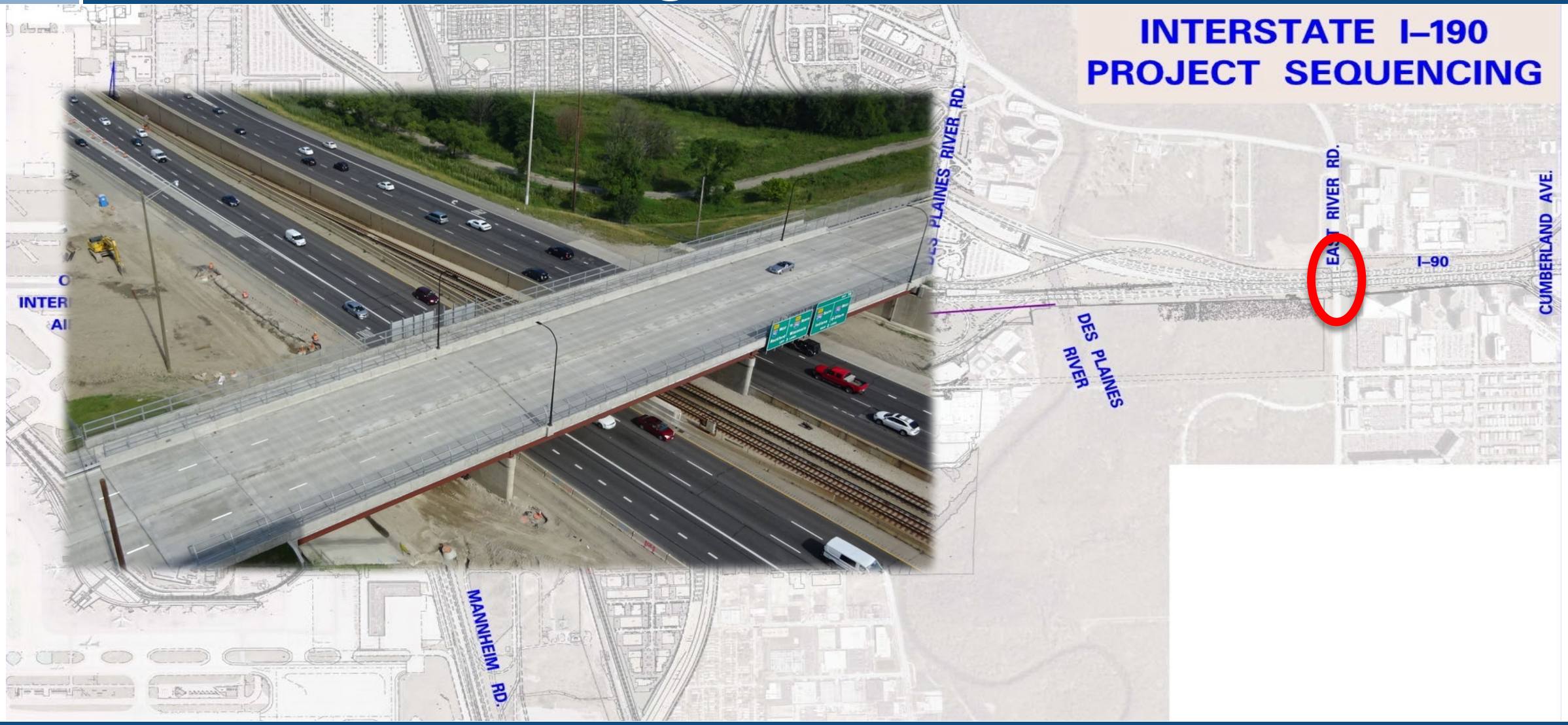
Advance Projects
East River Road Bridge



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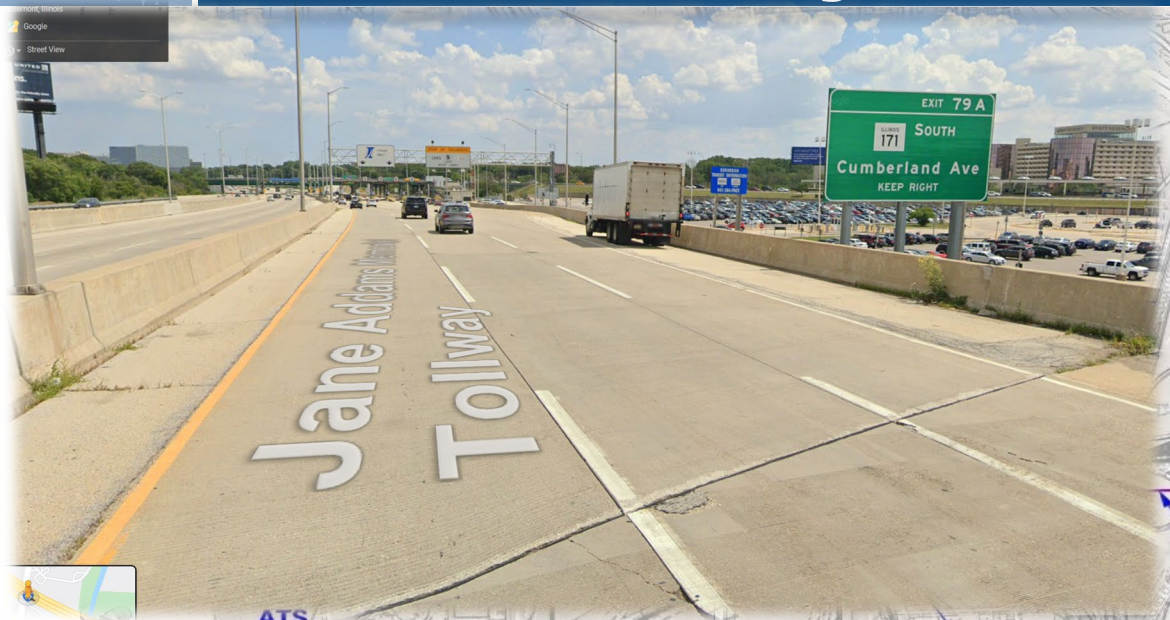
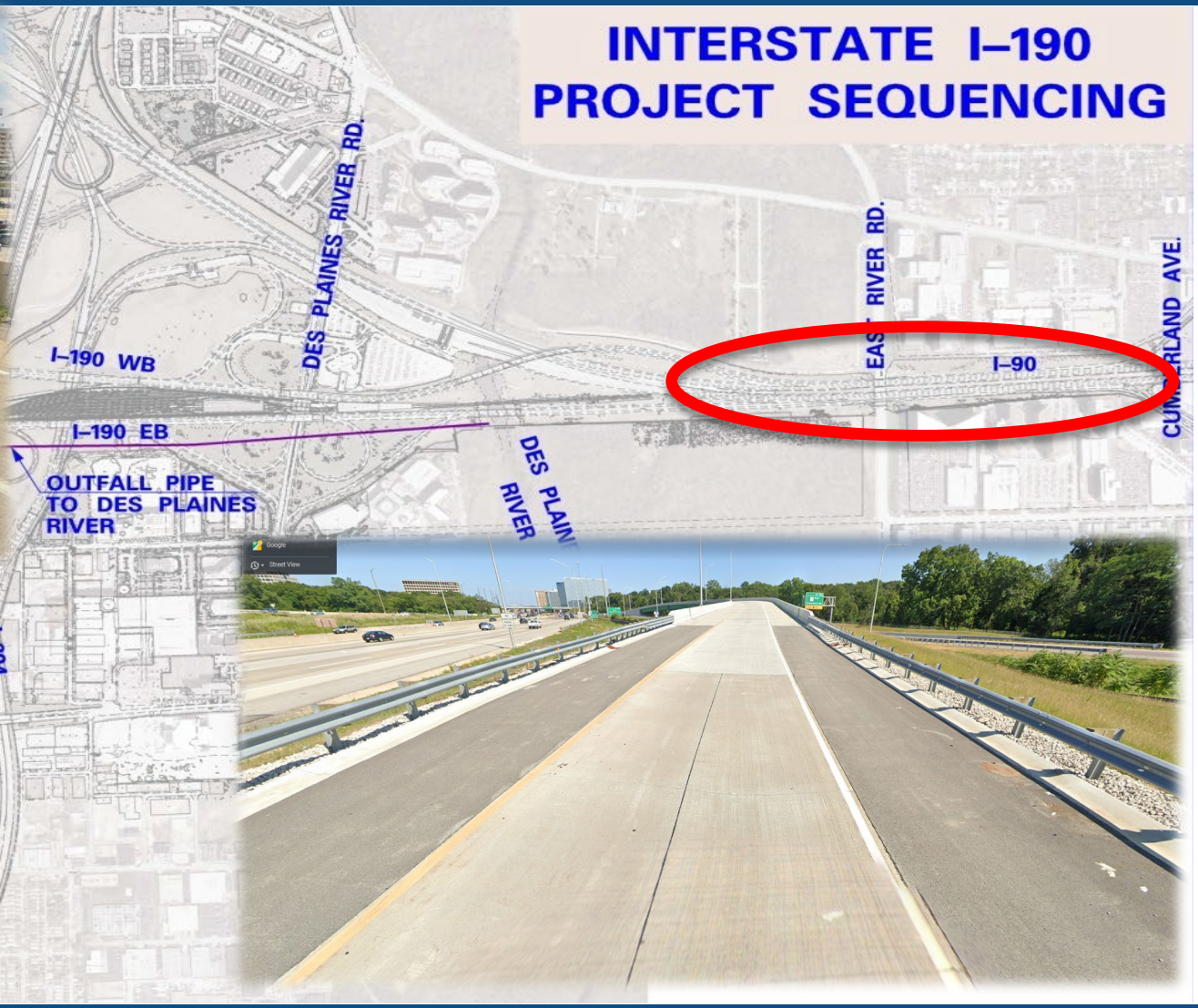
Advance Projects
Cumberland Flyover





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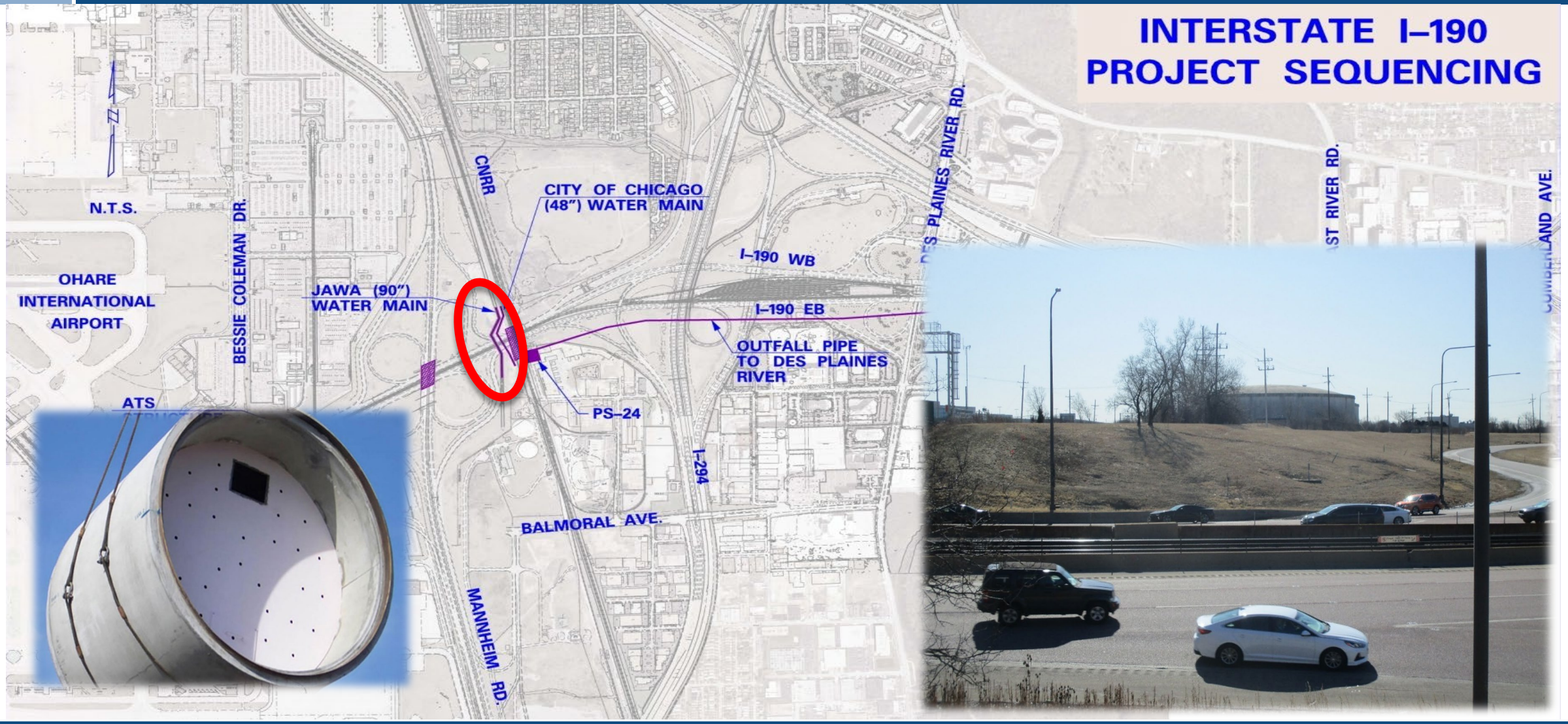
Advance Projects
90” JAWA & 48” CDWM Watermains



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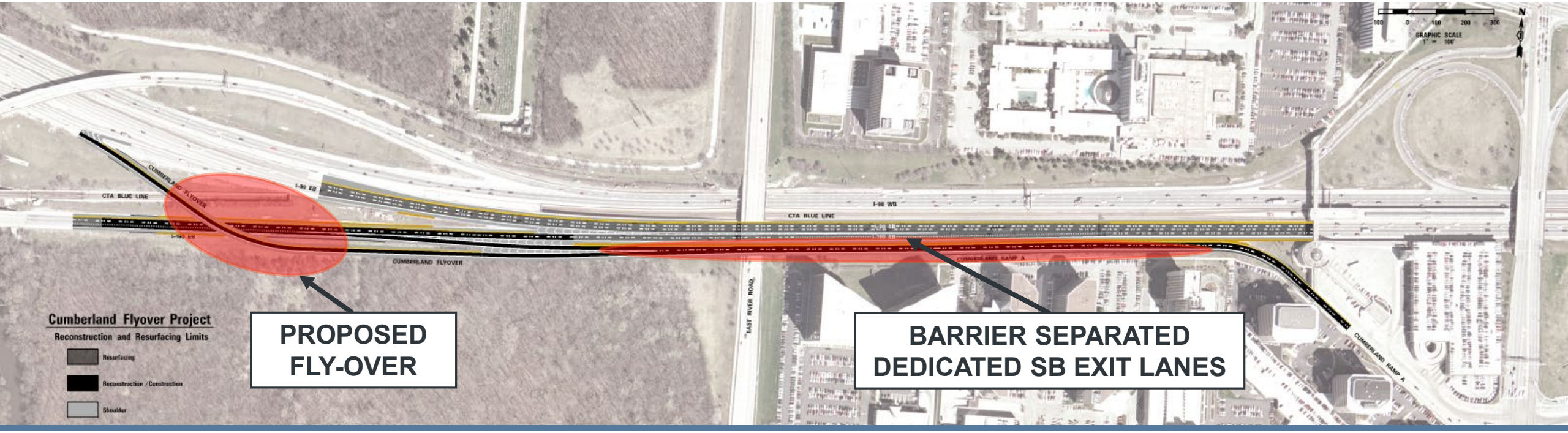
Cumberland Fly-over Project



- Existing Dangerous Weave - EB I-90 and I-190 Traffic with Traffic Exiting to Cumberland Avenue in Short Distance.
- Two EB Lanes Drop at SB and NB Cumberland Avenue Exit Ramp.
- Constraints - Forest Preserve, East River Road Bridge, CTA Blue Line, Cumberland CTA Station and Parking Garage.
- Proposed Skewed Alignment Fly-over Stays Within Existing ROW and Merges with EB I-190 Ramp That Exits to SB Cumberland Avenue.

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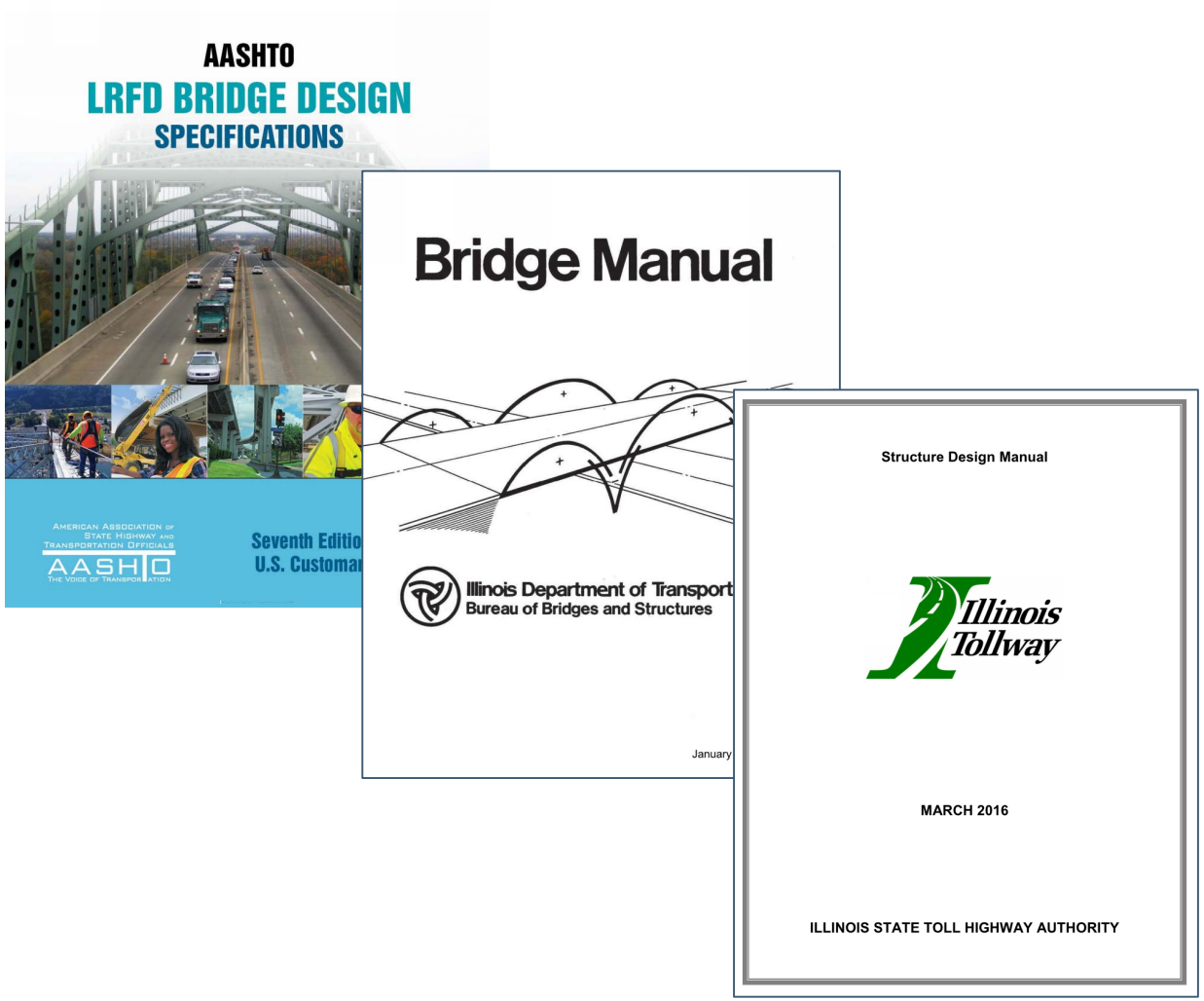
From Contracting to Construction: The Cumberland Flyover Project Reflective

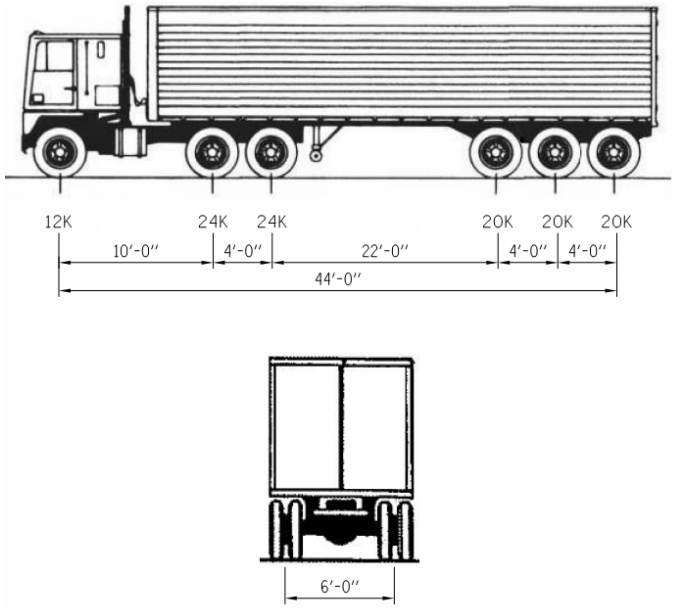
ILLINOIS TRANSPORTATION AND HIGHWAY ENGINEERING CONFERENCE

Irsilia Colletti, PE

HNTB

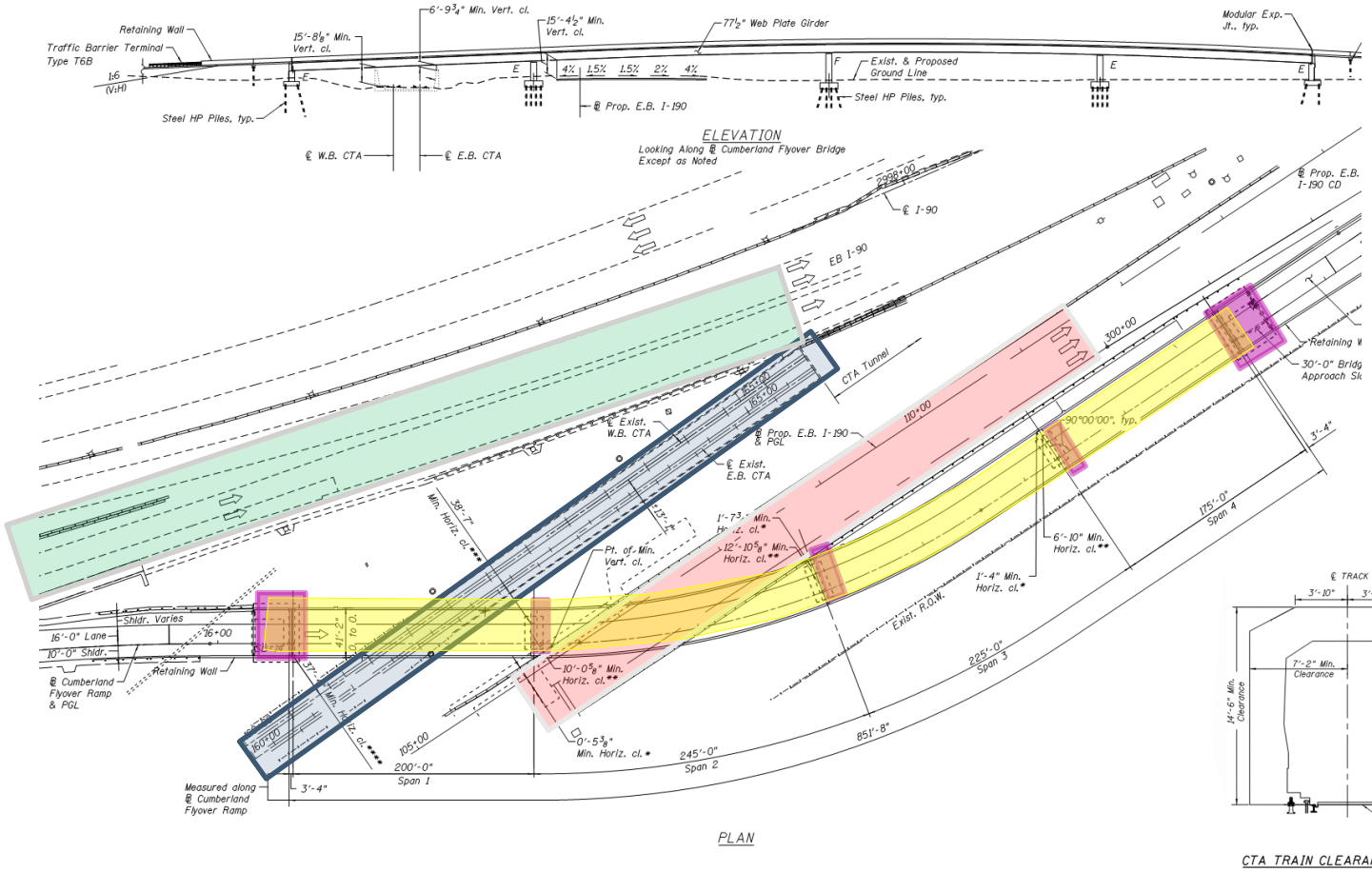
Design Criteria





IL-120 Design Truck

Design Constraints



Horizontal Clearances

- Abutment & Pier 1: 37 ft from CTA
- Pier 1 & Pier 2 – Adjacent to I-190

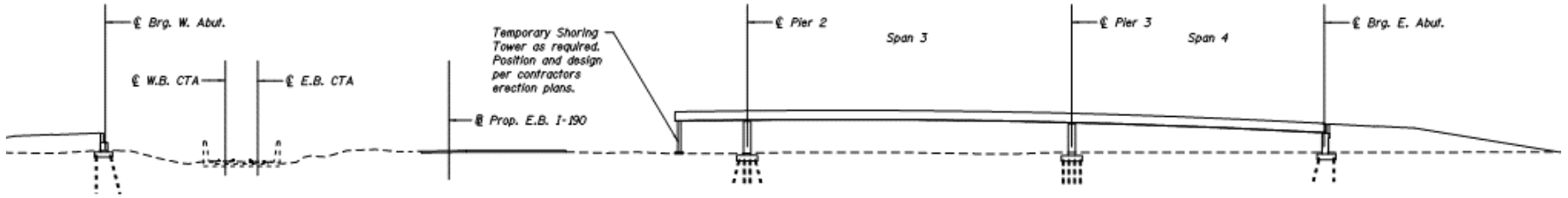
Vertical Clearance

- CTA = 14.5 ft required
- I-190 = 16 ft Desired
  - 15.25 ft min
  - 15.33 ft prov

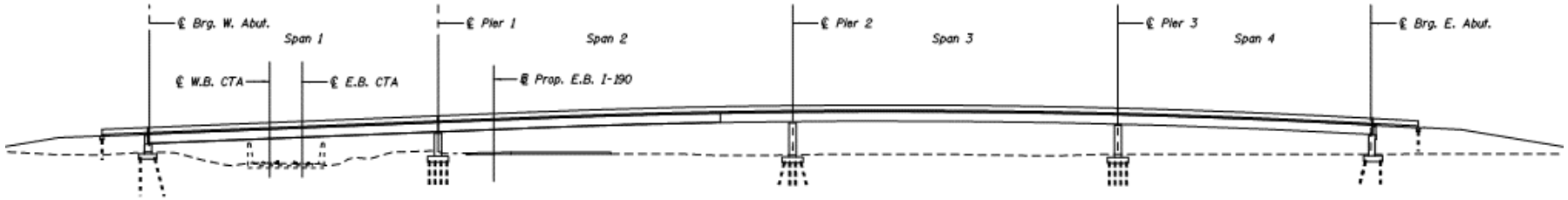
Super-elevation

- 6% max
- Minimize transitions

Proposed Staging



ELEVATION - STAGE 1
(Looking North)



ELEVATION - STAGE 2
(Looking North)

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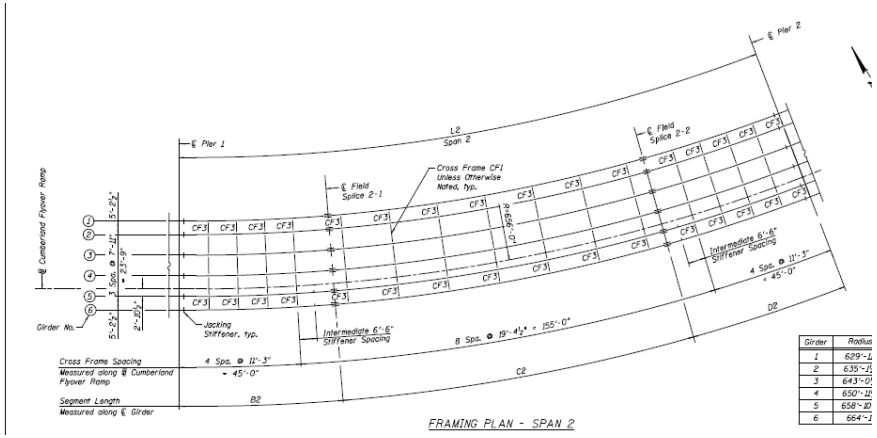
Proposed Staging

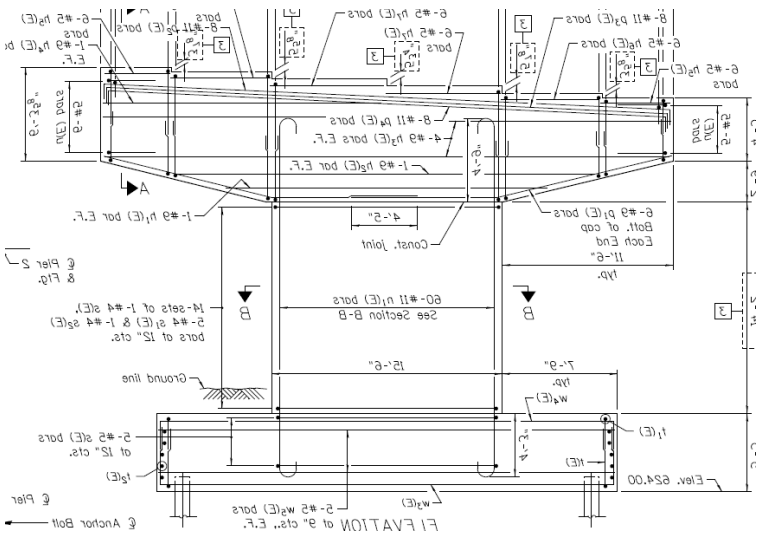
Bridge Superstructure

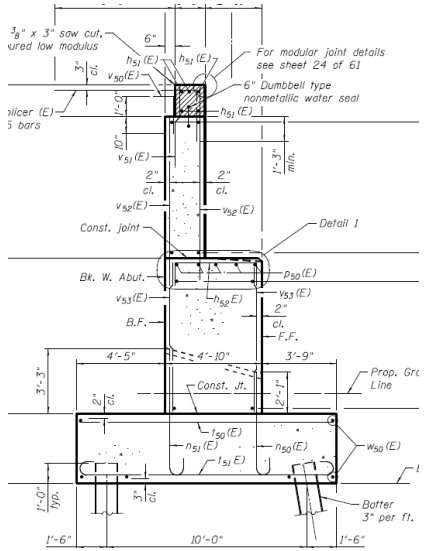
- 6-Steel Plate Girders
- 8” concrete deck, up to 6% super-elevation
- 4 Span Continuous Curved
  - Span Lengths 200’, 245’, 225’, 175’
  - Pier 2 fixed, expansion at all other supports
  - Cross frames as primary members
  - Radius of Curvature = 656’
- Relatively shallow due to aforementioned constraints
  - Exceeds AASHTO optional Span/Depth Ratio
  - Required intermediate stiffeners



Bridge Substructure

- Full height abutments
  - Driven Steel HP Pile Foundation
  - 30’ Long wingwalls
  - East: 13’-10” tall
  - West: 8’-5” tall
  - Approach Span Pile Bent
- 3 Hammerhead piers
  - Steel HP Pile Foundation
- HLMR Bearings





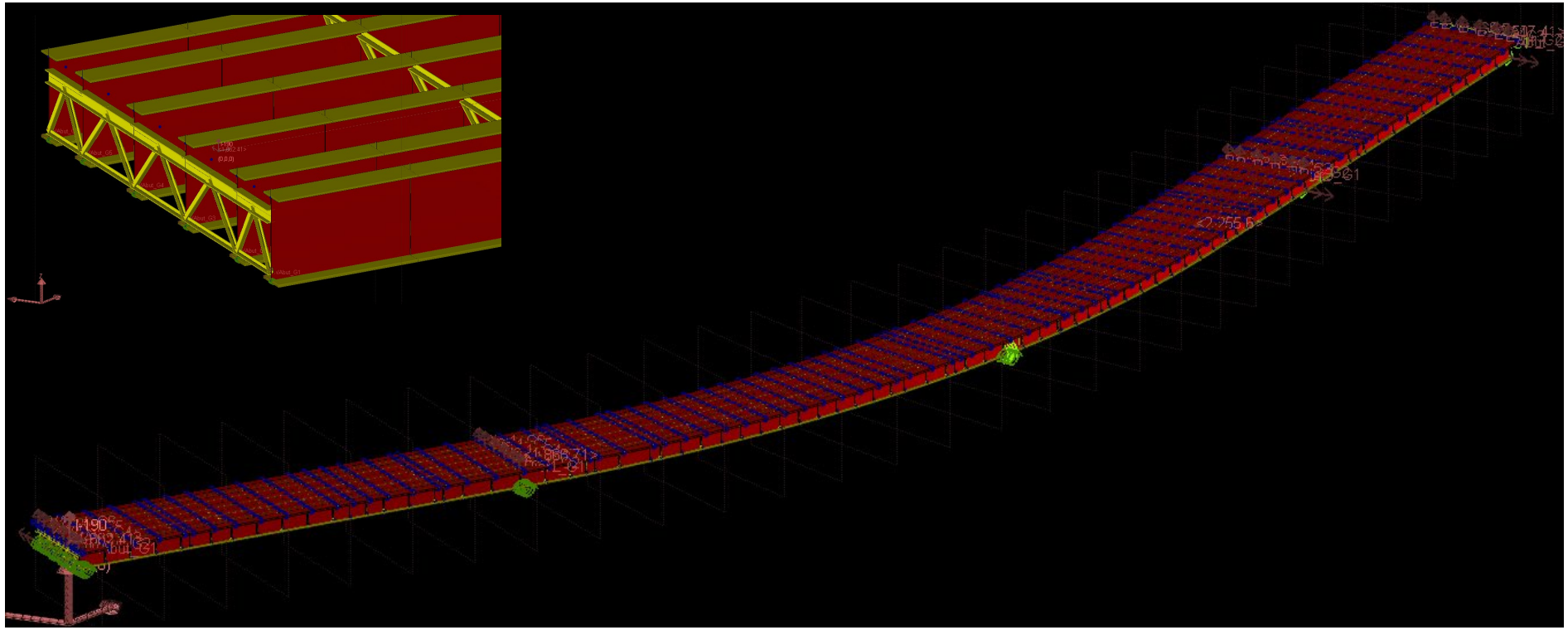
Superstructure Modeling

Superstructure modeled using LARSA 4D

- Preliminary Beam with Eccentric Deck
- Final Full 3D

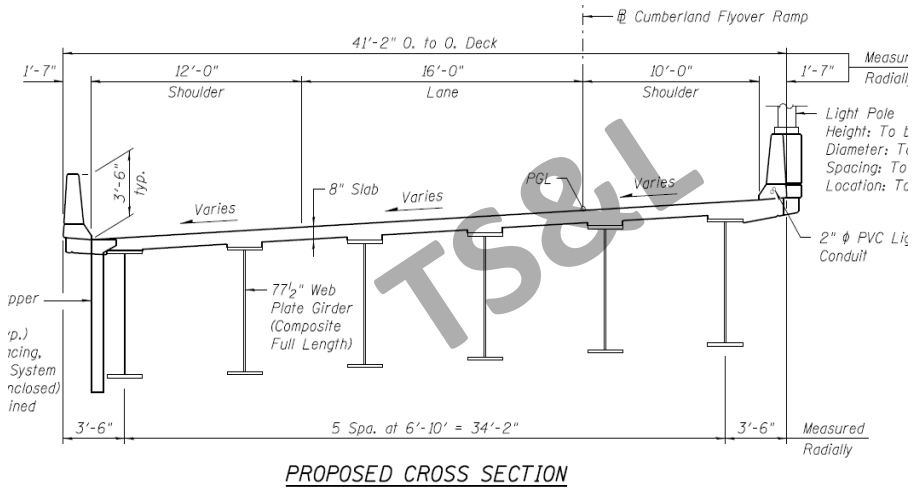
Steel Bridge Module Generated

- Internal Code Checks per AASHTO



Deflection Criteria

- TS&L
  - 6 girders at 6'-10"
  - Exceeded Client Deflection limit
  - Grillage model
- Final Design
  - Decreased spacing at exterior girders



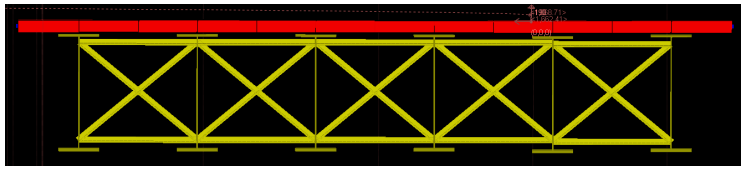
PROPOSED CROSS SECTION

BRIDGES – Deflection

Bridges Carrying Mainline Illinois Tollway Routes or Ramps	*For LRFD designs:* Live Load deflections shall be the larger of: 1. Max deflection resulting from ~~IL-120~~, HL-93 truck or HL-93 Tandem alone. 2. Max deflection resulting from design lane load plus the max deflection resulting from 25% of the ~~IL-120~~, HL-93 truck or HL-93 Tandem trucks. *For LFD or ASD designs:* HS-20 Live Load	Span Length/800 (if sidewalk present, Span Length/1000)
Other Bridges	Same as above, except requirements for IL-120 Live load do not need to be met.	

$$\frac{L_{as}}{D} \le 25\sqrt{\frac{50}{F_{yt}}} = \frac{245\times12}{77\frac{1}{2}} = 37.9 > 25 \quad (2.5.2.6.3\text{-}1)$$

Δ_{LL_Allow} (in)	Δ_{LL_TSL} (in)	Δ_{LL_Design} (in)
3	2.25	1.94
3.675	**4.13**	3.48
3.375	3.13	2.71
2.625	1.56	1.42



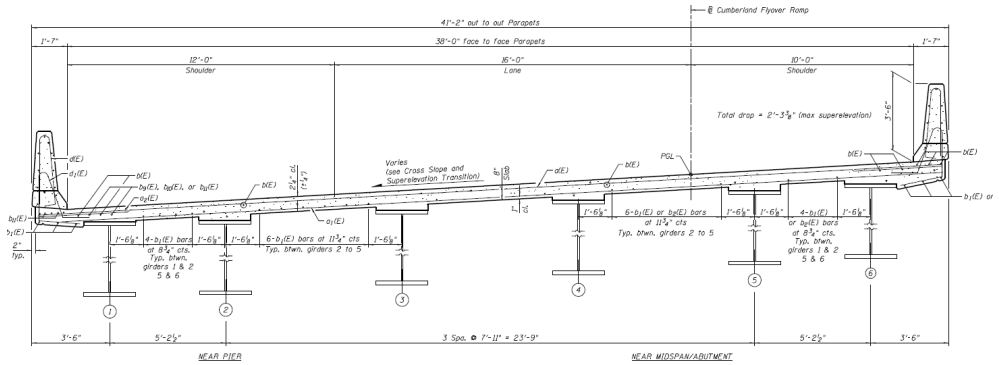
Framing Plan

6-Steel Plate Girders

- 5/8” x 77.5” Web
- 28” flanges
  - Thickness varies from 1.25” to 2.75”
- 6 Field Splices, 6 Shop Splices

Interior: 7’-11”

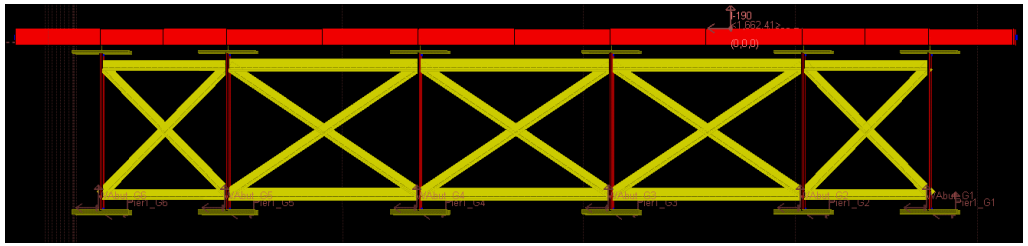
Exterior: 5’-2 ½”



Varying spacing a result of Excessive Live load deflection in initial runs

Large Shear demand

- Intermediate Stiffeners
- Shallow Girders



EAST RIVER ROAD BRIDGE

East River Road Bridge Replacement

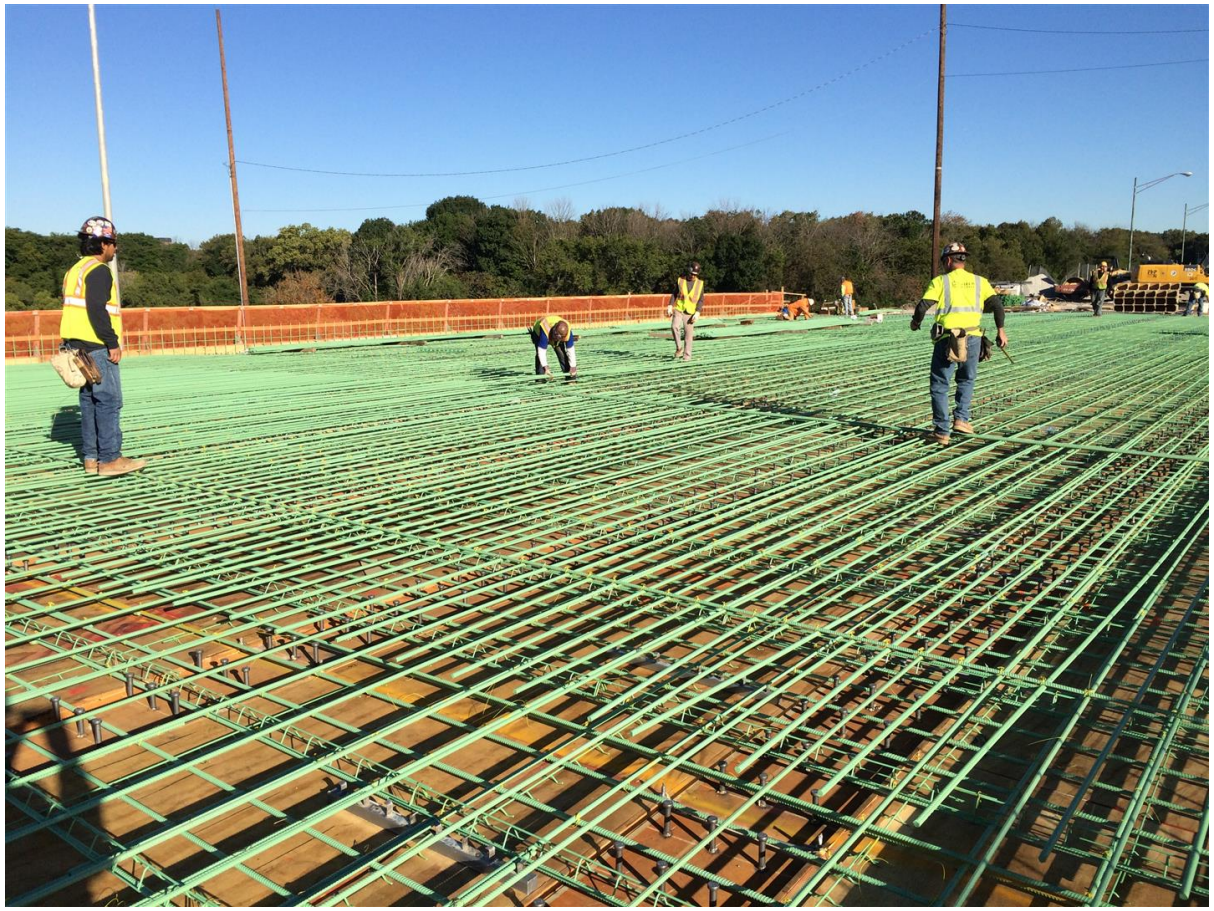
- Construction began April 2016
- South Abutment moved to south approximately 35ft to accommodate CD system build under Flyover contract
- North Abutment moved north approximately 45ft for future work
- One Pier to remain in same location; 2 Piers eliminated with new bridge
- All work completed under full detour

Bridge Removal

Substructure and Beams

Beams in Place

Decking and Rebar



Deck Pour

Deck Pour

Open to Traffic

Bridge Open to Traffic
October 31, 2016

Final Construction Cost
$11,093,973

CUMBERLAND FLYOVER BRIDGE

Cumberland Flyover Bridge

Flyover Bridge Construction Began December 2016

- Constructed North Pier footing and stem wall.
- Shifted work to south ROW of I-190
- Constructed East Abutment, Piers and relocated existing main drain ahead of bridge/retaining wall work

West Abutment

Close proximity to CTA ROW.

Required track monitoring during pile driving operations.

Storm Sewer Relocation

Piers 2 and 3 Construction

Pier Construction

Pier Construction

East Abutment

East Abutment

Beam Placement

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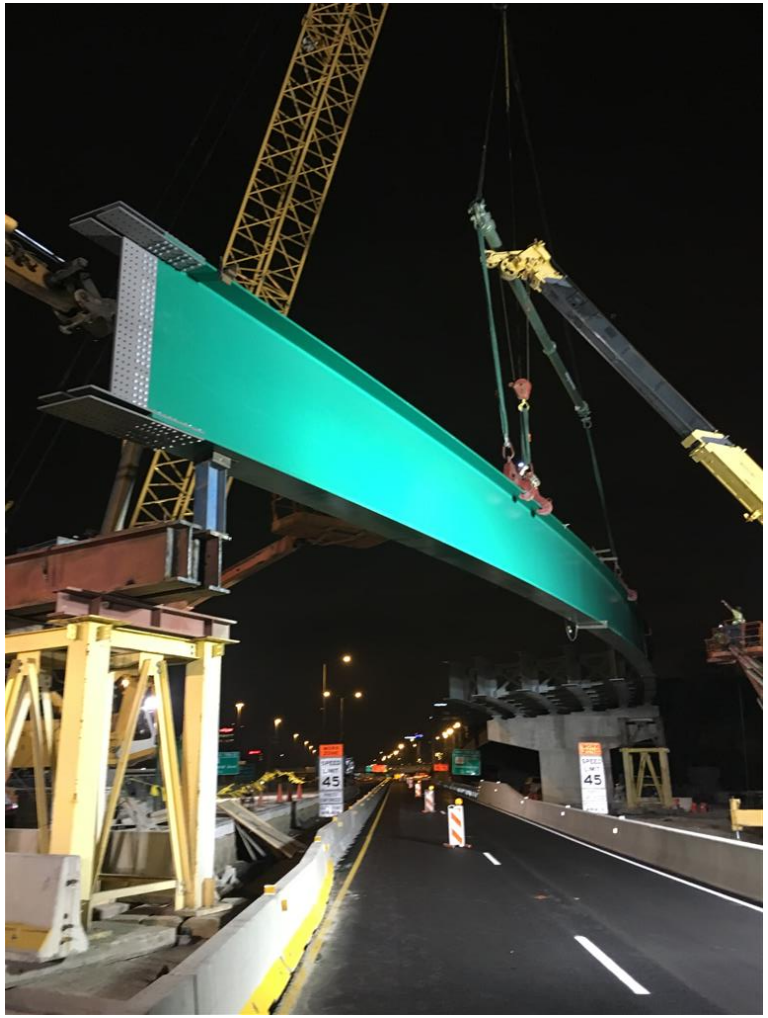
Beam Placement (Span 4)

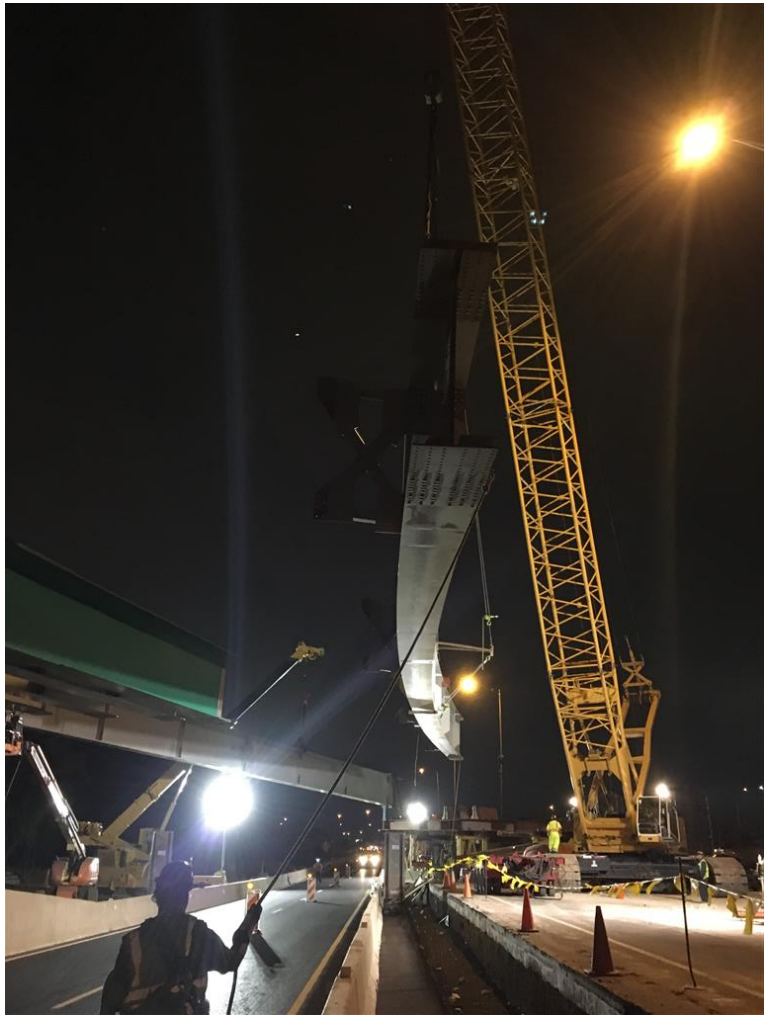
Beam Placement (Span 4)

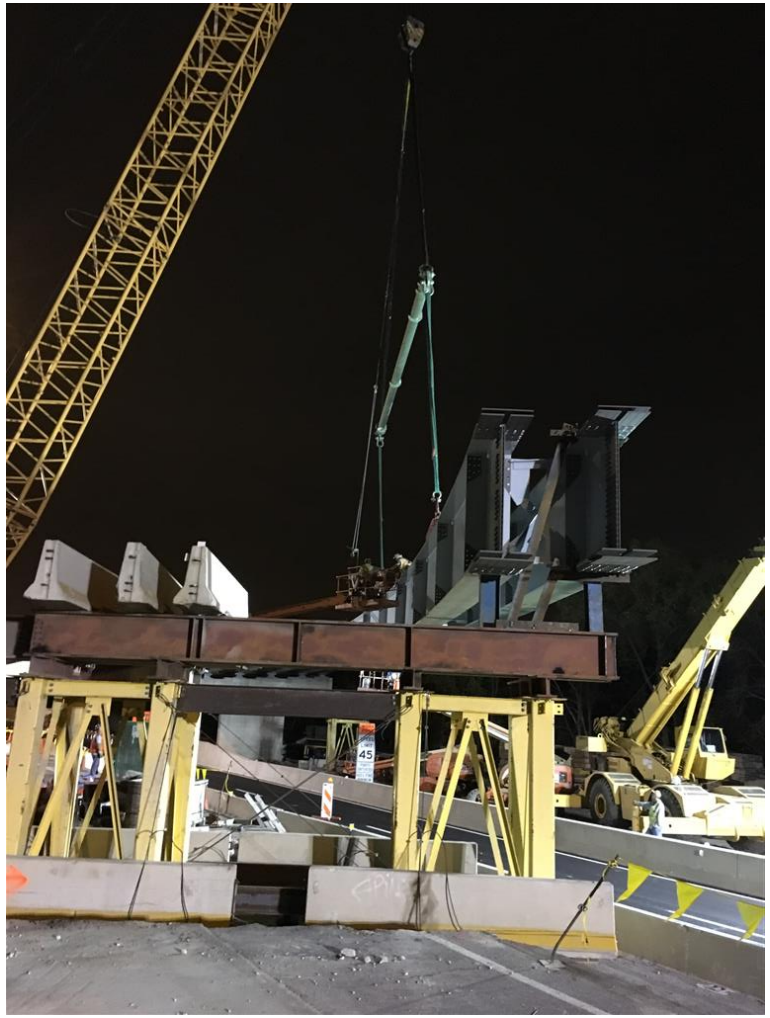
Beam Placement (Span 3)

Beam Placement (Span 3)

Beam Placement (Span 2)







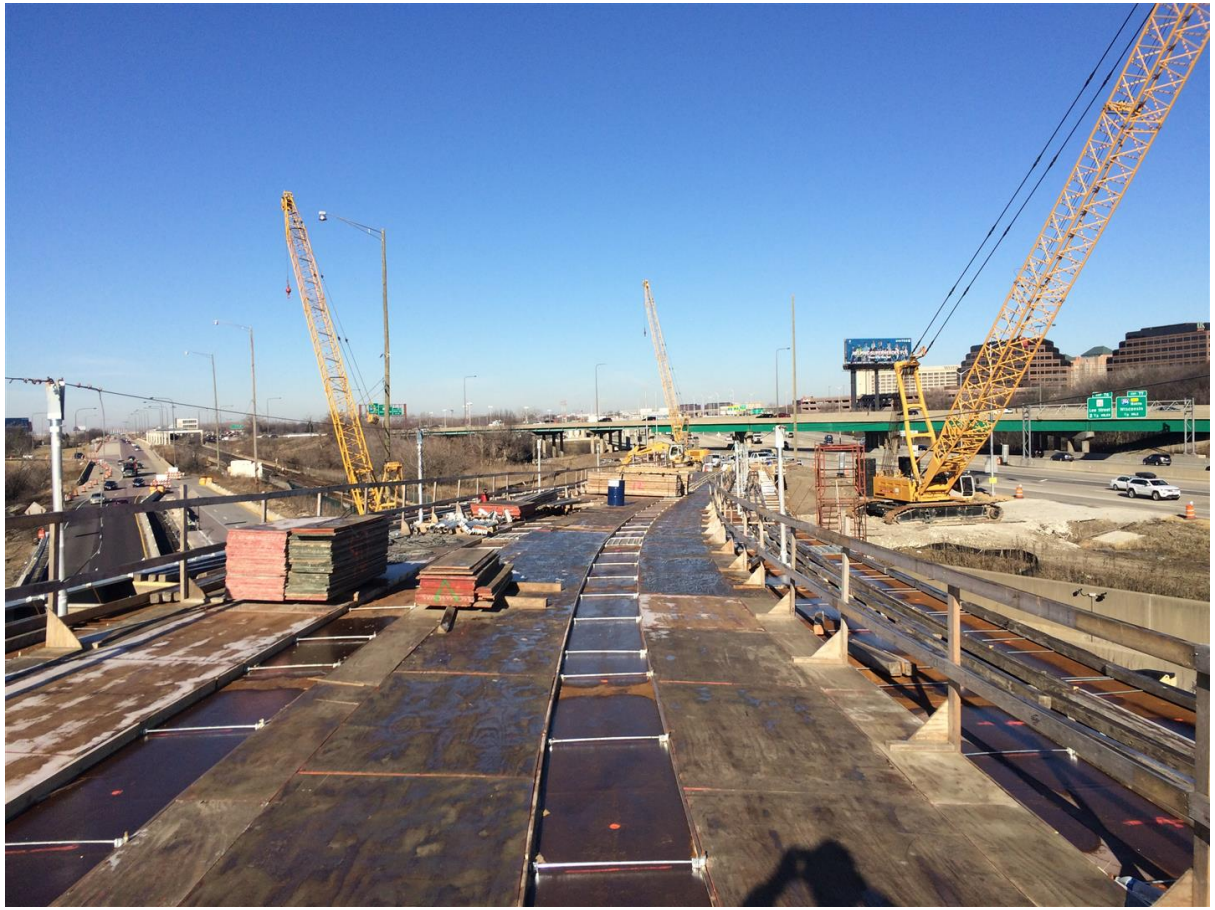
Beam Placement (Span 2)

Beam Placement (Span 1)

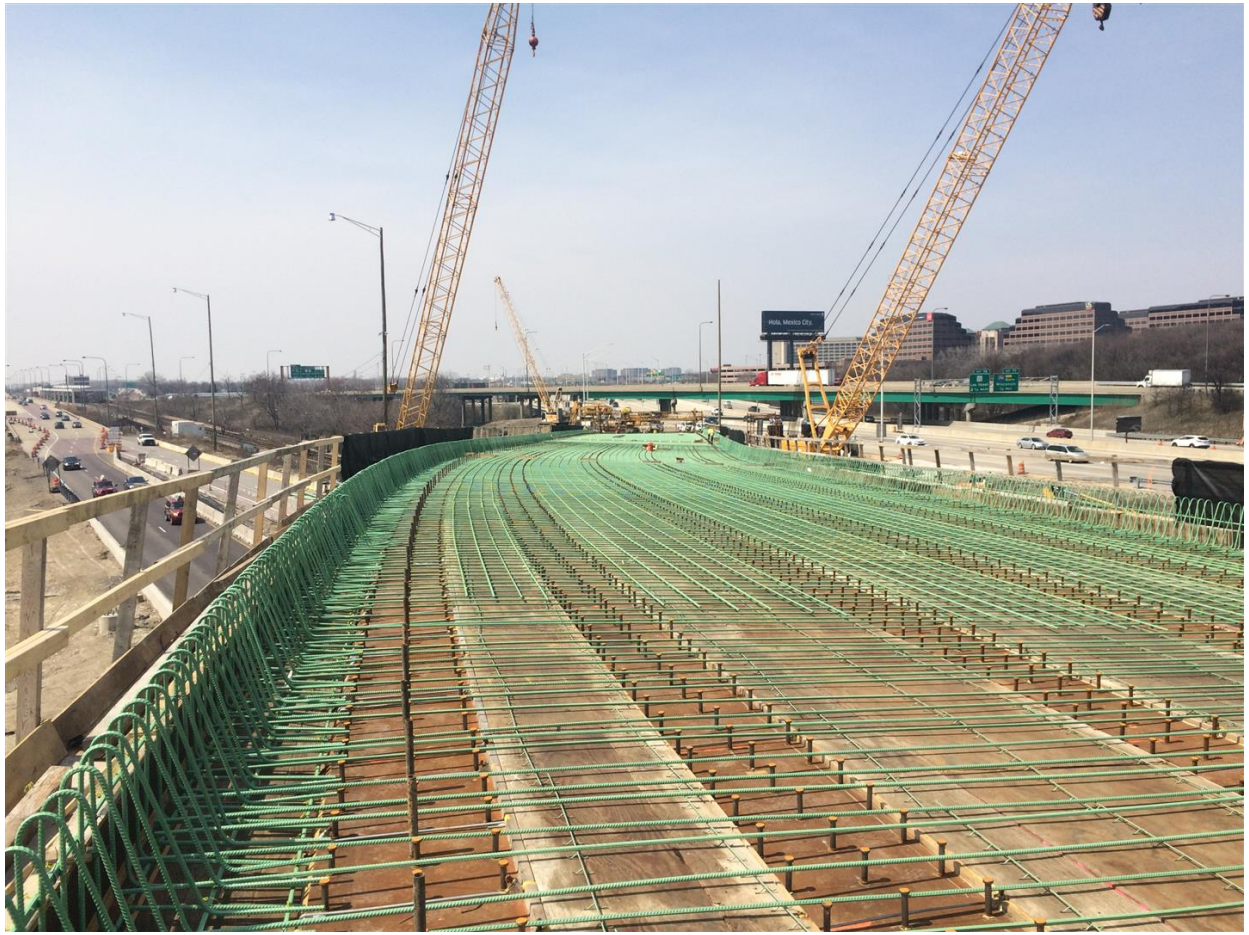
Beam Placement (Span 1)

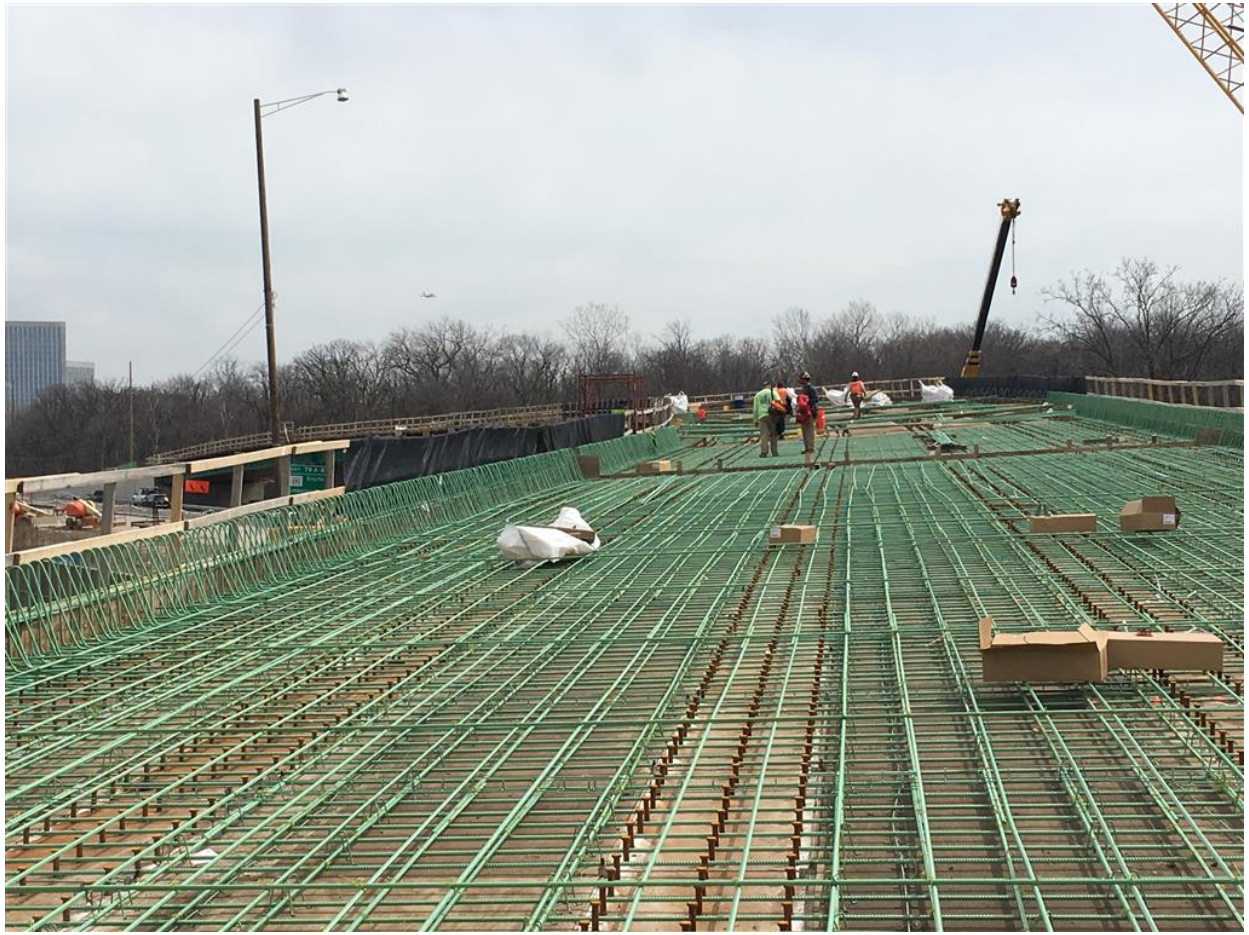
Beam Detailing

Decking

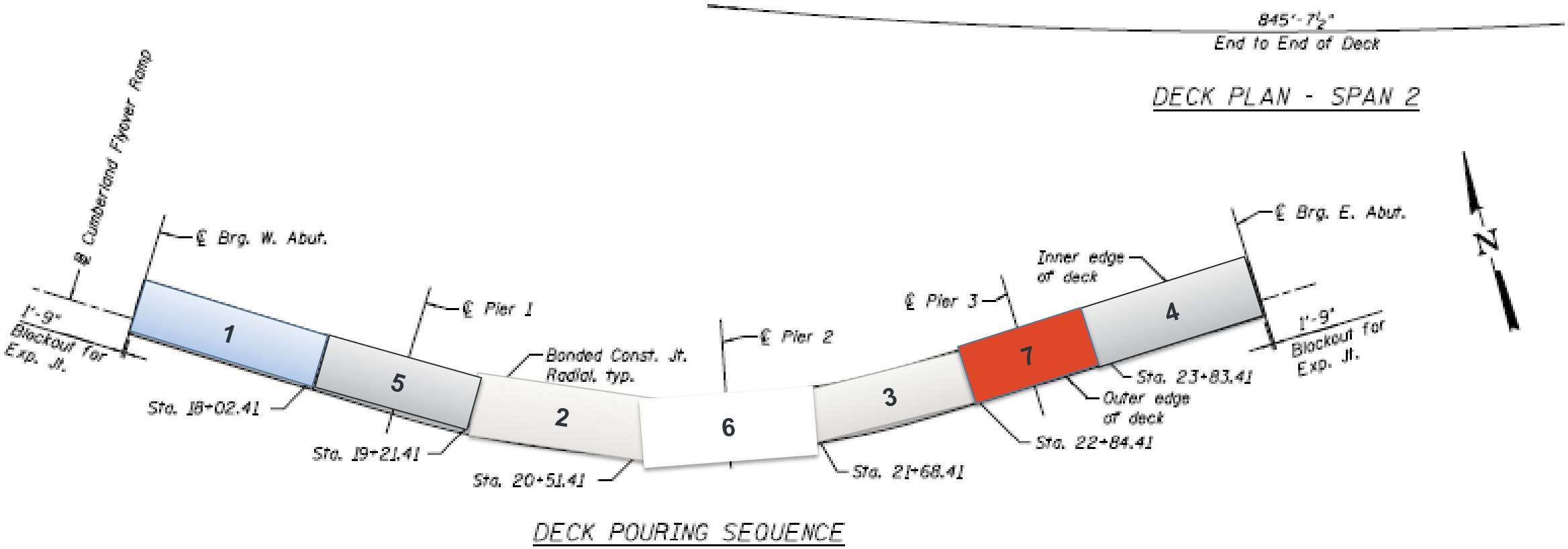


Rebar Placement

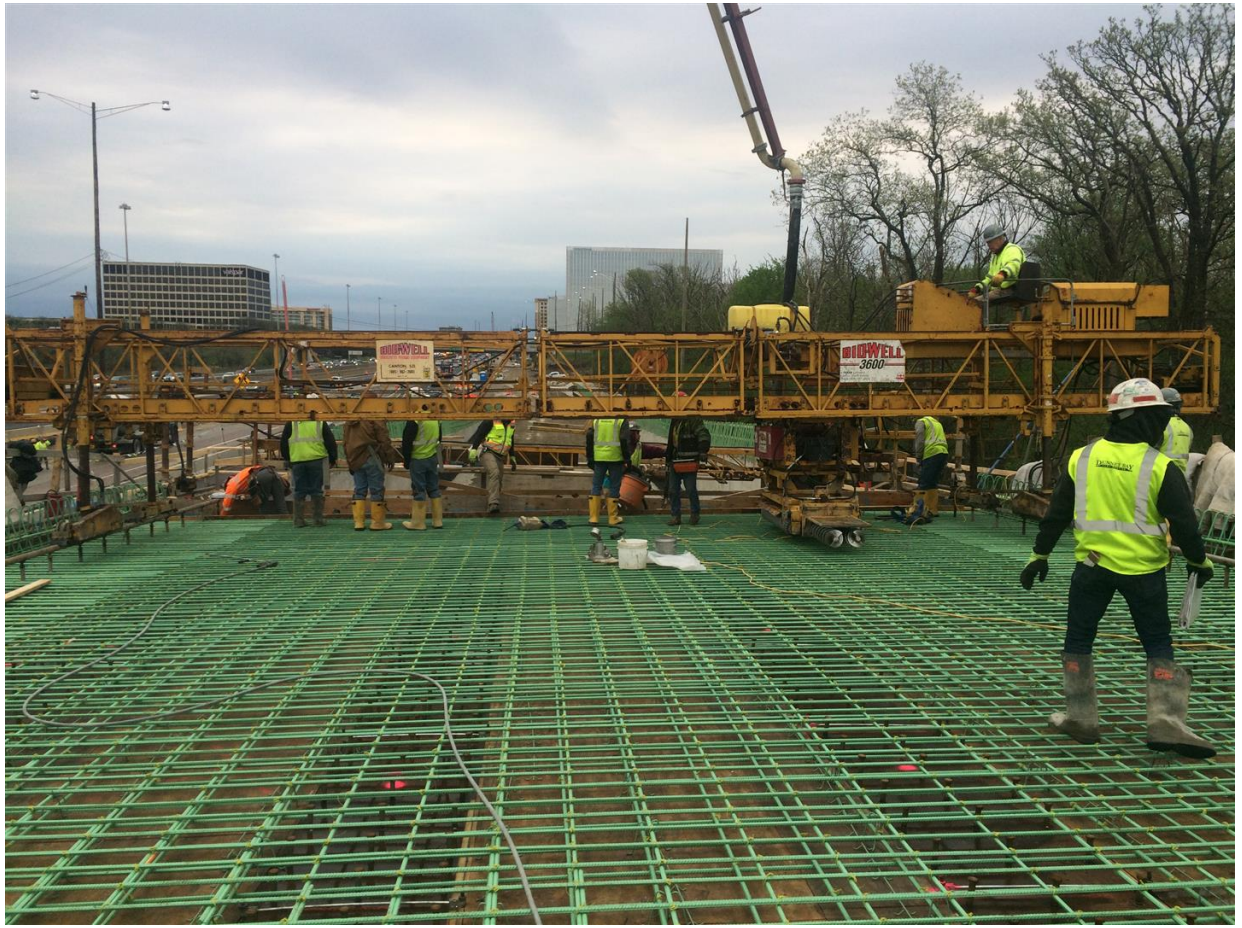




Deck Pour Sequence



Deck Pour



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Final Preparations to Open

Ready to Open

Bridge Open to Traffic
September 19, 2018

Final Construction Cost
$24,227,013

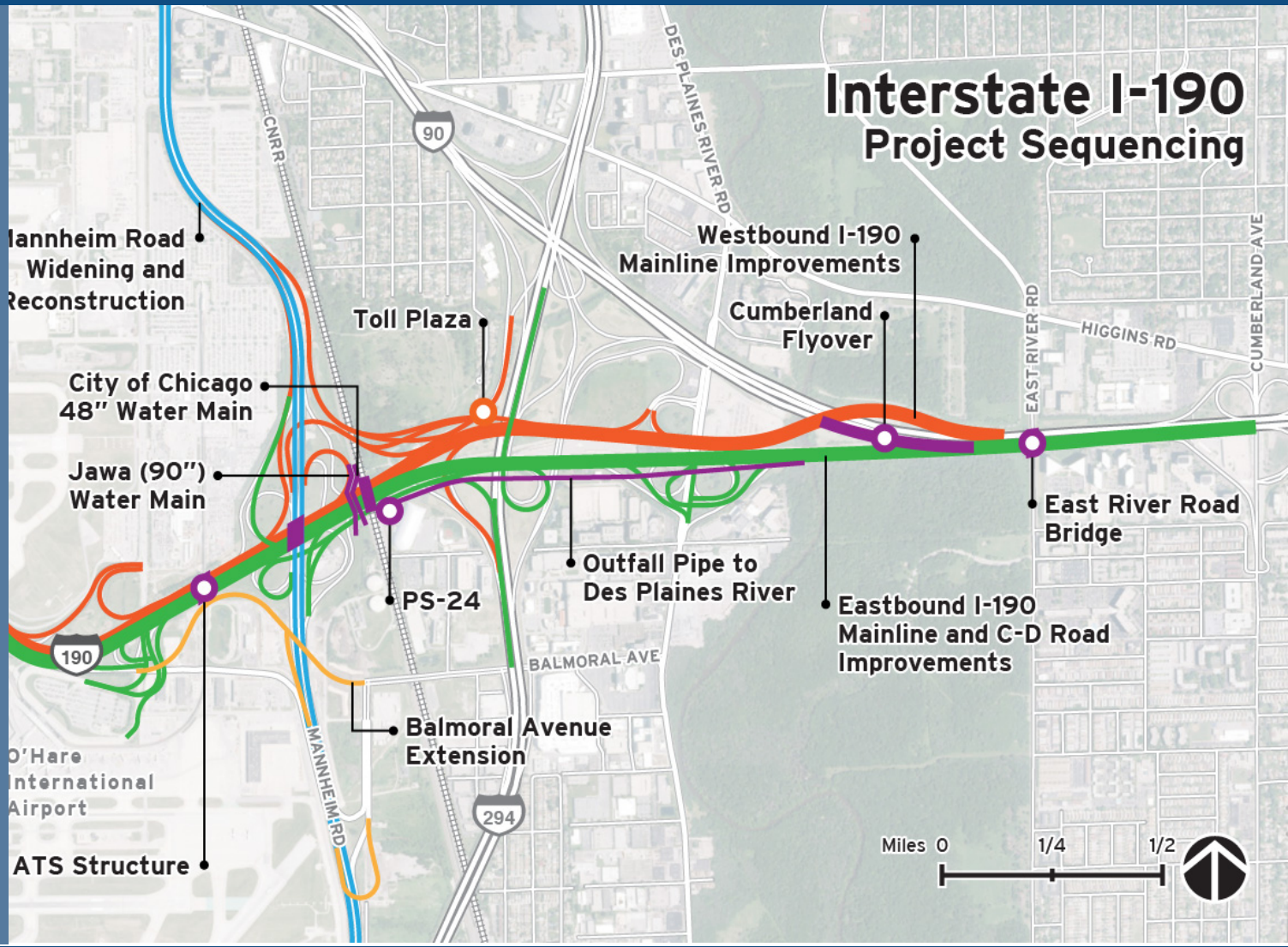
Quality Control

Public Input

Public Input

Interstate 190 Project Facts

- Design Approval Received in March 2011
- Advance Projects Have Been Constructed
- Work Remaining
  - WB I-190 Mainline and I-294 Ramps to Mannheim
  - EB I-190 Mainline and CD Road
- I-190 Total Project Cost
  - $561M in the Program
    - Includes Design and Construction Engineering



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Thank you!
Any questions?