Illinois Concrete Pipe Association

Engineering Challenges and Solutions

Illinois Tollway

March 6, 2019

About the Tollway

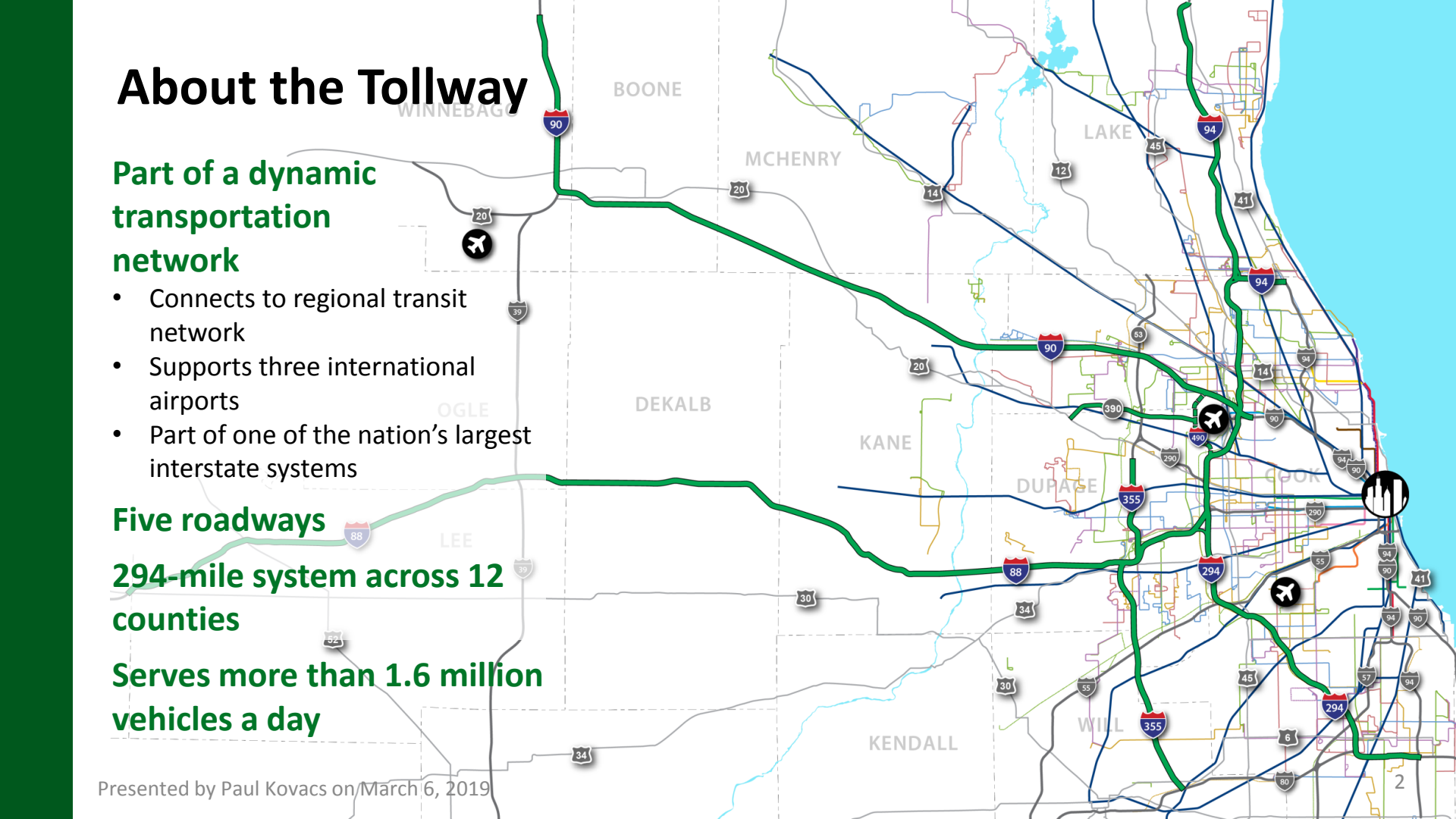
Part of a dynamic transportation network

- Connects to regional transit network
- Supports three international airports
- Part of one of the nation's largest interstate systems

Five roadways

294-mile system across 12 counties

Serves more than 1.6 million vehicles a day



Move Illinois Program
15-year, $14 billion capital program

TAKING CARE OF EXISTING SYSTEM
$4 billion

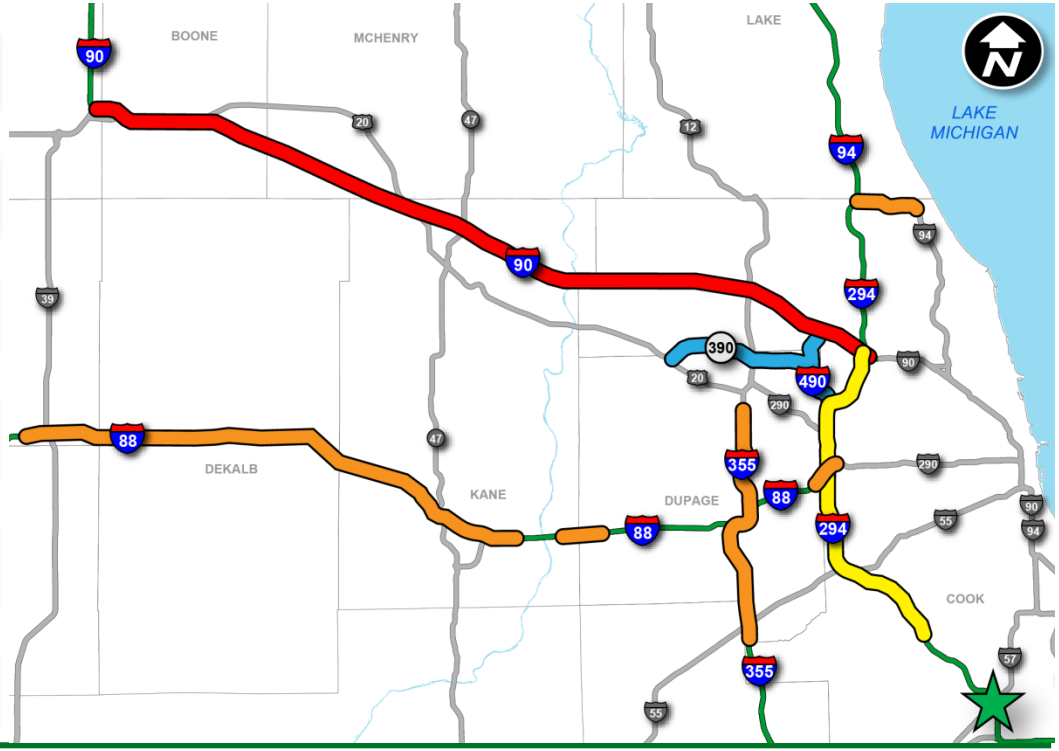
CENTRAL TRI-STATE TOLLWAY (I-294)
$4 billion

JANE ADDAMS MEMORIAL TOLLWAY (I-90)
$2.5 billion

ILLINOIS ROUTE 390 and I-490 TOLLWAYS
$3.2 billion

I-294/I-57 INTERCHANGE
$719 million

OTHER EMERGING PROJECTS



Agenda

Jane Addams Memorial Tollway (I-90) Rebuilding and Widening Project Overview
Paul Kovacs, P.E., Illinois Tollway
Chief Engineering Officer

NSMJAWA Water Transmission Main Relocation Along I-90
Mike Wicks, P.E., Illinois Tollway
Executive Project Engineer

Elmhurst Road Interchange Utility Relocations
Hope Garrett, P.E., Illinois Tollway
Senior Project Engineer

Building Information Modeling Implementation
Laura Thompson, P.E., Illinois Tollway
Senior Project Engineer

Jane Addams Memorial Tollway (I-90)

Rebuilding and Widening Project

Delivering the Roadway

Coordination with key stakeholders

Providing sustainable solutions

Delivering 62 miles of improvements in four years

Utility Coordination

26 utility companies

385 utility relocations

14,000 Nicor watch-and-protect locations

10,500 feet Nicor transmission relocation

6.5 mile water main relocation

NSMJAWA Water Transmission Main Relocation Along I-90

Mike Wicks, P.E., Illinois Tollway

About NSMJAWA

NSMJAWA was created by a joint agency agreement in 1981

- Elk Grove Village, Schaumburg, Rolling Meadows, Hoffman Estates, Hanover Park, Streamwood and Mount Prospect

The NSMJAWA system

- Includes more than 55 miles of transmission main
- Pipe sizes range between 12-inch and 90-inch
- Can deliver up to 128 million gallons of water per day
- Serves a daytime population of around 500,000 people

Pipe installed by agreement with the Tollway in 1984

- Runs adjacent to the Tollway for 16.5 miles

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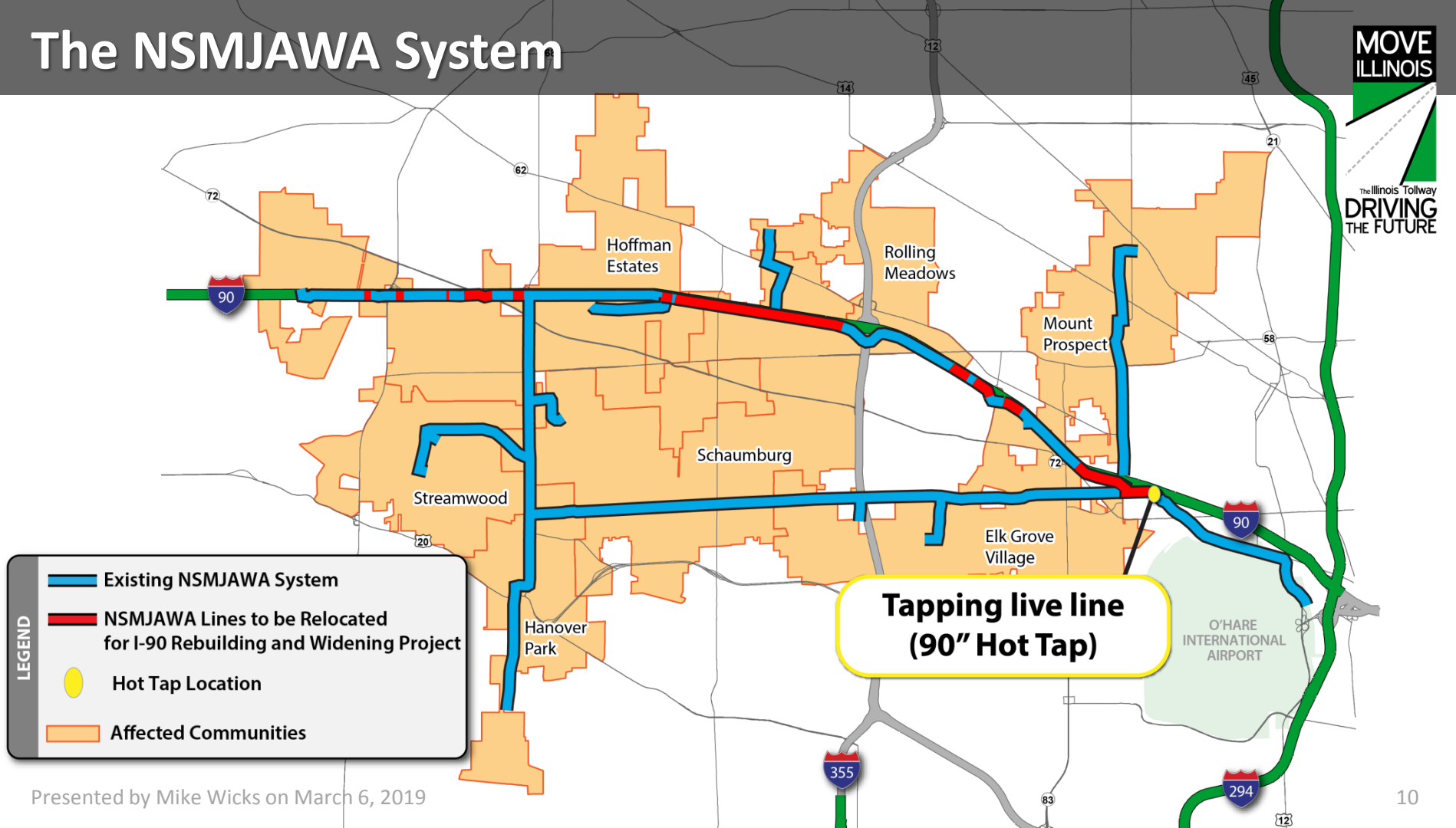
The Illinois Tollway
DRIVING THE FUTURE

The NSMJAWA System



Tollway Construction Contracts

Water main construction

- Barrington Road to Elmhurst Road
- Elmhurst Road
- Hot tap near Elmhurst Road

Roadway and bridge construction

- Bartlett Road Bridge reconstruction
- Barrington Road roadway, ramps and toll plazas

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Companies Involved

General contractors

- Benchmark Construction Co. Inc.
- TDW Services Inc.

Suppliers

- Hanson Pressure Pipe Inc.

Designers

- Alfred Benesch & Company and V3 Companies of Illinois Ltd.
- Crawford, Murphy & Tilly Inc. and HDR Engineering Inc.

Corridor construction managers/construction managers

- Omega & Associates Inc.
- AMEC Foster Wheeler Environment & Infrastructure Inc.

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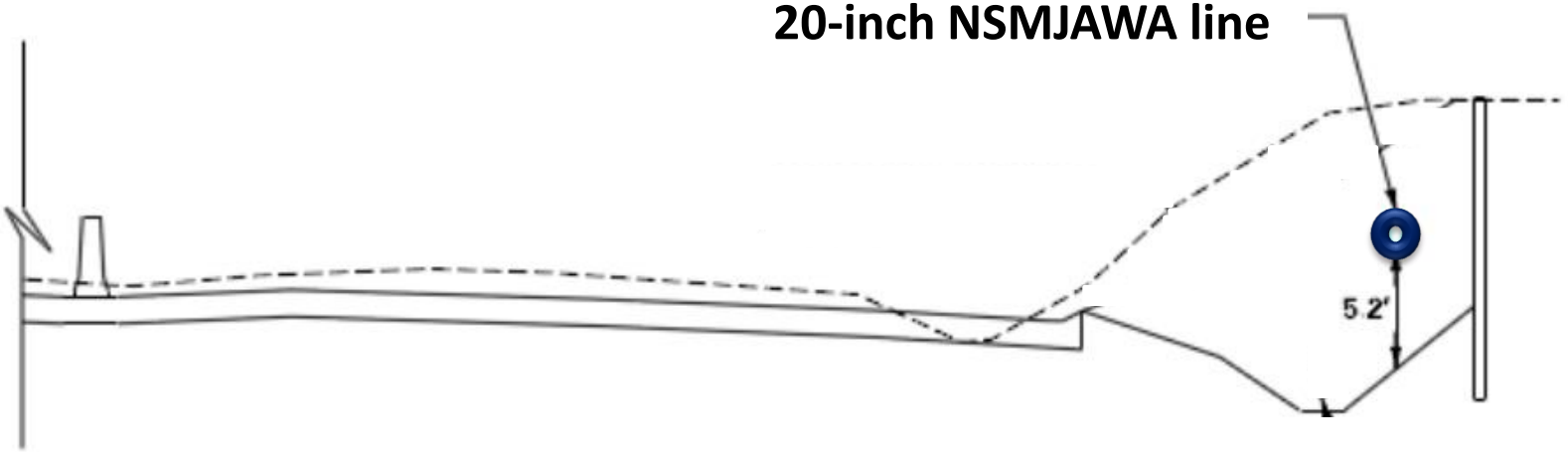
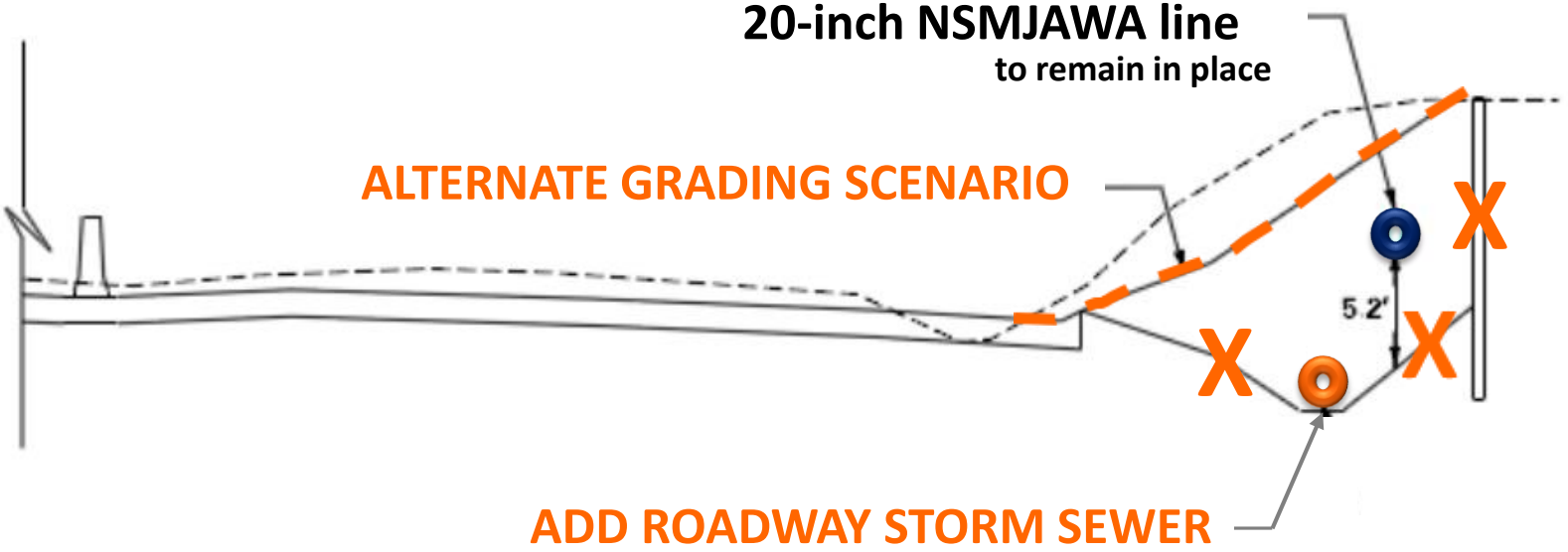
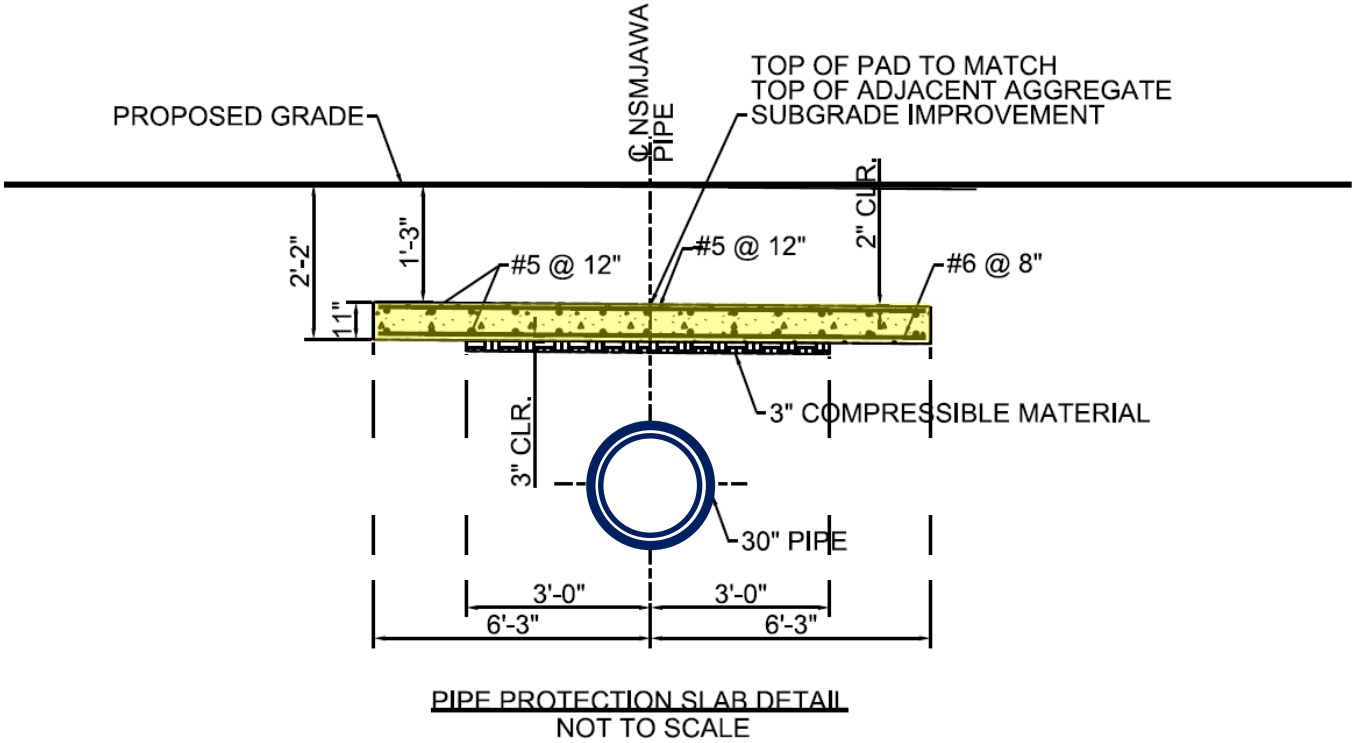
Design: Eliminating Potential Grading Conflicts



Design: Eliminating Potential Grading Conflicts

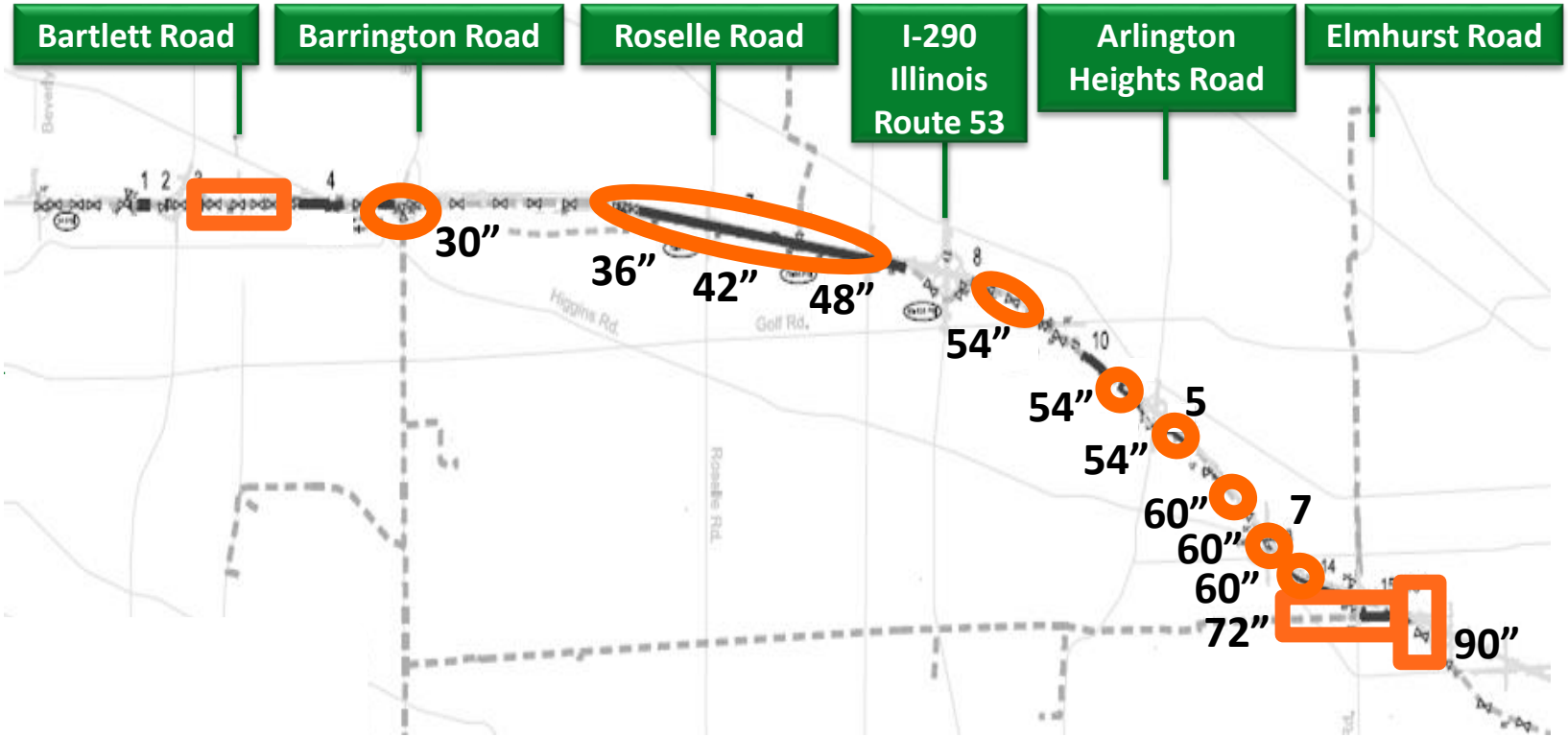


Design: Protecting Installed Pipelines



PIPE PROTECTION SLAB DETAIL
NOT TO SCALE

Construction: Relocation Overview



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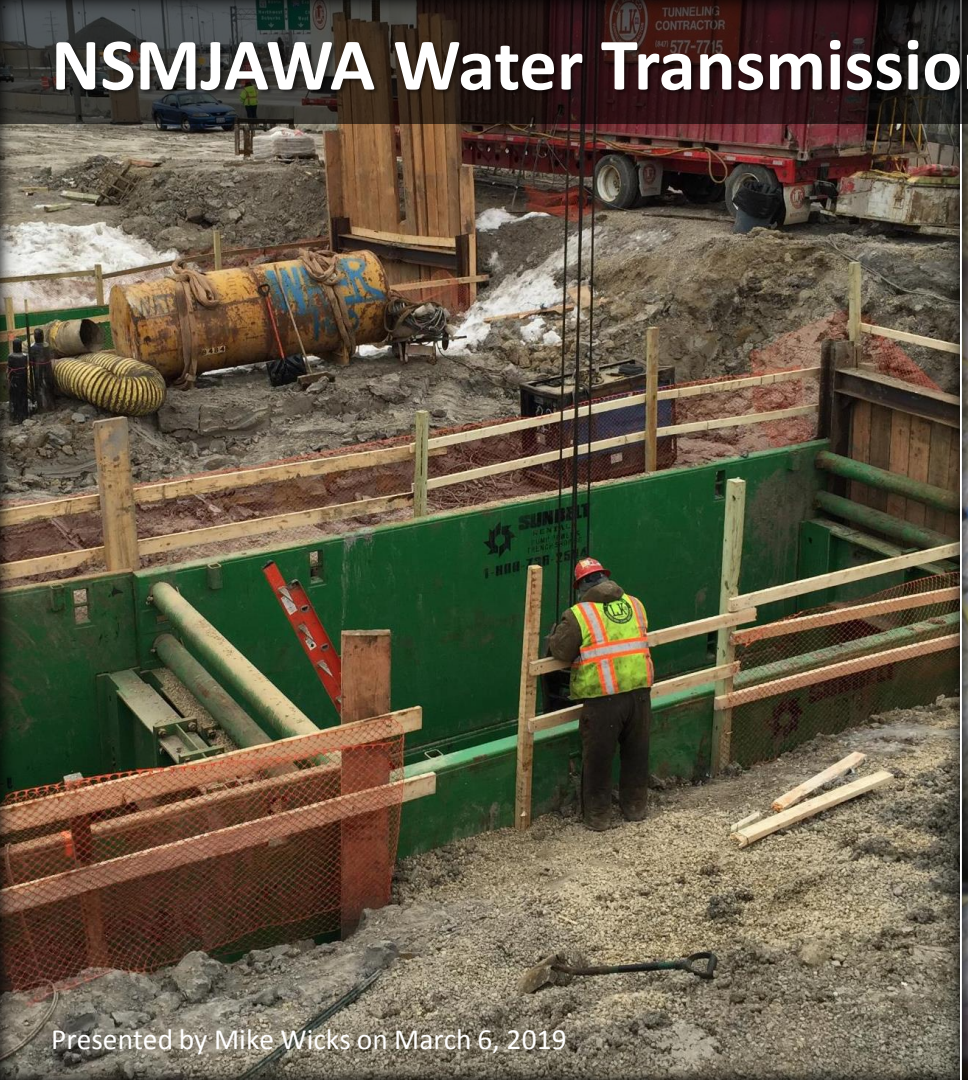
NSMJAWA Water Transmission Main

NSMJAWA Water Transmission Main



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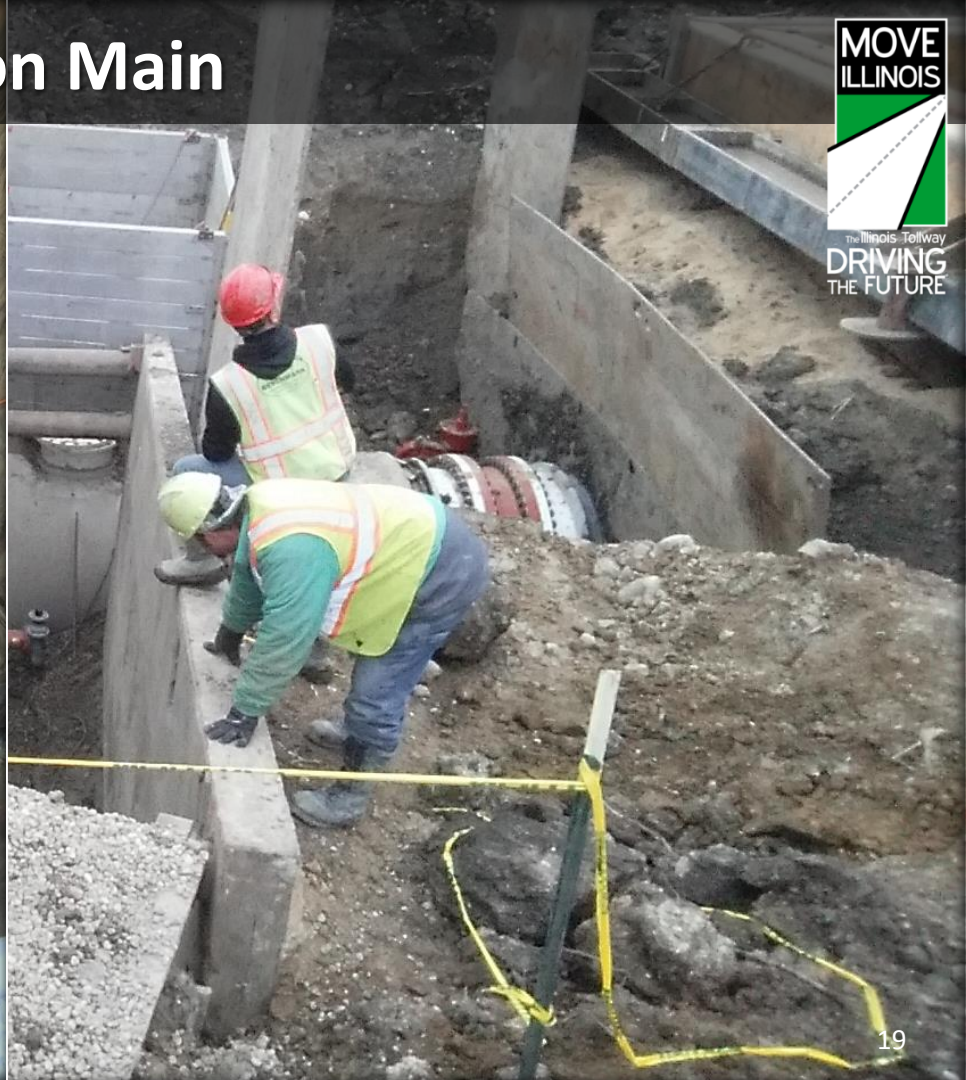
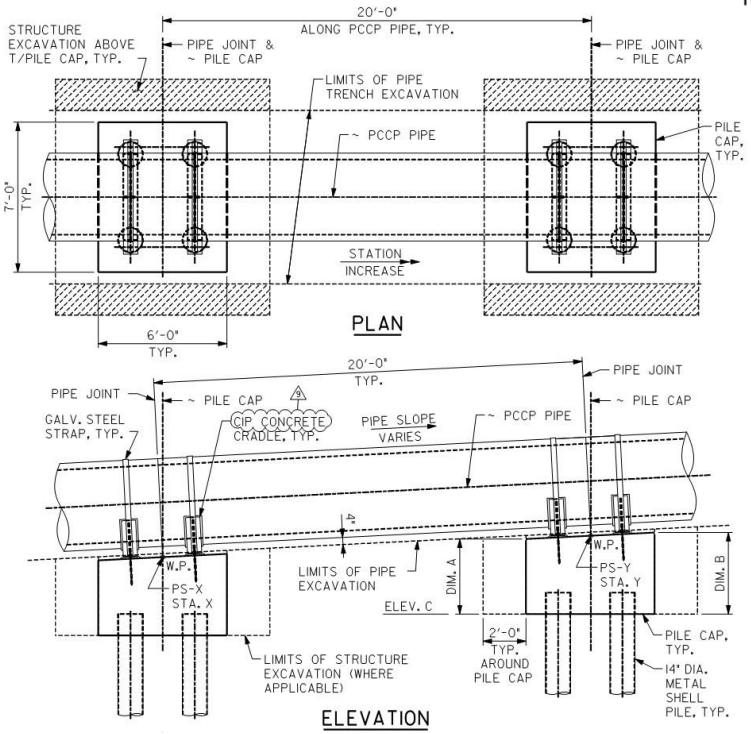
NSMJAWA Water Transmission Main



Roselle Road Relocations

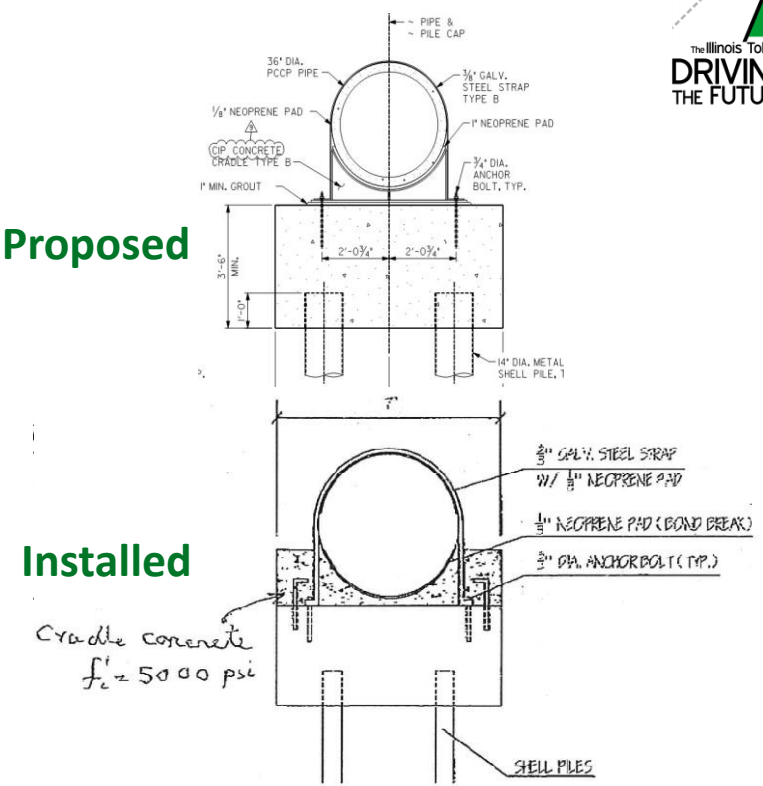


Presented by Mike Wicks on March 6, 2019

Roselle Road Relocations

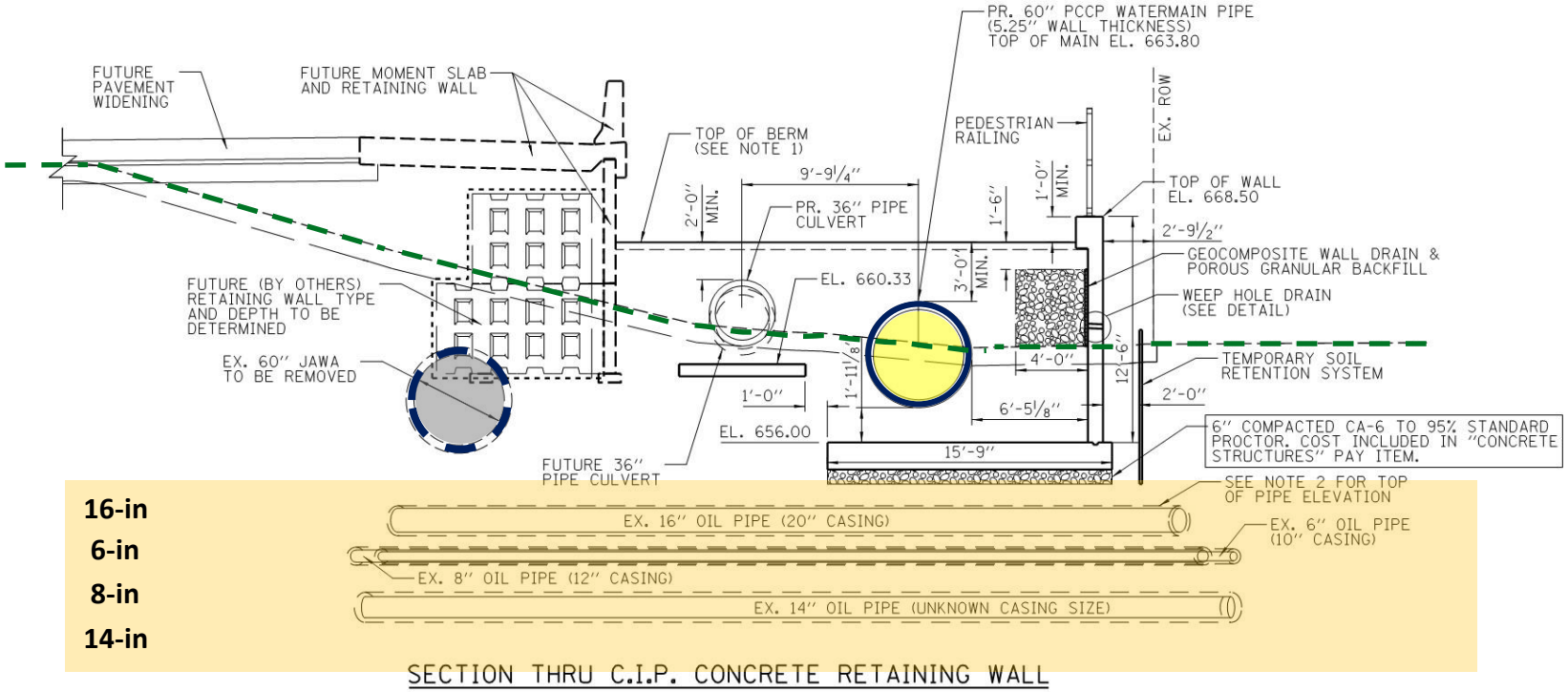
Proposed

Installed



Roselle Road Relocations

Oakton Street Conflicts



16-in

6-in

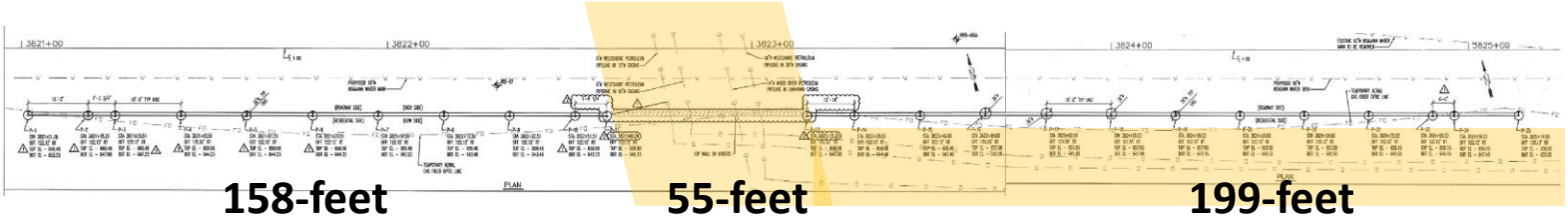
8-in

14-in

Oakton Street Conflicts

Wall 55 feet in length directly above utilities

- 12.5-foot-high cast-in-place concrete wall on spread footing



Wall 199 feet in length along side utilities

- Proposed 5- to 8-foot-high sheet pile wall with concrete facing
  - Sheet piles to be driven 20 to 35 feet below existing ground
  - Two of the four oil lines travel within 10 feet of the wall
- Installed 5- to 8-foot-high post and panel wall
  - Shafts drilled 8 to 14 feet below existing ground

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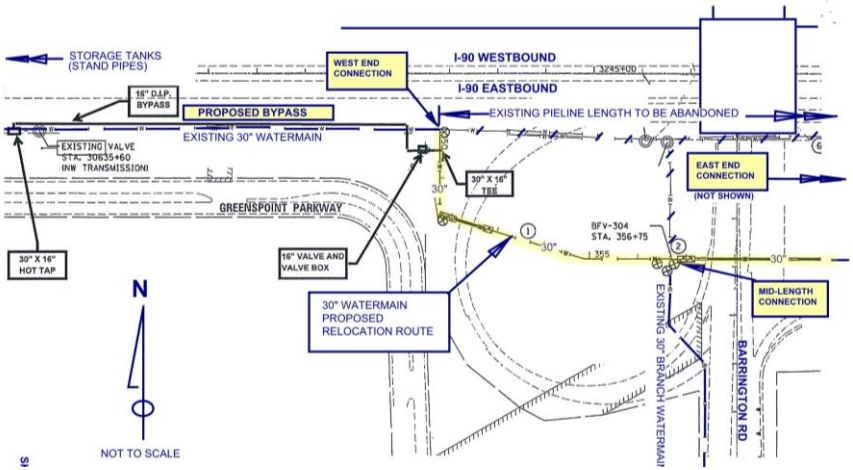
Oakton Street Conflicts

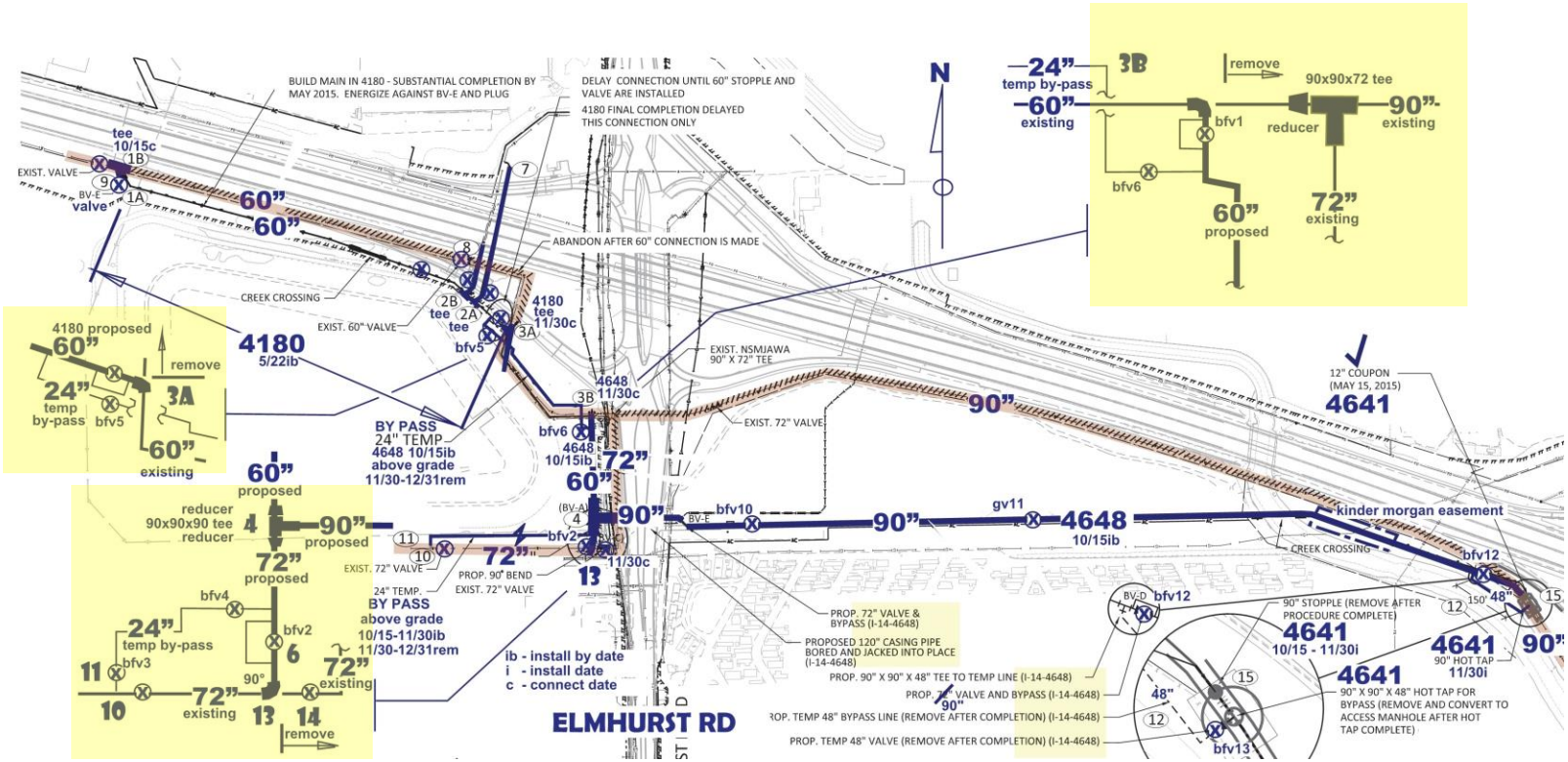
Adding Bypass During Connections

Cut-overs

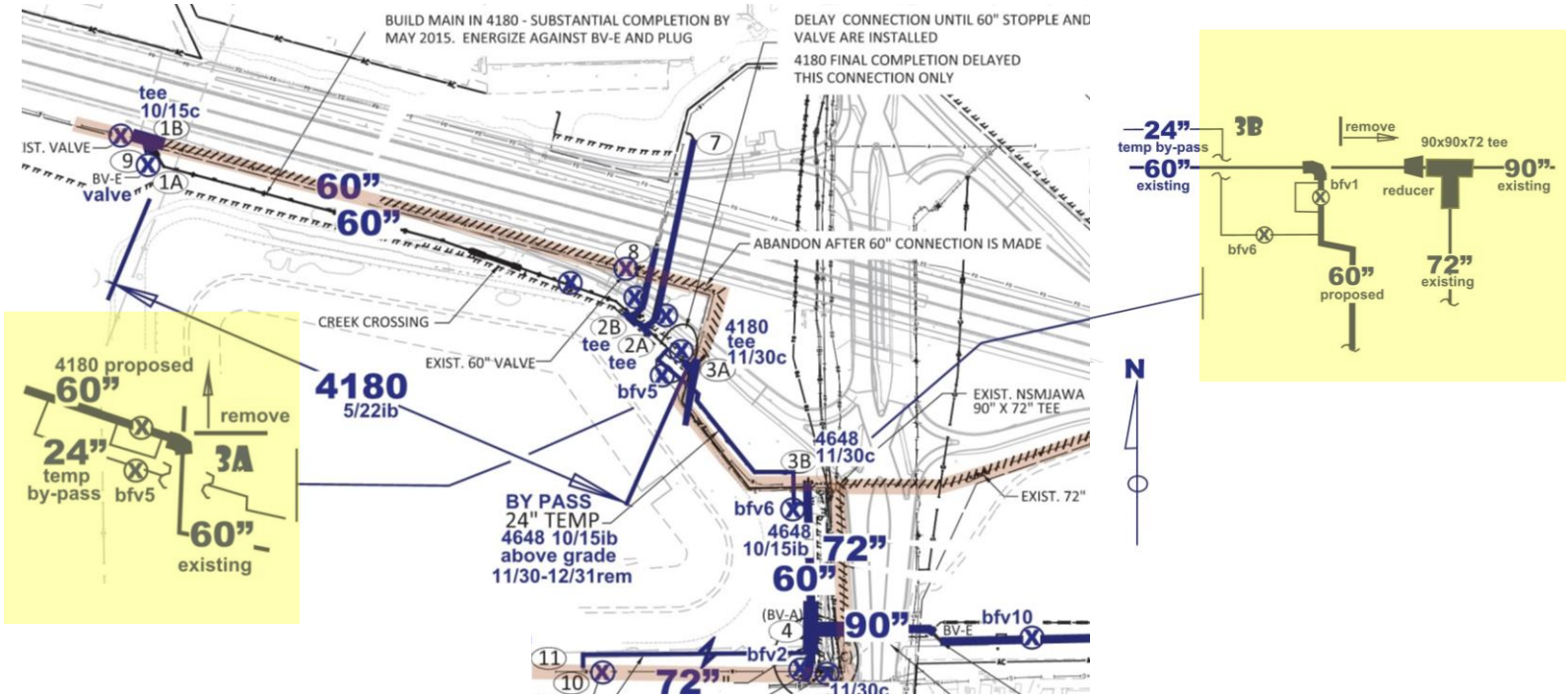
- Connect newly relocated pipes to the system
- Used localized coordinated shutdown of the system
- Performed in areas where pipe sizes were less than 90 inches
- Limited shutdown times
- Aging system



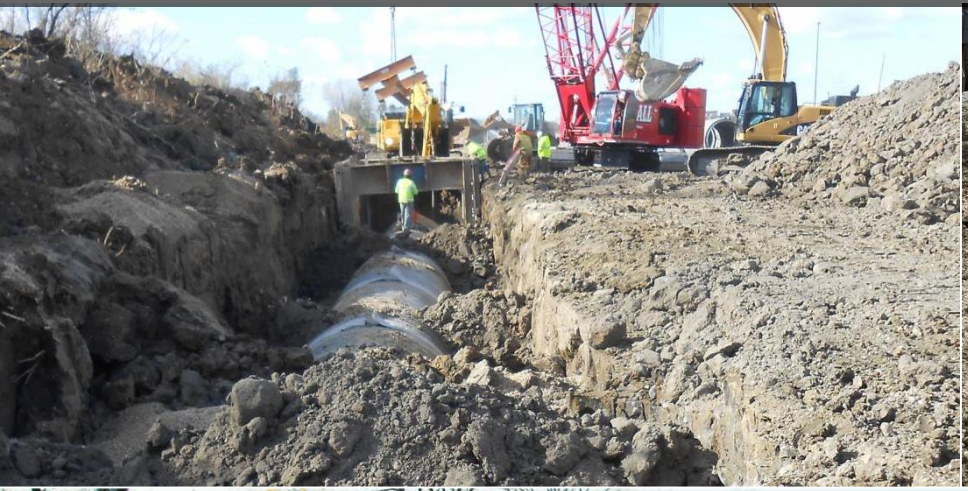
Elmhurst Road Relocations

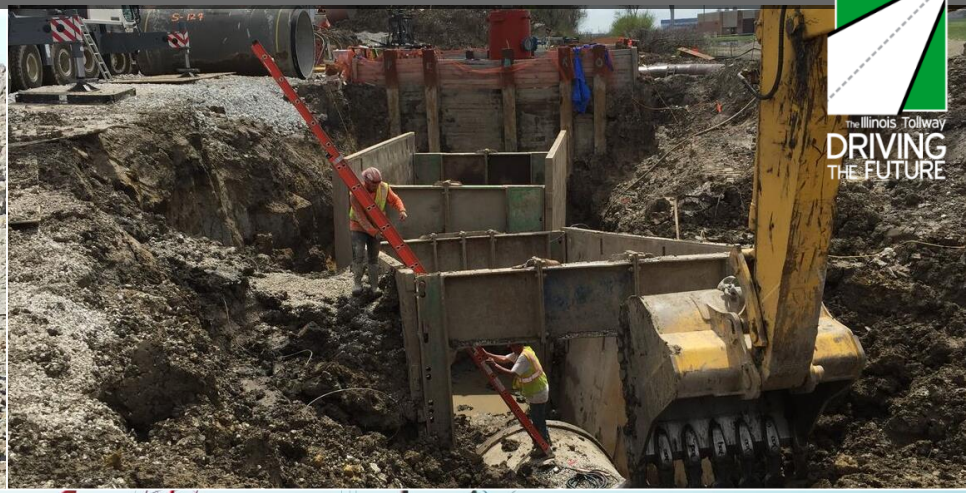


Elmhurst Road Relocations

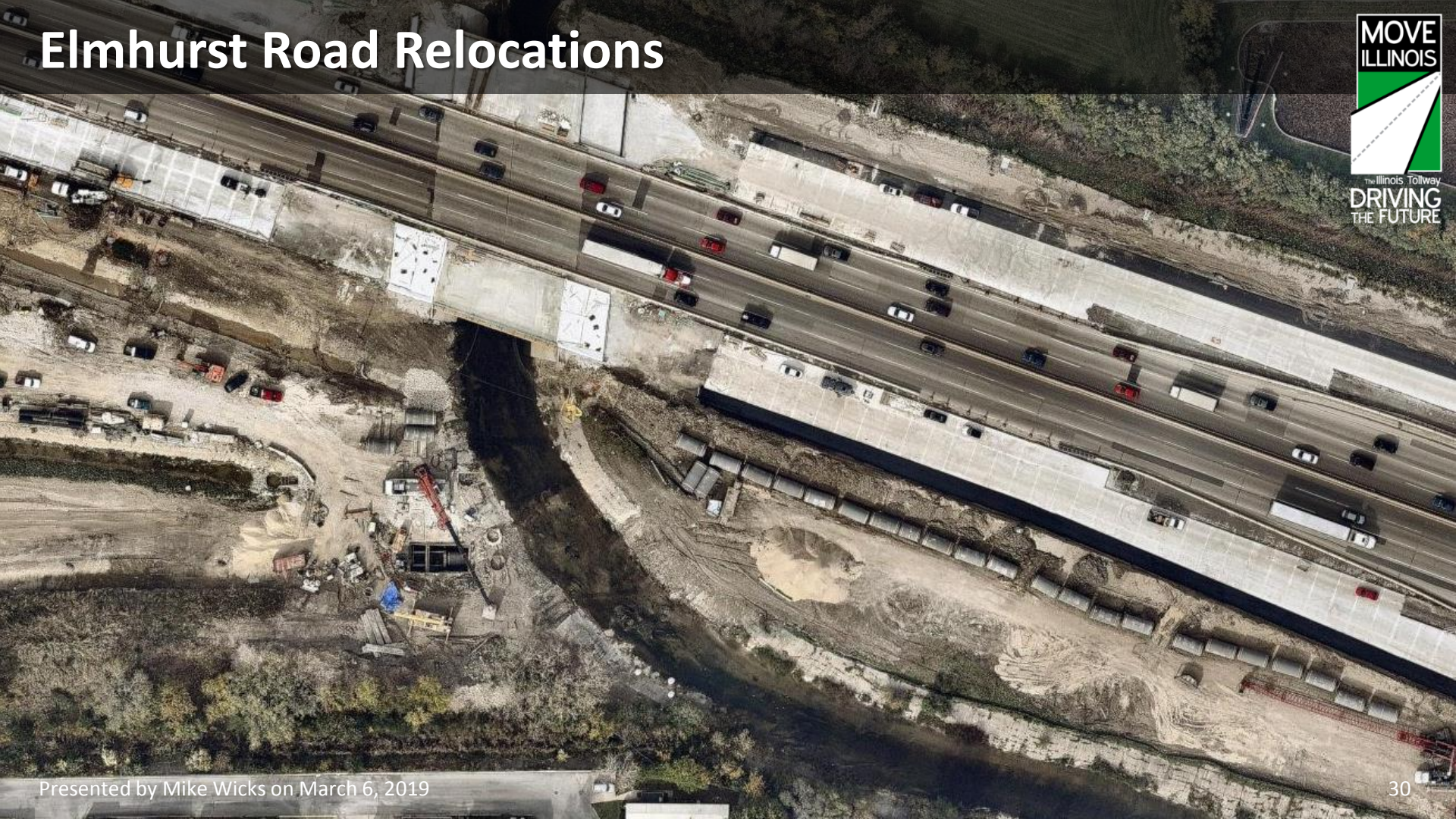


Elmhurst Road Relocations





Elmhurst Road Relocations



Elmhurst Road Hot Tap

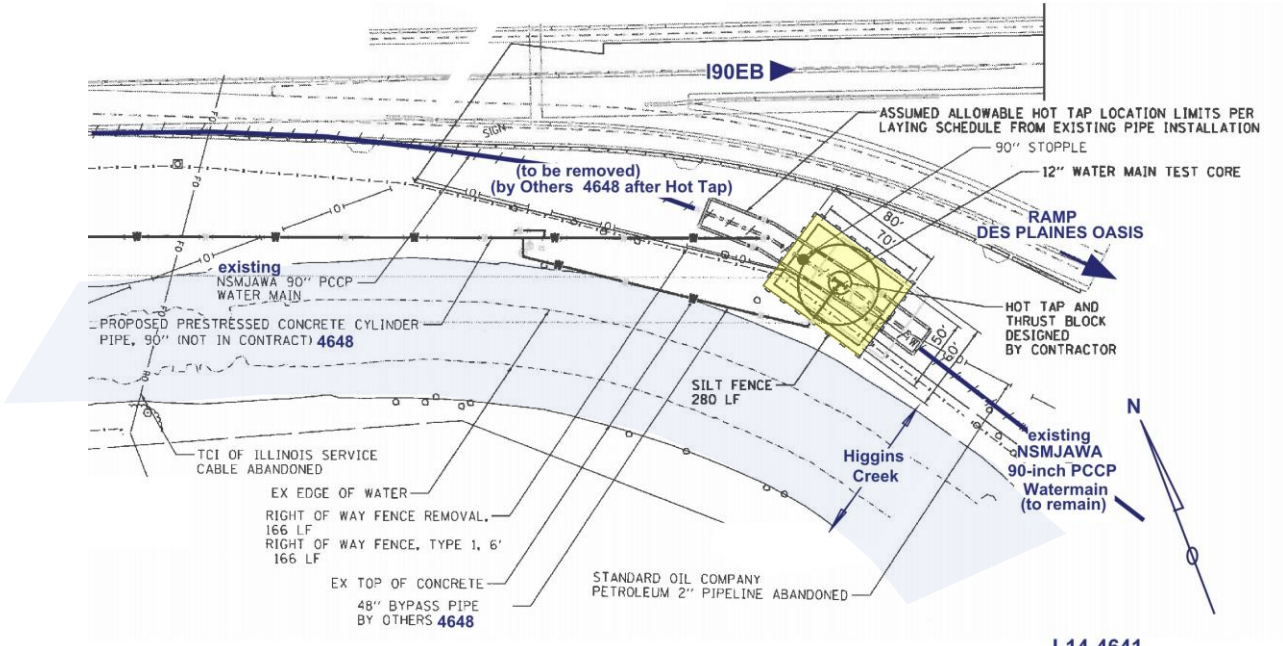
What is a hot tap?

- A hot tap makes a connection to existing piping without interrupting or emptying that section of pipe

Why use a hot tap?

- Total shutdown is not an option – no disruption of service
- Temporary bypass piping is used to maintain water service
- Performed when water usage is lowest
- Lowest amount of risk

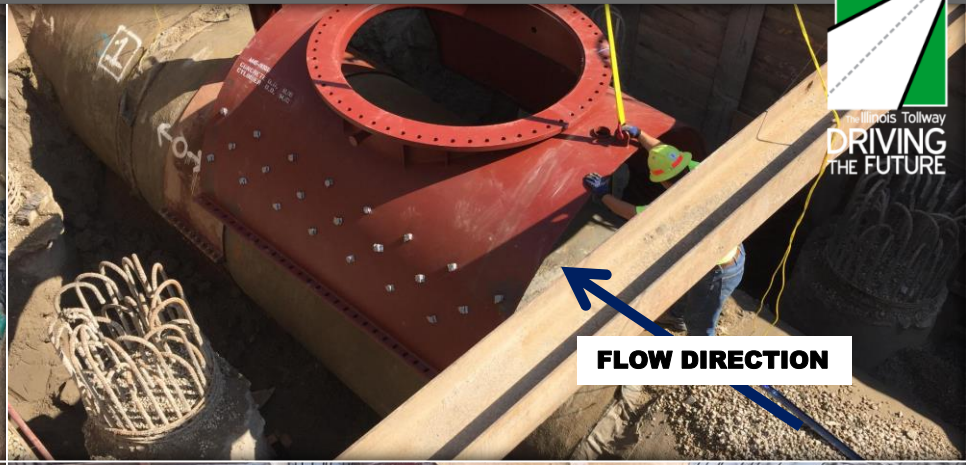
Elmhurst Road Hot Tap

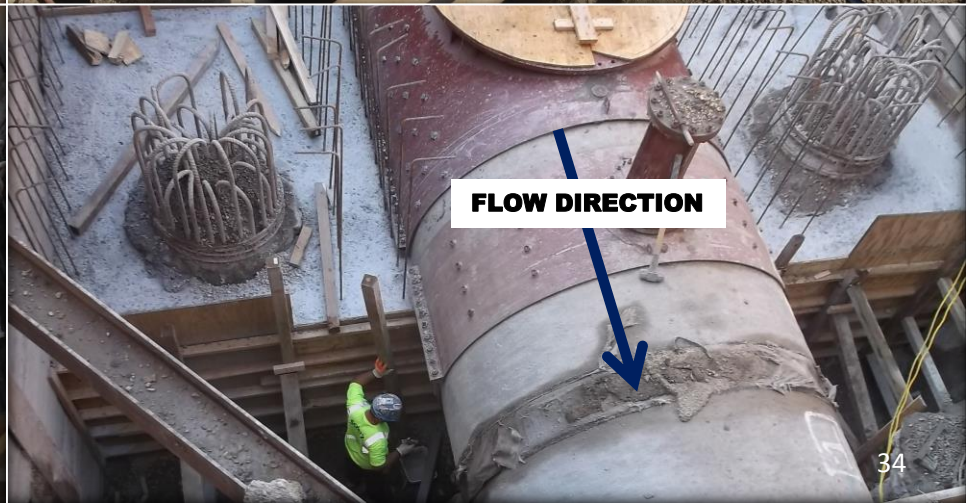


I-14-4641
90-inch HOT TAP
GENERAL LOCATION SKETCH
from DWG 6 of 8
Sheet WM-01

Elmhurst Road Hot Tap

Elmhurst Road Hot Tap



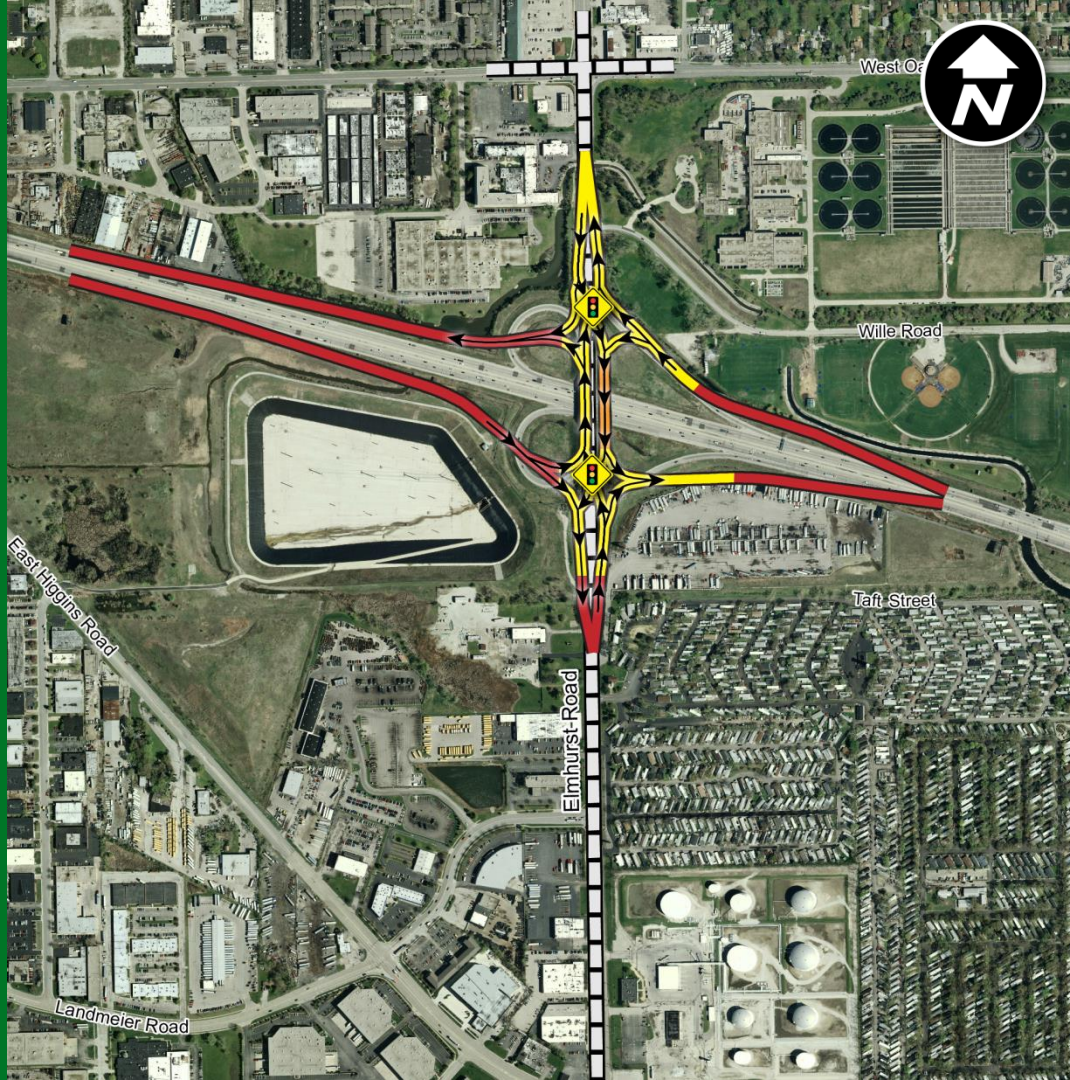


Delivering the Project

Elmhurst Road Interchange Utility Relocations

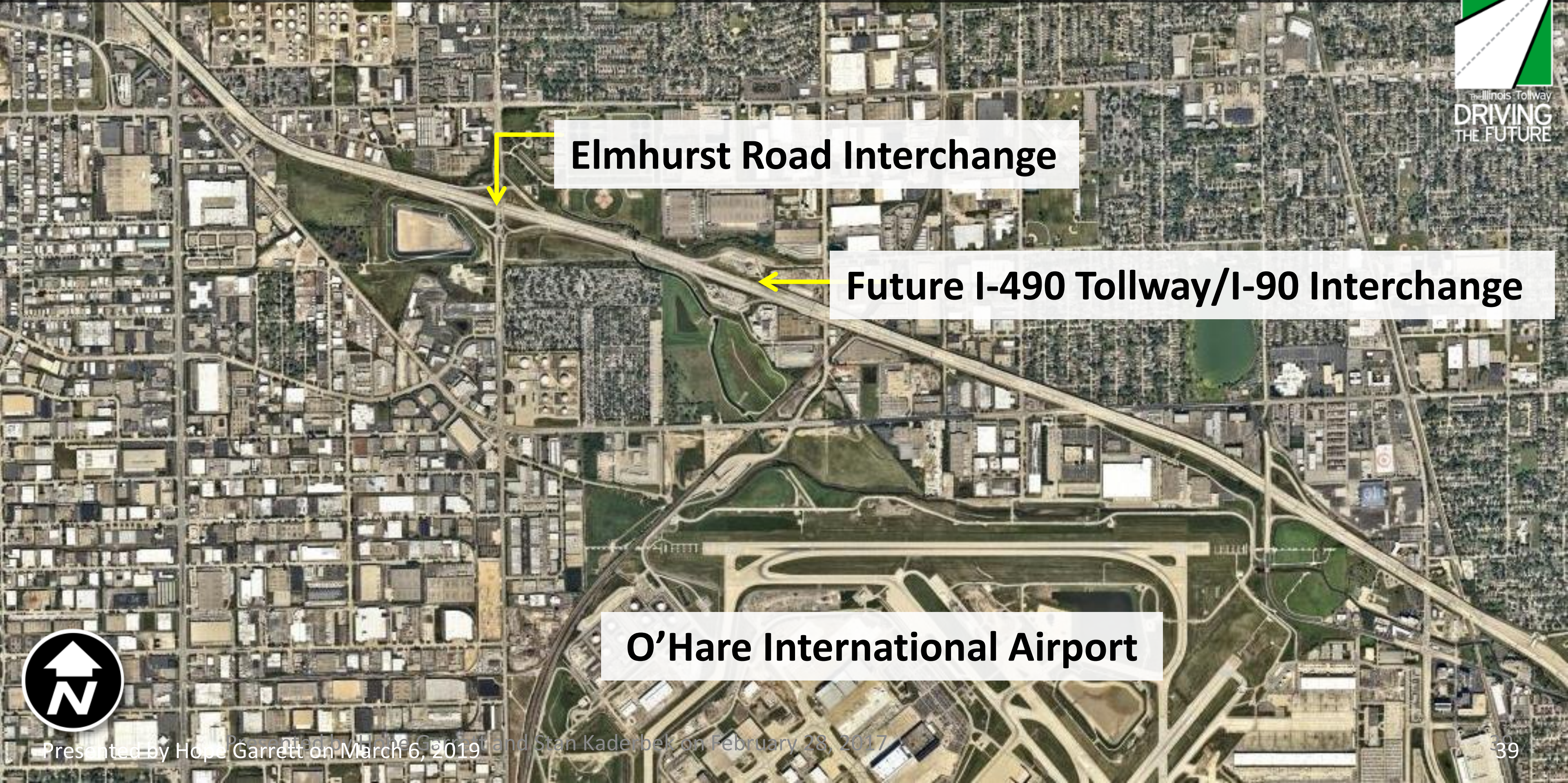
Hope Garrett, P.E., Illinois Tollway

Elmhurst Road Interchange



Presented by Hope Garrett on March 6, 2019

Elmhurst Road Interchange



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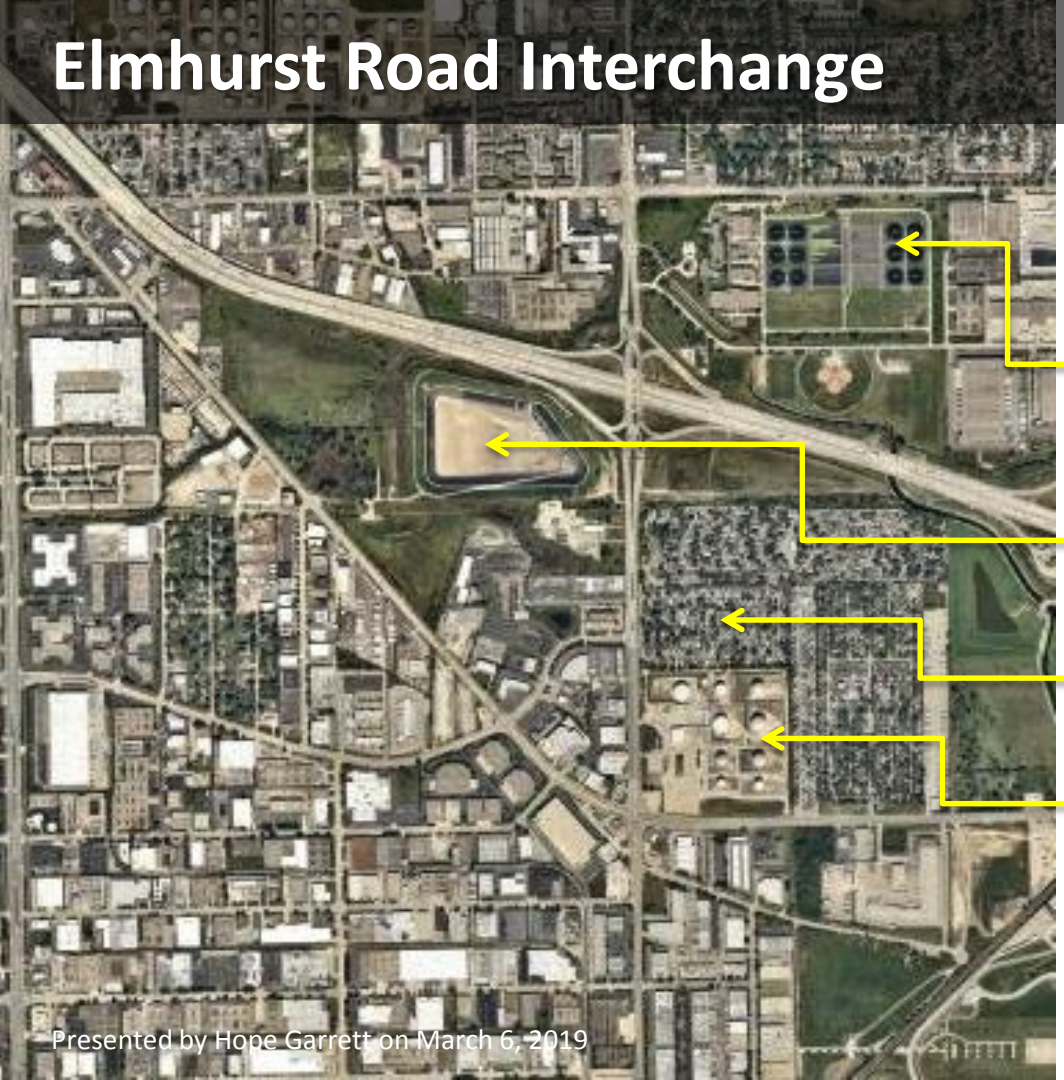
Elmhurst Road Interchange



MWRD wastewater treatment plant

MWRD deep tunnel reservoir

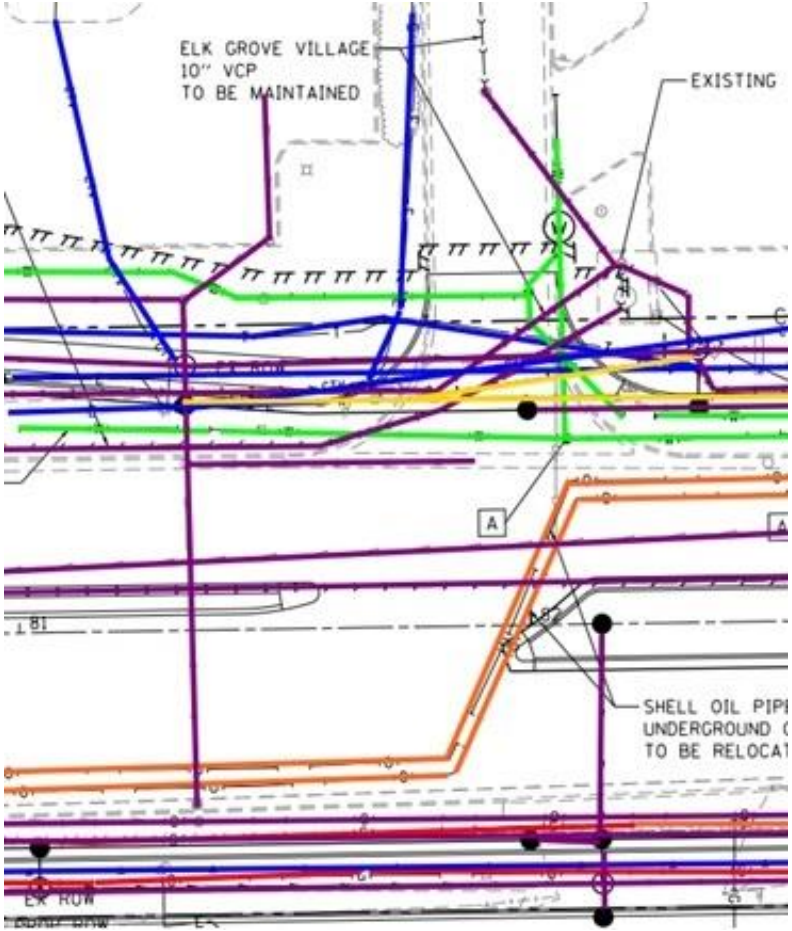
Estimated 1,000 mobile homes

Petroleum tank farm

Utility Conflicts

18 utility companies with 27 different lines

- MWRD sludge line relocation
- Shell gas lines serving O'Hare International Airport
- Nicor gas distribution line
- 90-inch NSMJAWA relocation for construction of southwest ramps



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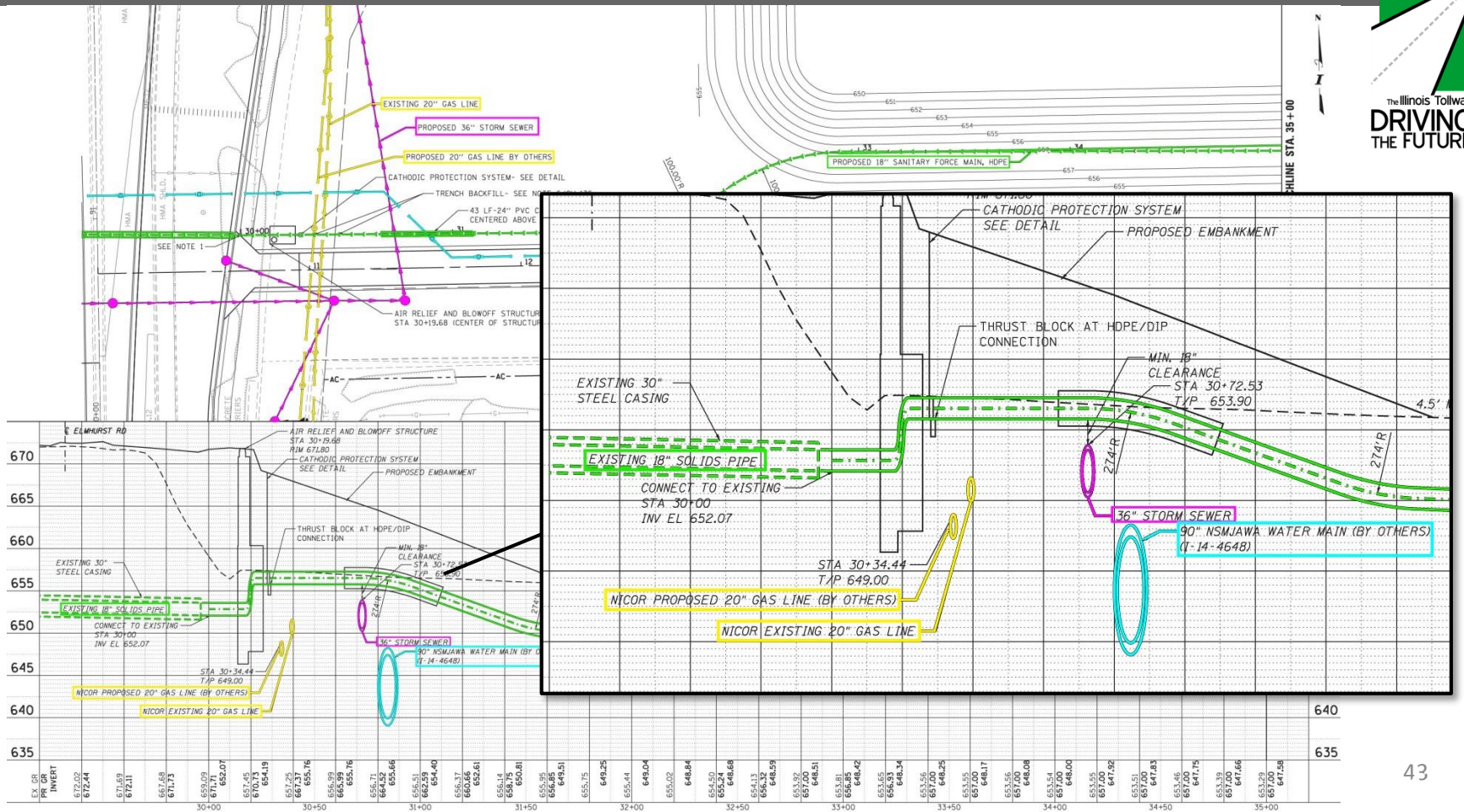
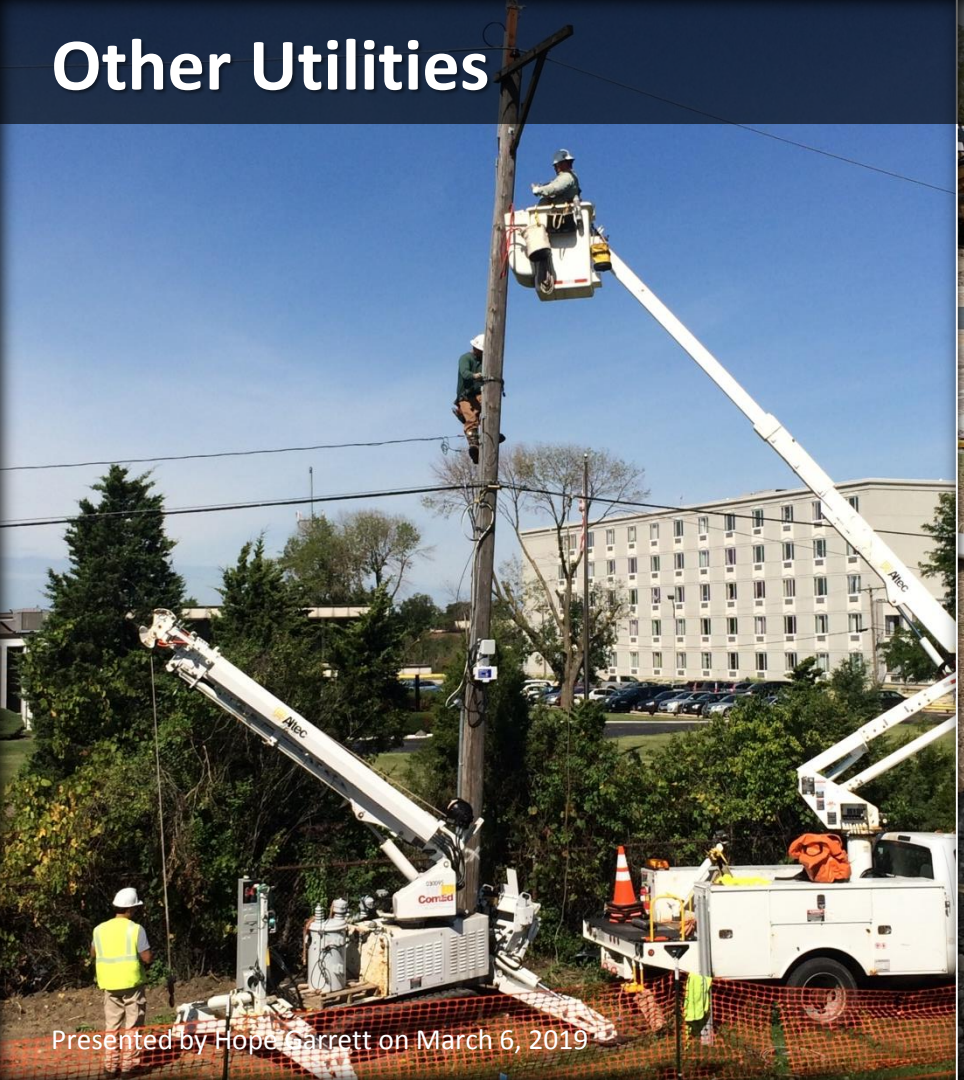
NSMJAWA Water Main at Elmhurst Road

Sludge Line MWRD Relocation



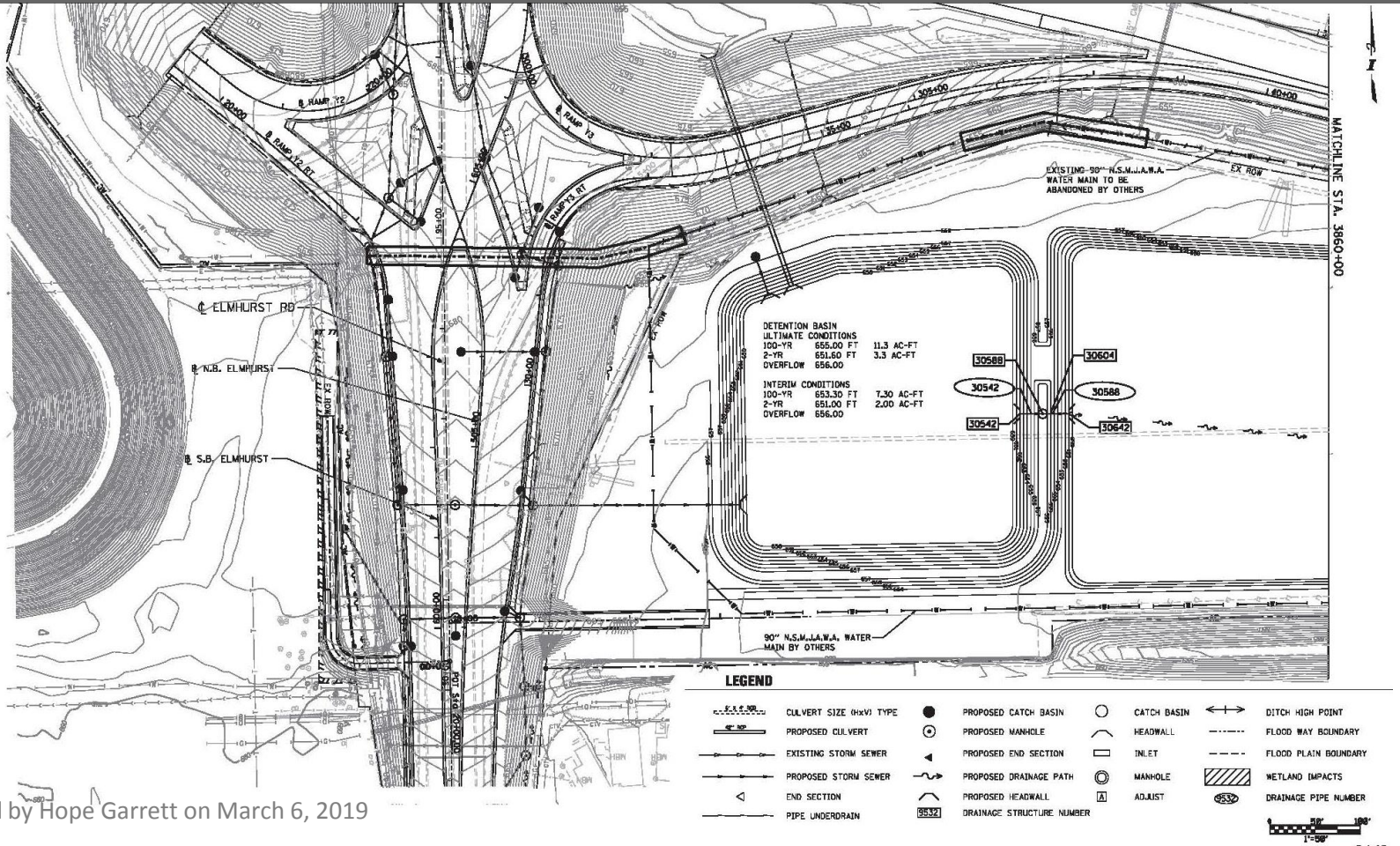
Sludge Line
MWRD Relocation

Other Utilities

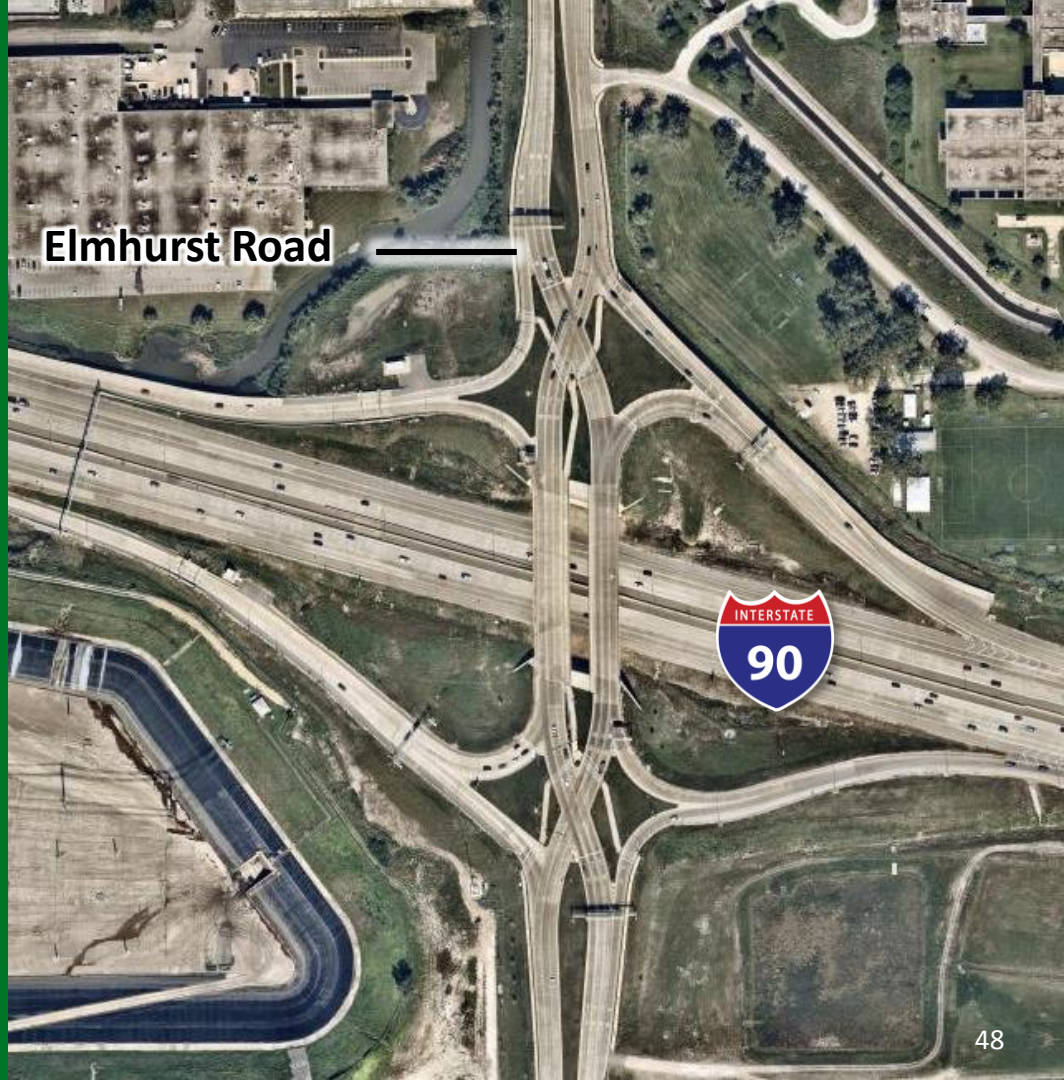


Concrete Sewer Pipes

Drainage System and Pond



Project Completion



Presented by Hope Garret on March 6, 2019

48

Building Information Modeling Implementation

Laura Thompson, P.E., Illinois Tollway

Agenda

Goals and initiatives

Pilot project

Construction implementation

Future application

Goals and Initiatives

1. Implement latest technology throughout the life cycle of asset management
2. Deliver electronic plan sets
3. Pursuing legislative changes
4. Electronic files in construction (as-builts)
5. Collaboration with IDOT and industry

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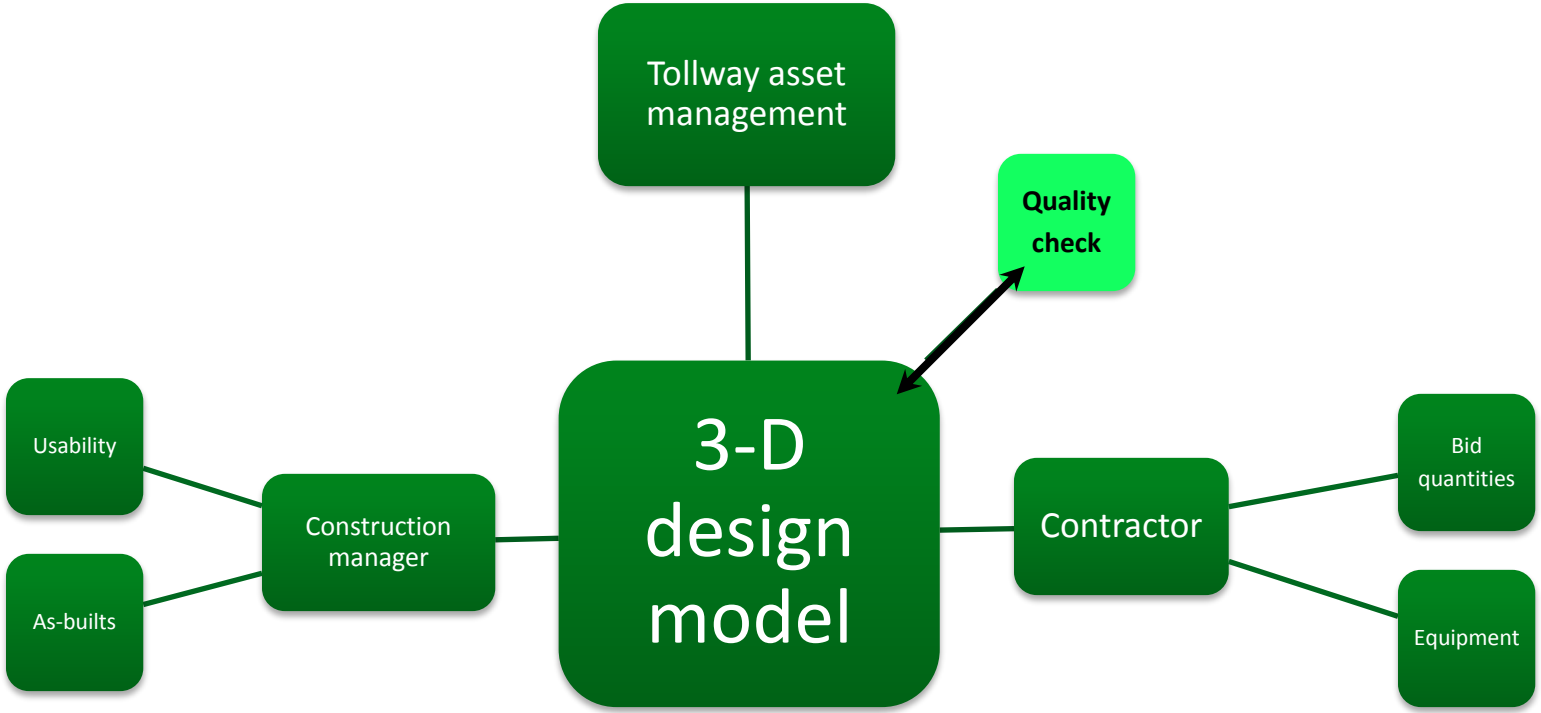
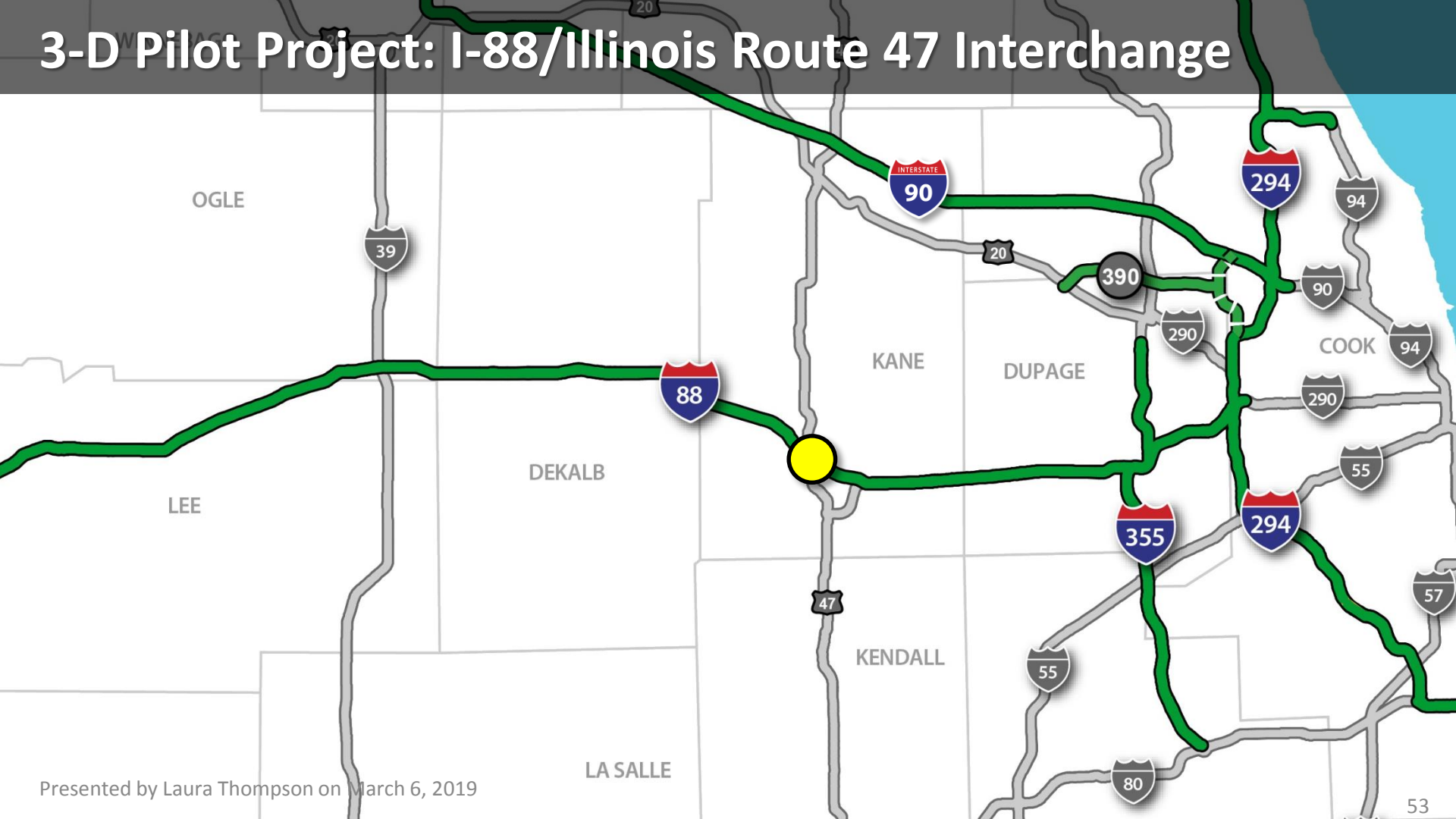
Tollway Goals

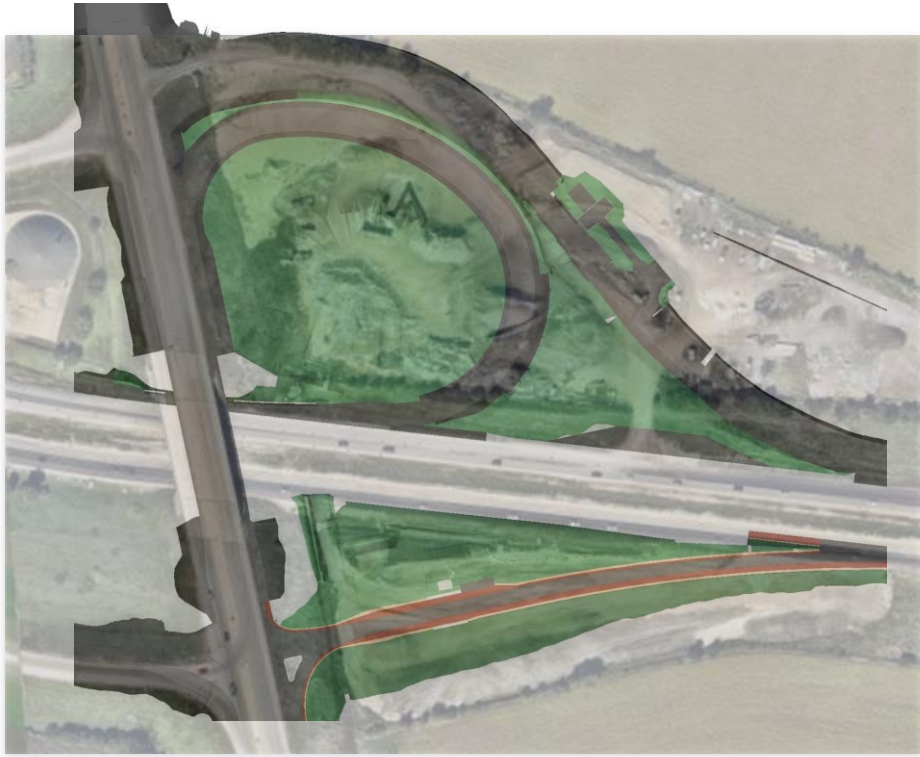


3-D Pilot Project: I-88/Illinois Route 47 Interchange



3-D Pilot Project: I-88/Illinois Route 47 Interchange

- Constructing a full interchange with the additions of two ramps
- Reduction to plan set
- Removed cross-section and drainage profiles
- Start spring 2019
- Complete fall 2019



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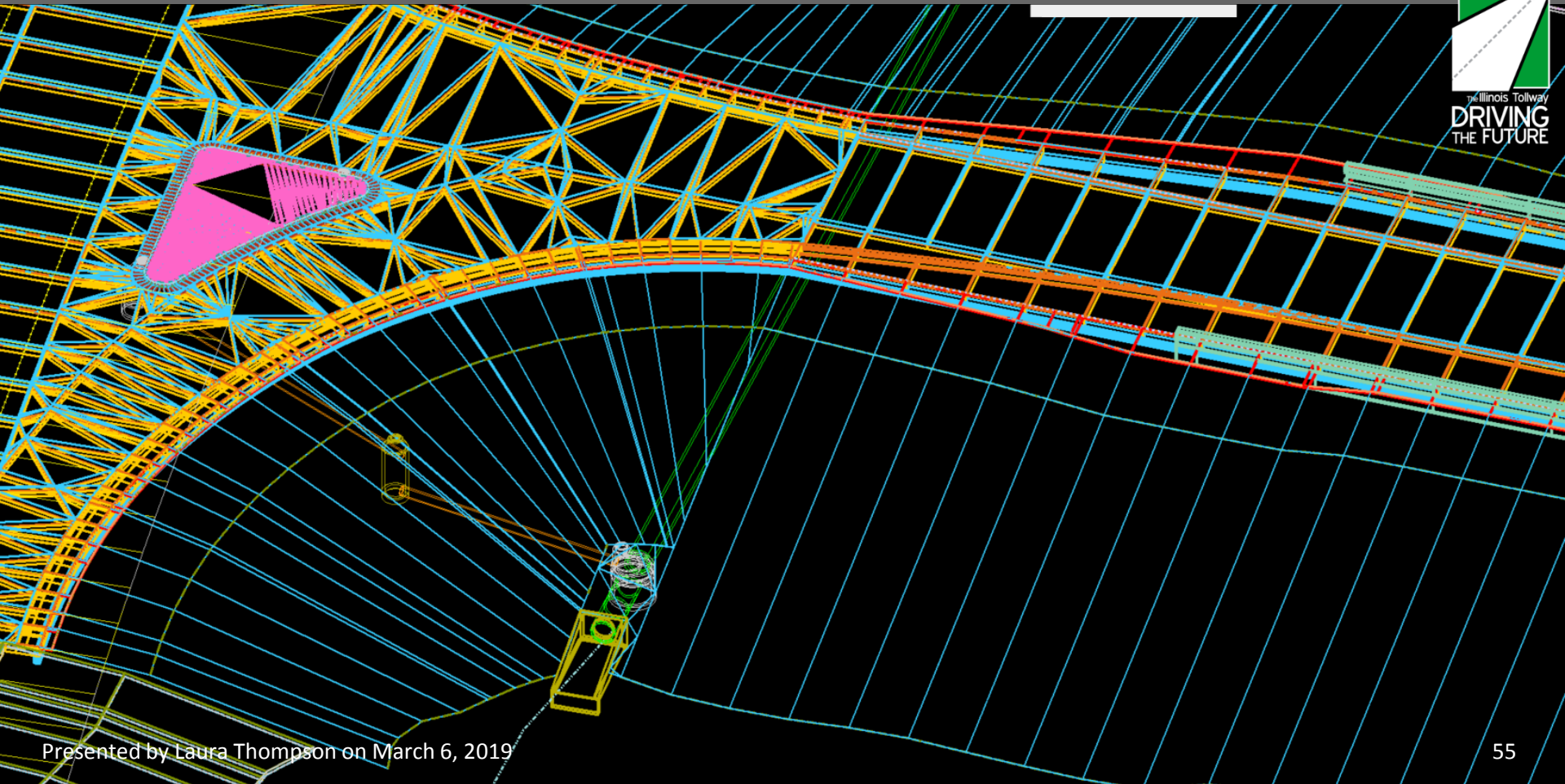
3-D Model Composition



Benefits and Lessons Learned

Designer

- Cross-sections removed
- Utility and drainage conflicts avoided

Contractor

- Saved time and resources on bidding
- Machine controlled grading

3-D Pilot Project Phase 3: Construction and As-Builts

Ensure the designed 3-D files match the as-built condition

Tollway assessing accuracy requirements for acceptable as-builts

Options under consideration

1. Surface shots of as-built
2. Remodeling with field changes
3. Redline markups on plan sheets
4. CM and contractor interactions with 3-D model

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Future

Tackle more complex designs

Remove roadway plan sheets

Legislative changes for document retention and certified PE signatures

Questions?

THANK YOU