



FINLEY

The Demolition of Two Precast Segmental Bridge's
ASBI Fall 2018 Convention
November 6, 2018



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Purpose and Learning Objectives

Purpose

The Convention provides an educational forum to learn new techniques used in successful projects, lessons learned from development projects, and showcases a case study allowing for discussion of the project.

At the end of this presentation you will be able to:

- Understand analysis requirements for a demolition scheme
- Understand Demolition sequence requirements
- Develop demolition details

Ft. Lauderdale Airport



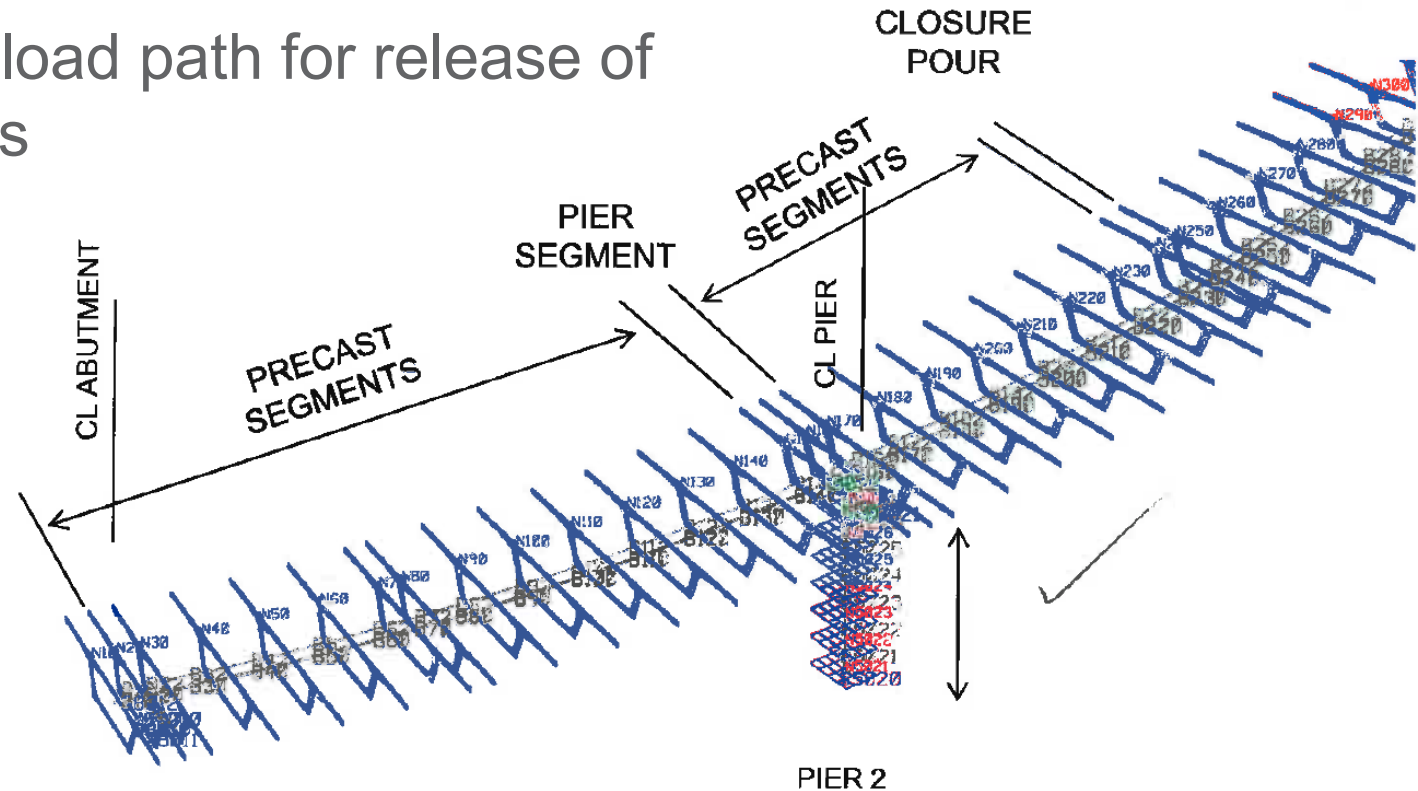
FEC RXR



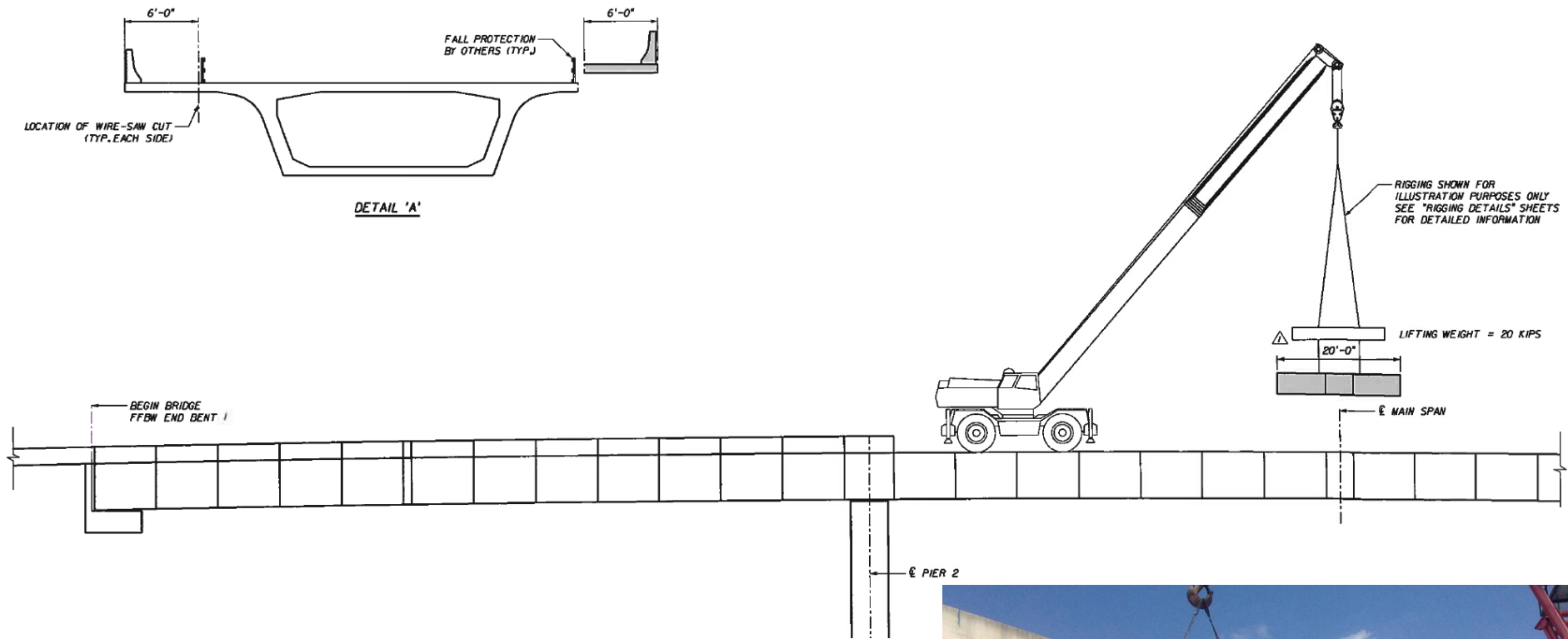
- Precast Segmental Bridge constructed in balanced cantilever
- 3 span bridge with 125' – 152' – 96' spans, Overall in great condition
- 1982 In-House design by FDOT
- Demolition Contractor: Structural Technologies (formerly VSL)
- Specialty Engineer: FINLEY Engineering Group, Inc

Demolition Analysis

- Understand the bridge's weak points under self-weight
- Check Stability of intermediate removal stages
- Determine extents of partial weakening
- Analysis of What-if scenarios
- Determining the load path for release of permanent forces



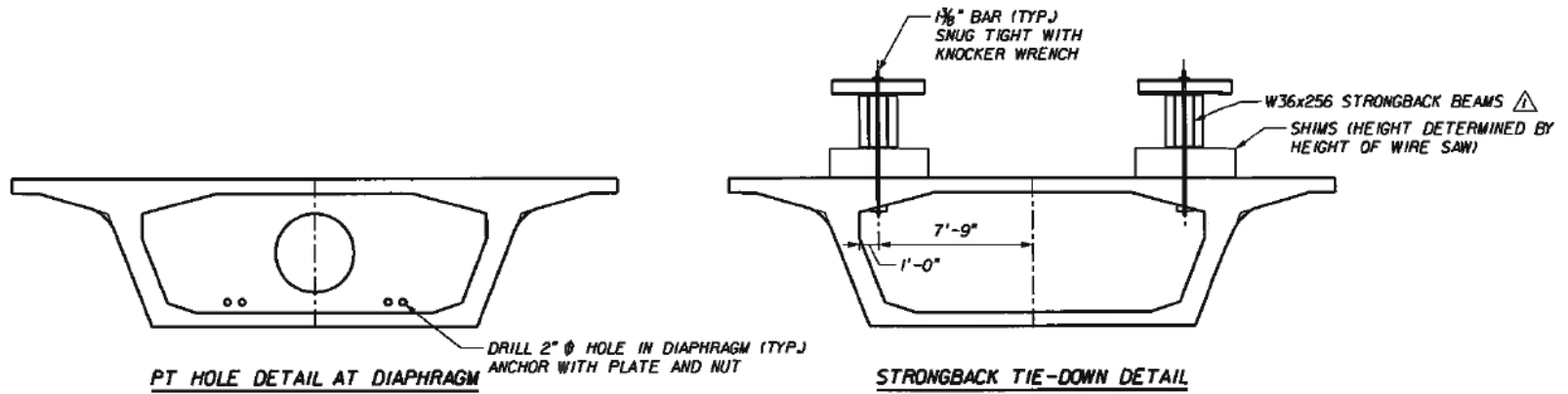
Ft. Lauderdale Airport | Demolition Sequence



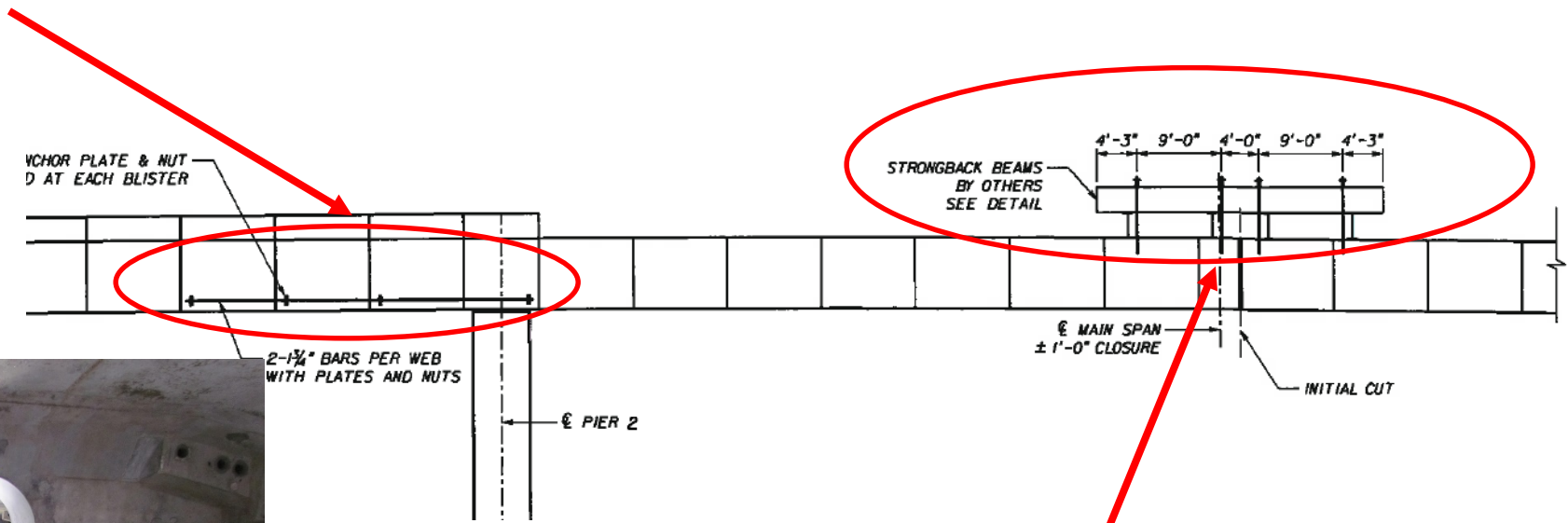
- Wings and barriers removed to reduce center span weight
- Extended the range of crane radius over RXR
- Reduced mid-span forces



Ft. Lauderdale Airport | Demolition Sequence



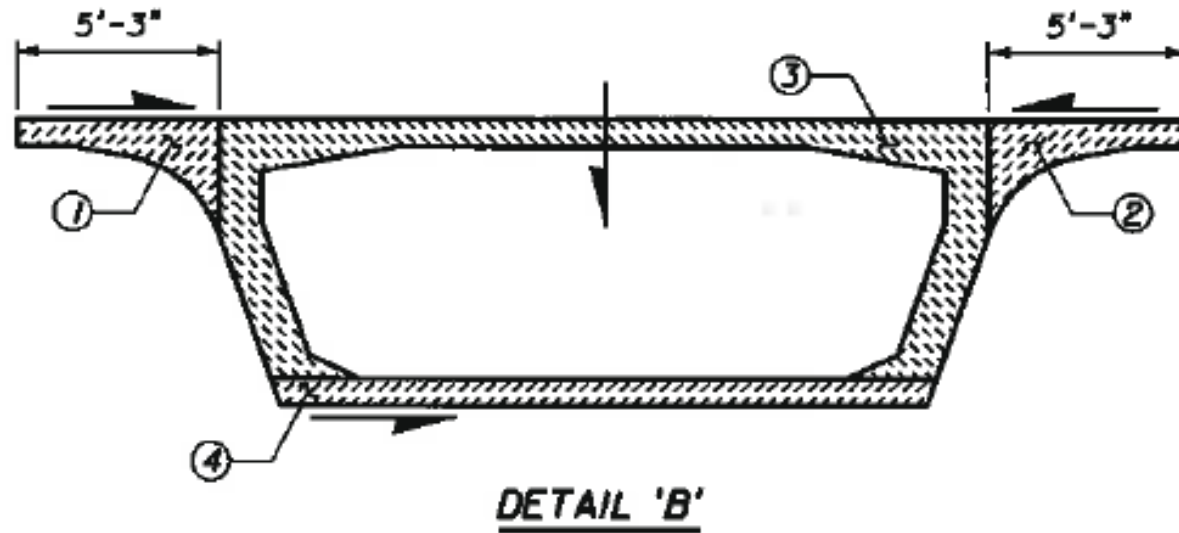
Supplemental PT bars added to allow outer spans to become simply supported



Strongback beams used to stabilize across the initial cut

Ft. Lauderdale Airport | Demolition Sequence

TRANSVERSE CUT SHALL BE PERFORMED AS FOLLOWS:



- Initial cut sequence developed with 4 phases
- Remaining wing sections cut to reduce section to its core
- Deconstruction showed slight vertical deflection with this sequence
- Bottom Slab final cut also provided the option for mechanical removal of the bottom slab

Ft. Lauderdale Airport | Demolition Sequence



- Clearly marking cuts, limits, etc. is critical

Ft. Lauderdale Airport | Demolition Sequence

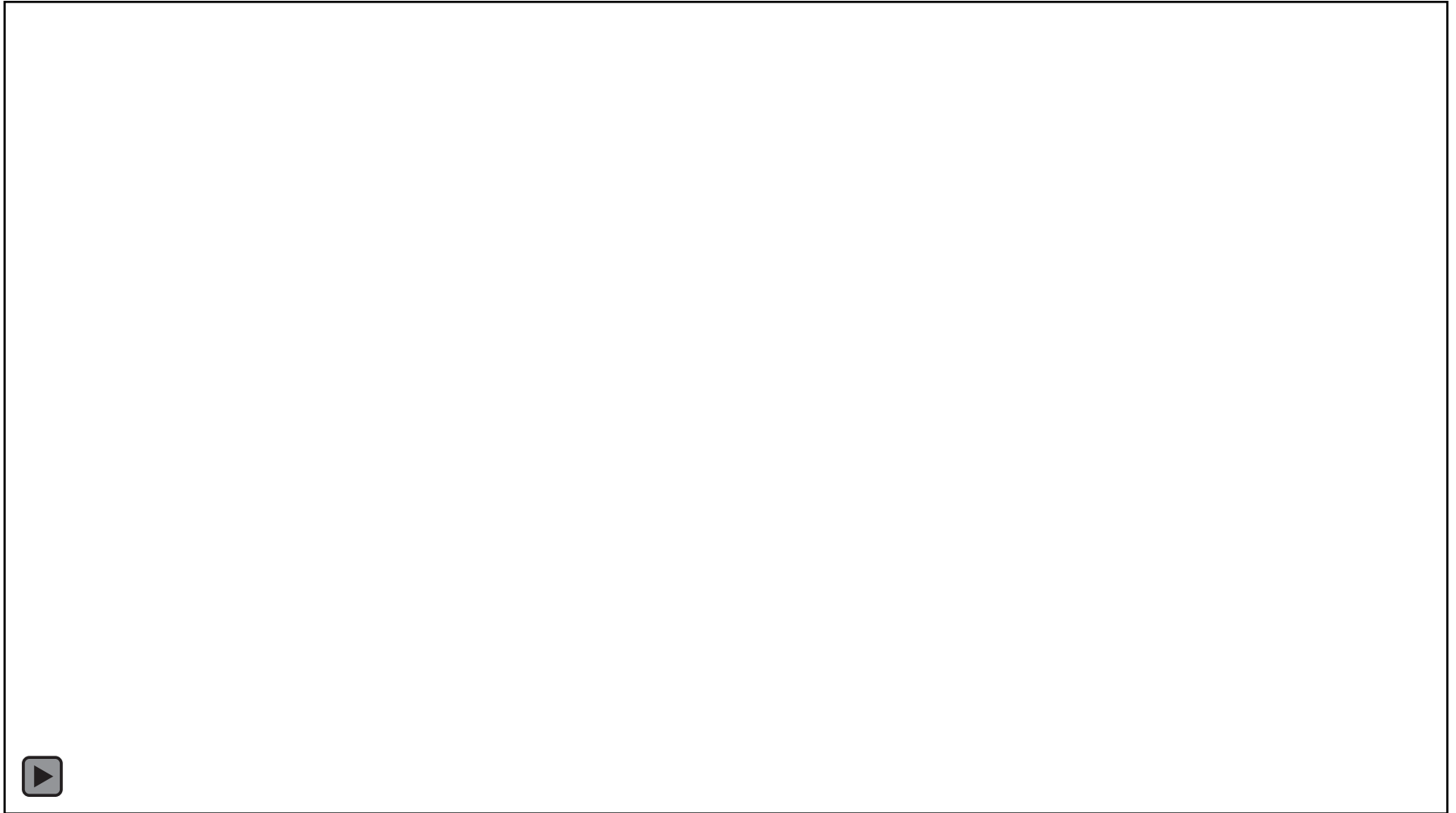


Ft. Lauderdale Airport | Controlled Demolition



- End span demolition by controlled collapse
- Develop mechanism to bring the span **ALL** the way down

Ft. Lauderdale Airport | Controlled Demolition



1940 Ramp NW Demolition Project, NV | Subtitle



- Precast segmental Span-x-Span bridge with External tendons
- Spans 14-17 were removed to accommodate new ramp alignment geometry
- Span Lengths: 141' – 141' – 120' – 122'
- Constructed in the late 1990's, Bridge was overall in great condition
- Client/Demolition Contractor: Harbor Demolition
- Specialty Engineer: FINLEY Engineering Group, Inc

Demolition Details | Demolition Sequence

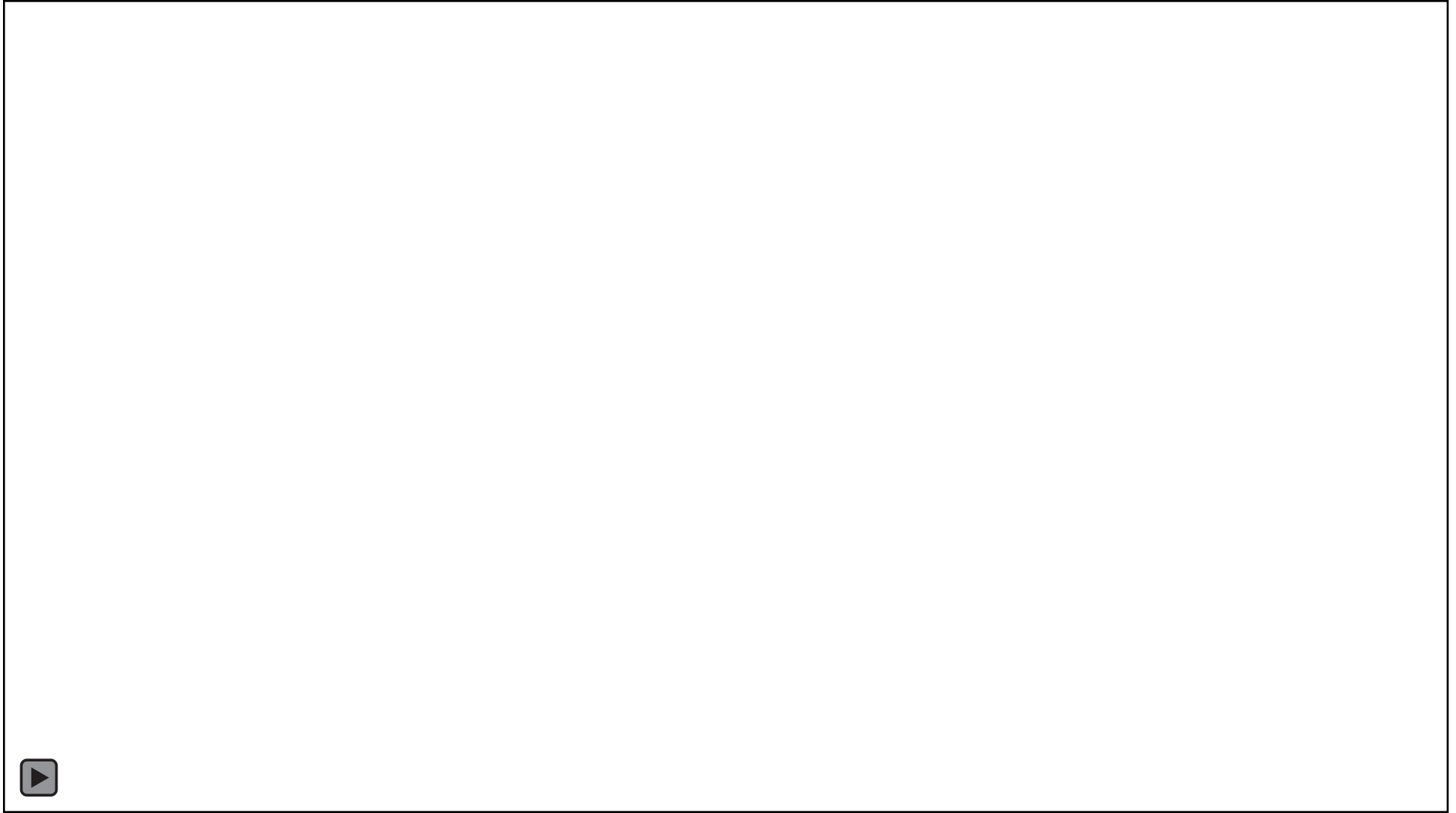
Significant Project Schedule Constraints:

- Rapid schedule for demolition
- Closure of MLK Blvd limited to 48 hours

Final Sequence developed was span-by-span controlled collapse of individual spans

- Key to success was partial weakening to maintain the adjacent span stable and safe

Demolition Techniques | Subtitle

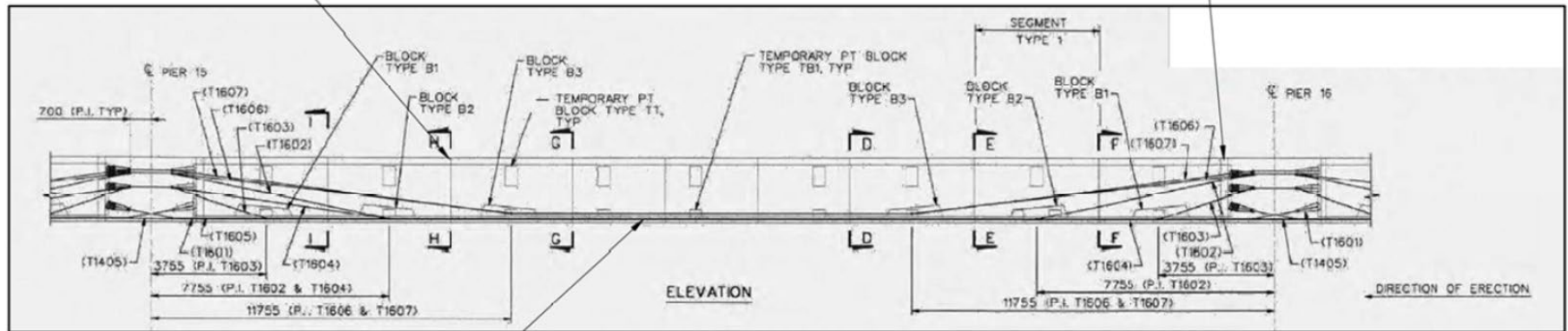


Demolition Analysis | Typical Span

GENERAL BEHAVIOR OF STRUCTURE: SPAN 14-17 ARE CONSTRUCTED WITH PRECAST CONCRETE SEGMENT POST-TENSIONED TOGETHER.
THE CONTRACTOR IS ALERTED TO THE FOLLOWING BEHAVIORS PARTICULAR TO THIS STRUCTURE TYPE.

THERE IS NO MILD REINFORCEMENT BETWEEN SEGMENT JOINTS, ONLY EPOXY GLUED

CLOSURE JOINTS HAVE NO MILD REINFORCING
ACROSS JOINTS THERE IS NO EPOXY AT THESE JOINTS

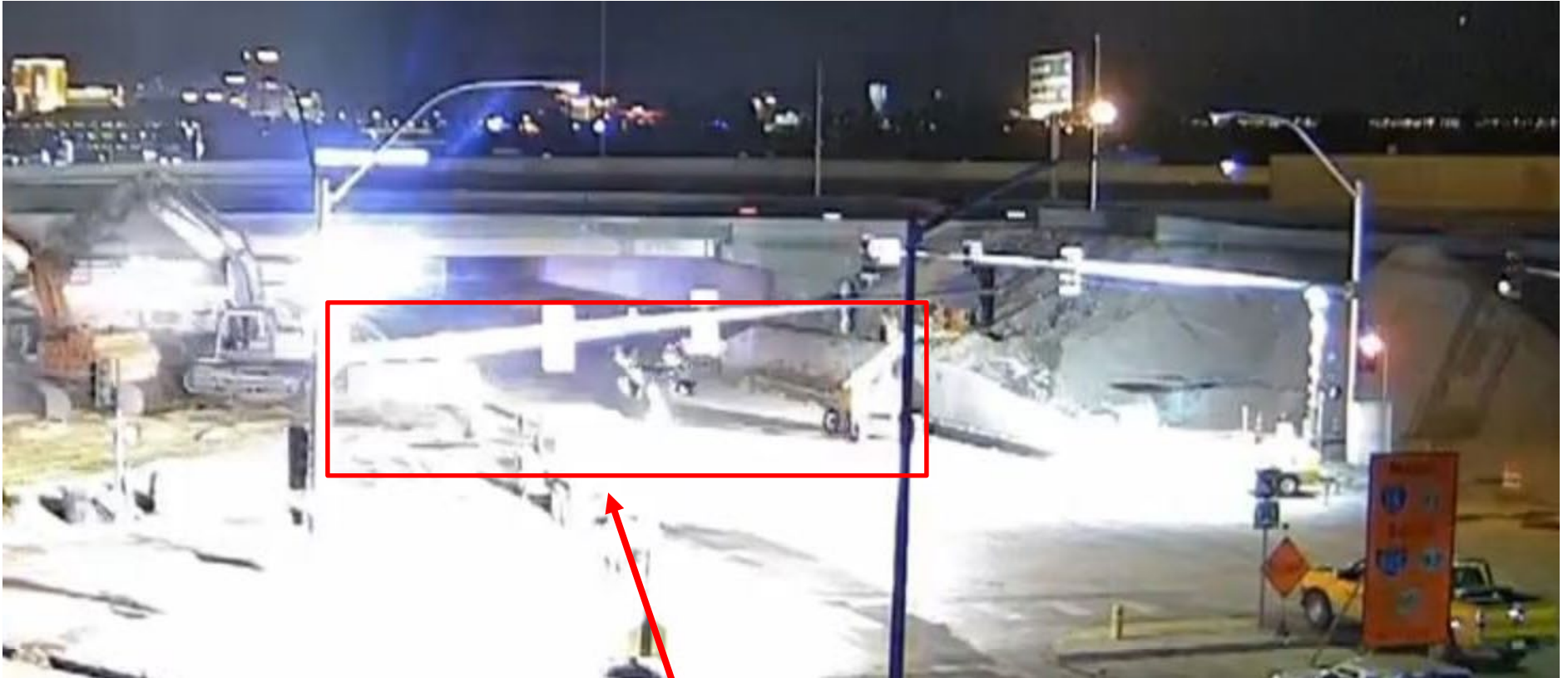


CONTINUOUS, BONDED POST-TENSIONING STRAND IS CONTAINED WITHIN THE BOTTOM SLAB ONLY

NOTES:

- 1) DUE TO LACK OF CONTINUOUS, MILD REINFORCING, NO CONCRETE BREAKING OF SPAN SHALL TAKE PLACE UNTIL A SPAN IS SUPPORTED BY THE GROUND.
- 2) SIGNIFICANT SPAN DEFLECTIONS UP TO 36" ARE EXPECTED WITHIN SPAN AT HINGE LOCATIONS.

Demolition Sequence



MLK covered with 2-4ft sand to protect roadway during span demolition

Demolition Sequence



Pier-Column painted attack region

Partial Weakening performed:

- Allowed complete shear failure within span
- Minimized transmission of forces into adjacent span

Demolition Sequence



- **Partial Collapse down onto pier column lower section**
- **Pier-Column used as shield for operator**
- **Remaining box section removed beyond diaphragm**

Demolition Sequence



- **Span brought down to rest onto rumble below**

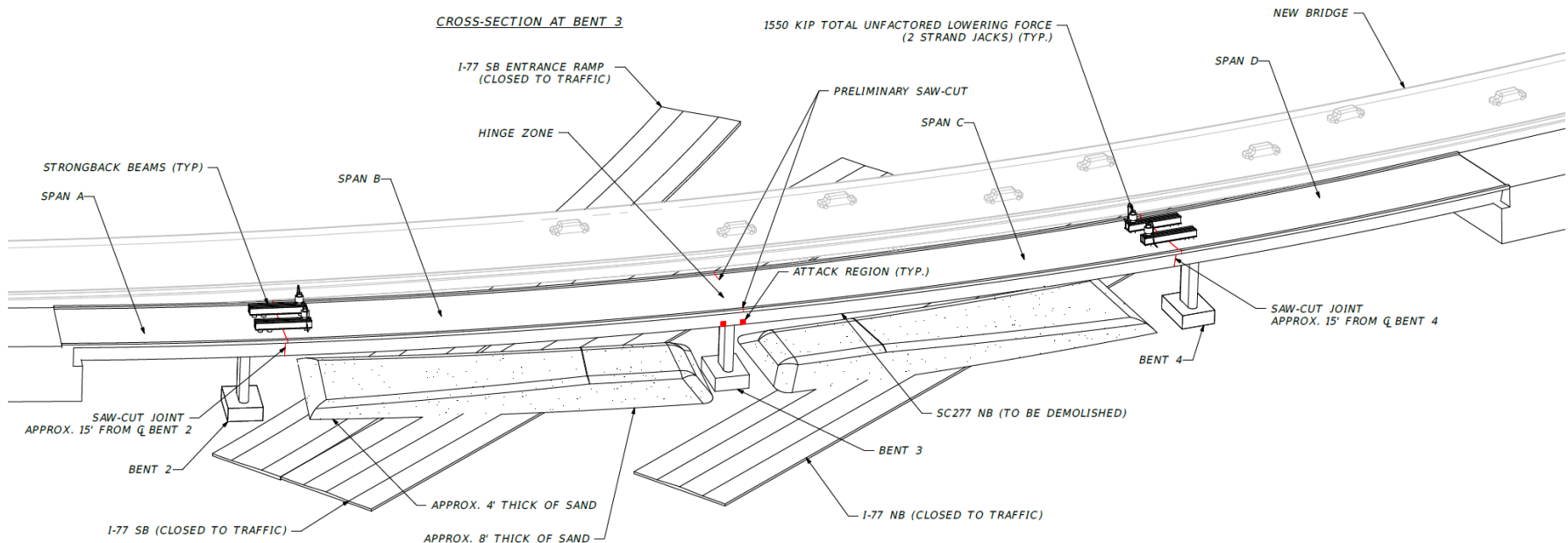
Demolition Sequence



- Ground demolition can now be completed with multiple machines

Lessons Learned | Subtitle

- Clearly mark regions for sawcutting, breaking, etc.
- Analyze what-ifs scenarios and have alternate plans.
- Perform analysis and demo scheme to ensure spans will fall completely down to safe position to continue demolition.
- Gravity wins! Spans drop straight downward.
- Demo Sequence drawings are critical to communicate to everyone limits, stability requirements, restrictions, etc.



? CONCLUSION | Q&A



Jerry Pfuntner, P.E., S.E. P.Eng.
Principal

1589 Metropolitan Boulevard • Tallahassee, FL 32308-3776
(850) 300-7200 office • (850) 894-1614 fax • (850) 221-1457 cell
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Questions?