

EIT Workshop

Construction and Field Evaluation of an Electrically Isolated Tendon System in the Coplay Bridge

Field Construction Experience

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October 24, 2018

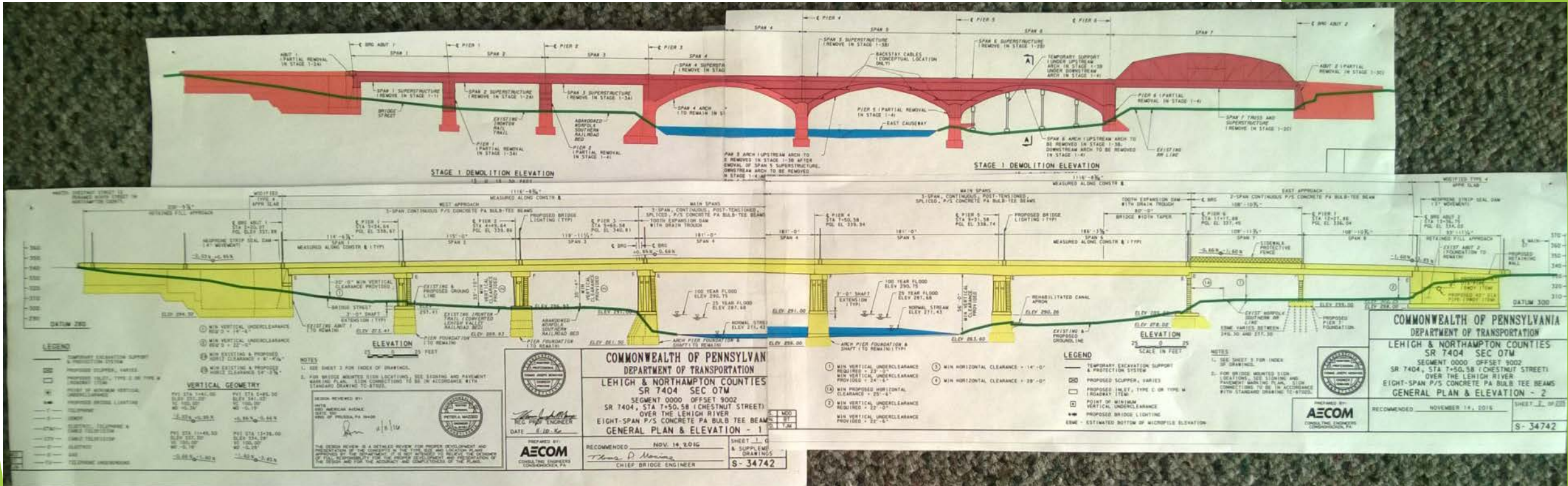
Lehigh University, Bethlehem, PA



Coplay/Northampton Bridge Project

- ▶ Existing Bridge - 3 Types of structures
- ▶ New Bridge - Prestressed/Post Tension (utilize portions of existing structure)
- ▶ EIT Demonstration Selection

Existing / New Bridge



EIT Participation

- ▶ FHWA searching for a project that fit the criteria for demonstrating the EIT System
- ▶ FHWA in conjunction with Pa DOT suggested our project
- ▶ After several months of questions and research the project was able to agree to demonstrate the EIT System
- ▶ Project concerns about schedule, time and costs were satisfied.

Existing Bridge - Demolition Stage



Existing Bridge



Existing Bridge



Existing Bridge



Demolition



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Construction Stage

- ▶ Piers & Abutments
- ▶ Beam Delivery
- ▶ Beam Erection
- ▶ Closure Joint Duct Splices
- ▶ Closure Joint & Diaphragm Concrete
- ▶ Post Tension Operations
- ▶ EIT

Construction Stage



Beam Delivery



Beam Delivery



Beam Erection



Beam Erection



Beam Erection



Beam Erection



Beam Erection



Erection - Drop-Ins



Erection - Drop-Ins



Project Challenges

- ▶ Splice Joints - Drop-Ins and Strongbacks
- ▶ Causing slight beam alignment issues
- ▶ Duct alignment
- ▶ Solution - shims underside of beams
- ▶ Beam Delivery (Travel Route)
- ▶ Mother Nature

Project Challenges



Beam Delivery



Project Challenges



Project Challenges



Construction Arial View



Construction Aerial View



Ducts Splices Closure Joints



Shrink Wrap



Completed Connections



Continuity Strands



Closure Joints For Drop-ins



Top View Closure Joints



Closure Concrete Placement



Closure
Concrete -
Class A -
9000 psi



Construction Stage

- ▶ Piers & Abutments
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- ▶ EIT

Full Scale Mockup



Strands Installed



Strands in Clear Duct



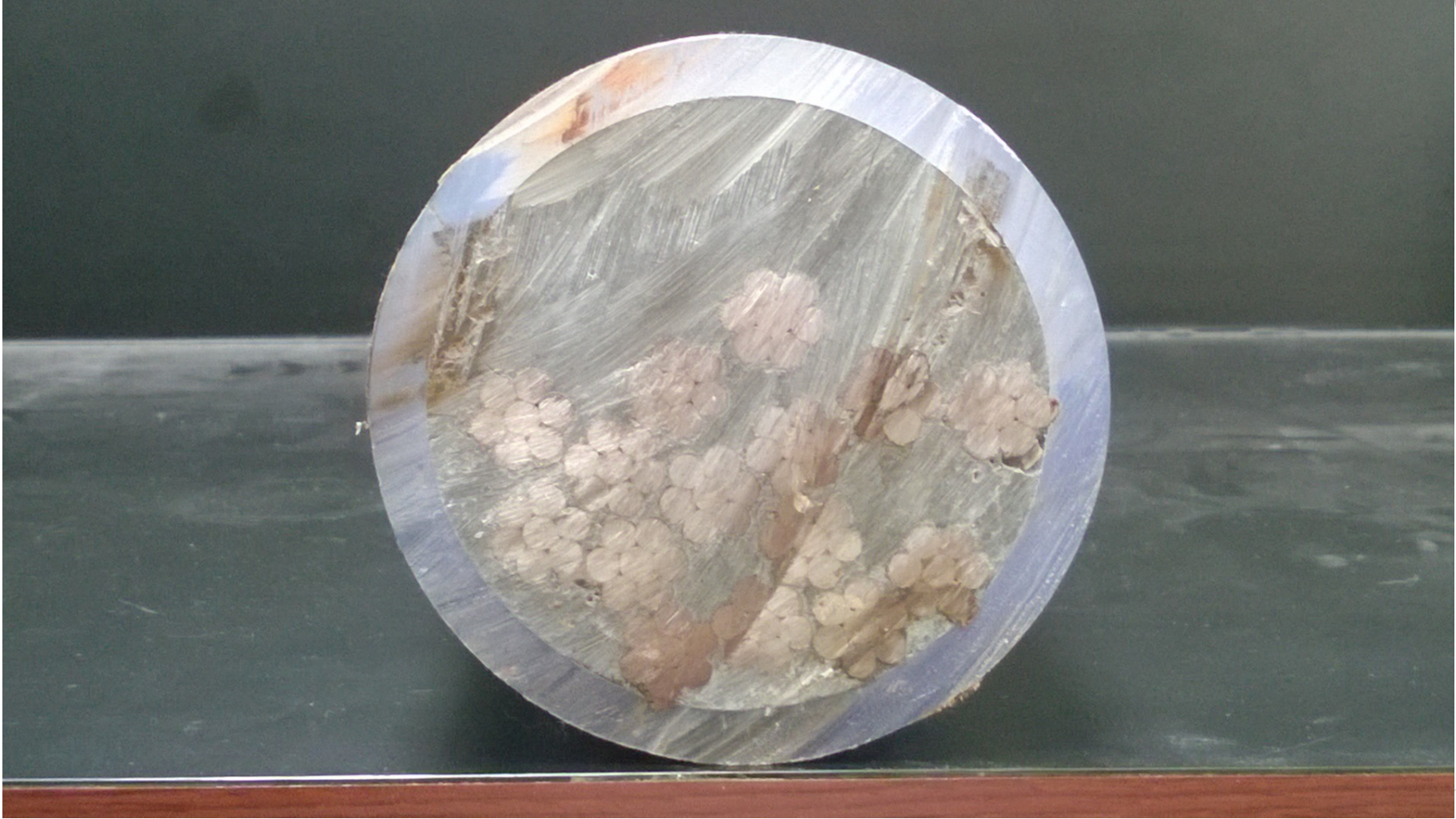
Grouting Apparatus



Mud Balance / Bleed Tests



Grout Mockup Cut Section



EIT - System

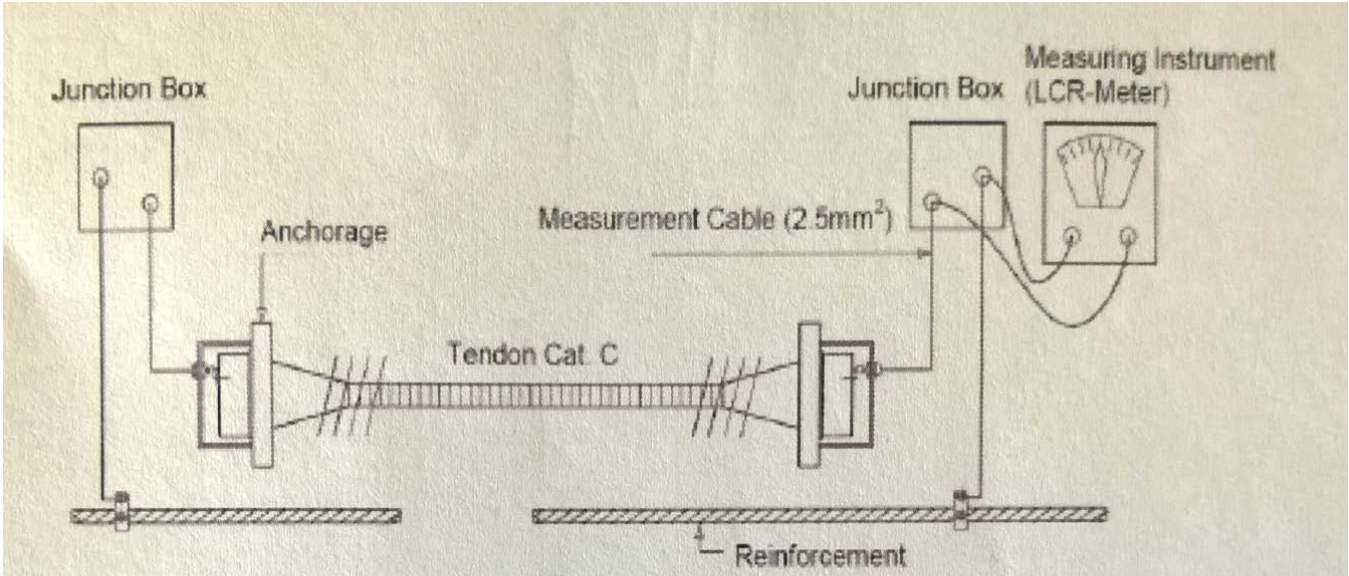
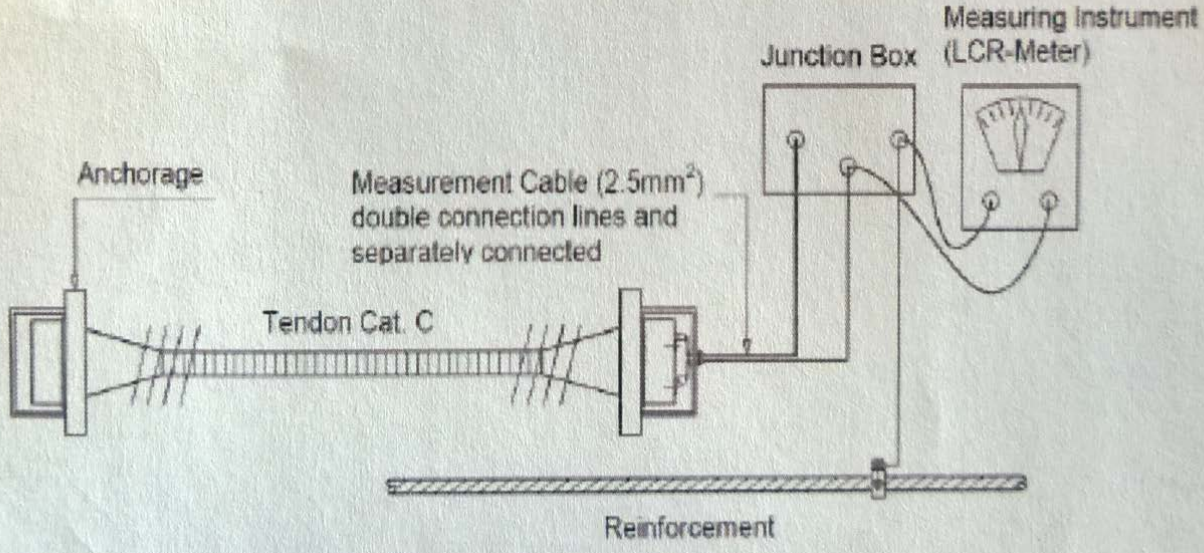


Figure 22. Electrical connections to the tendon at both ends [2, 3]



Schematic - Tendon Protection

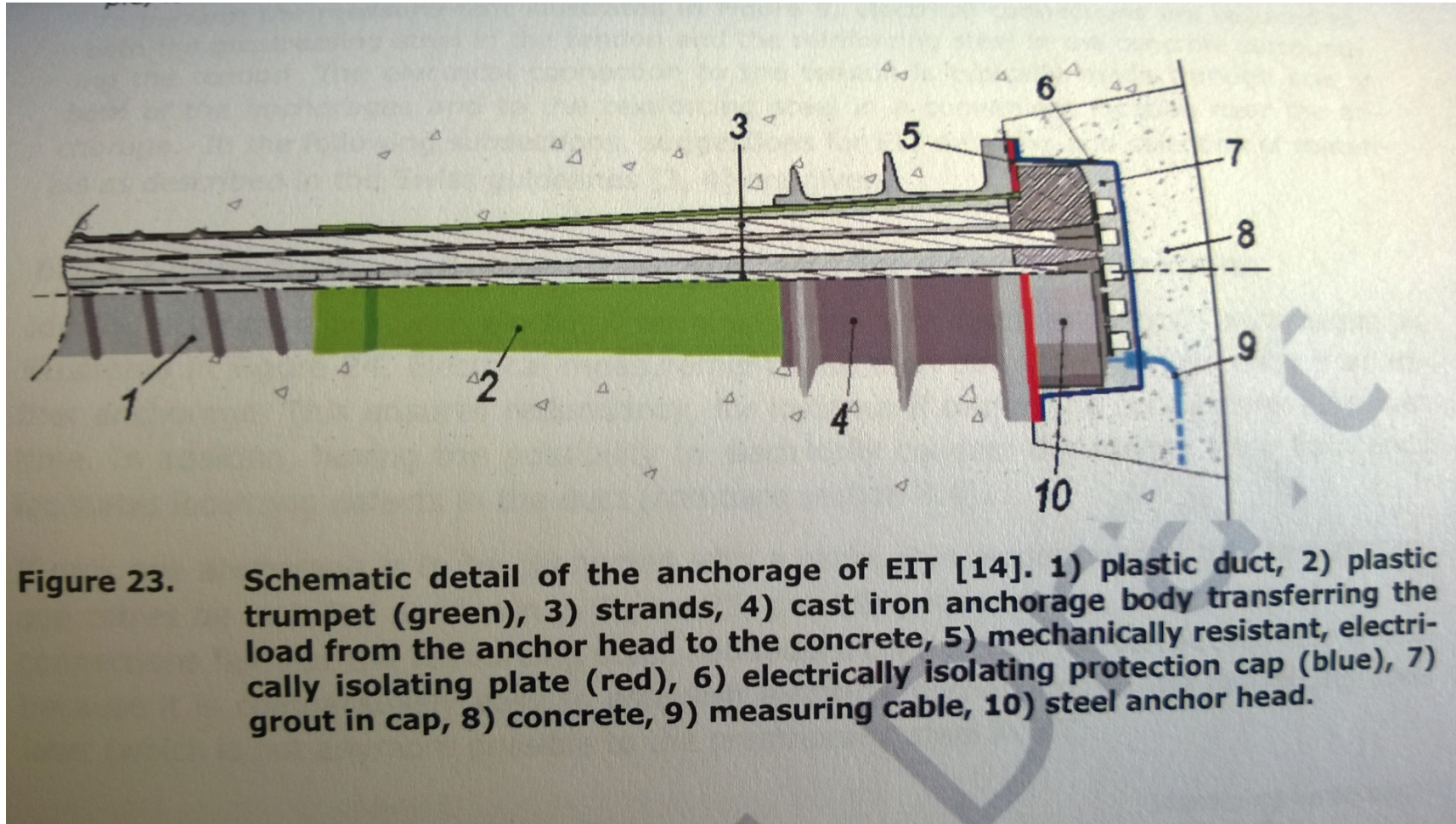


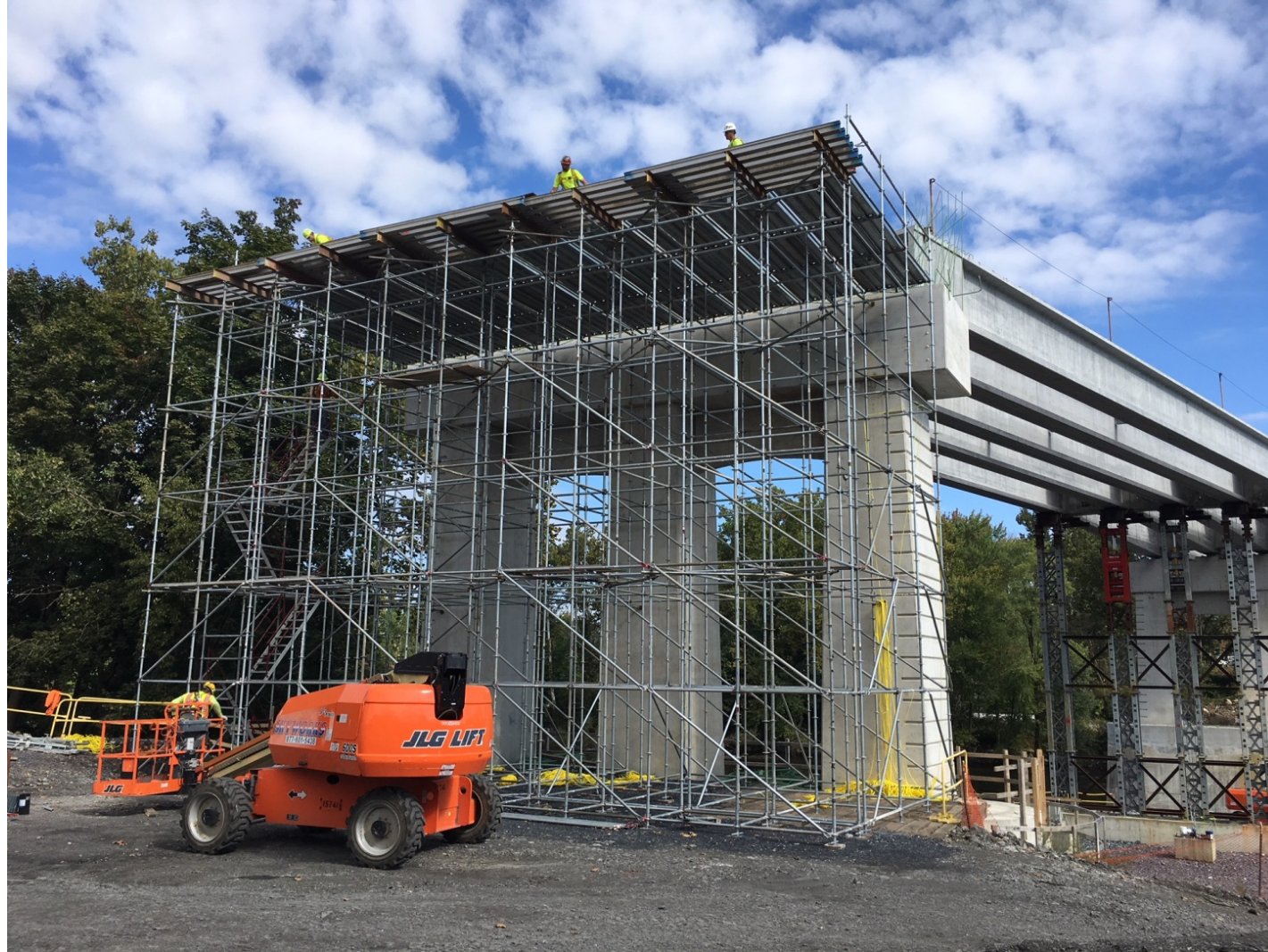
Figure 23. Schematic detail of the anchorage of EIT [14]. 1) plastic duct, 2) plastic trumpet (green), 3) strands, 4) cast iron anchorage body transferring the load from the anchor head to the concrete, 5) mechanically resistant, electrically isolating plate (red), 6) electrically isolating protection cap (blue), 7) grout in cap, 8) concrete, 9) measuring cable, 10) steel anchor head.

Post Tension Platform



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Scaffold for Post Tension



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Strand Installation



Strand Installation



Tendon Installed



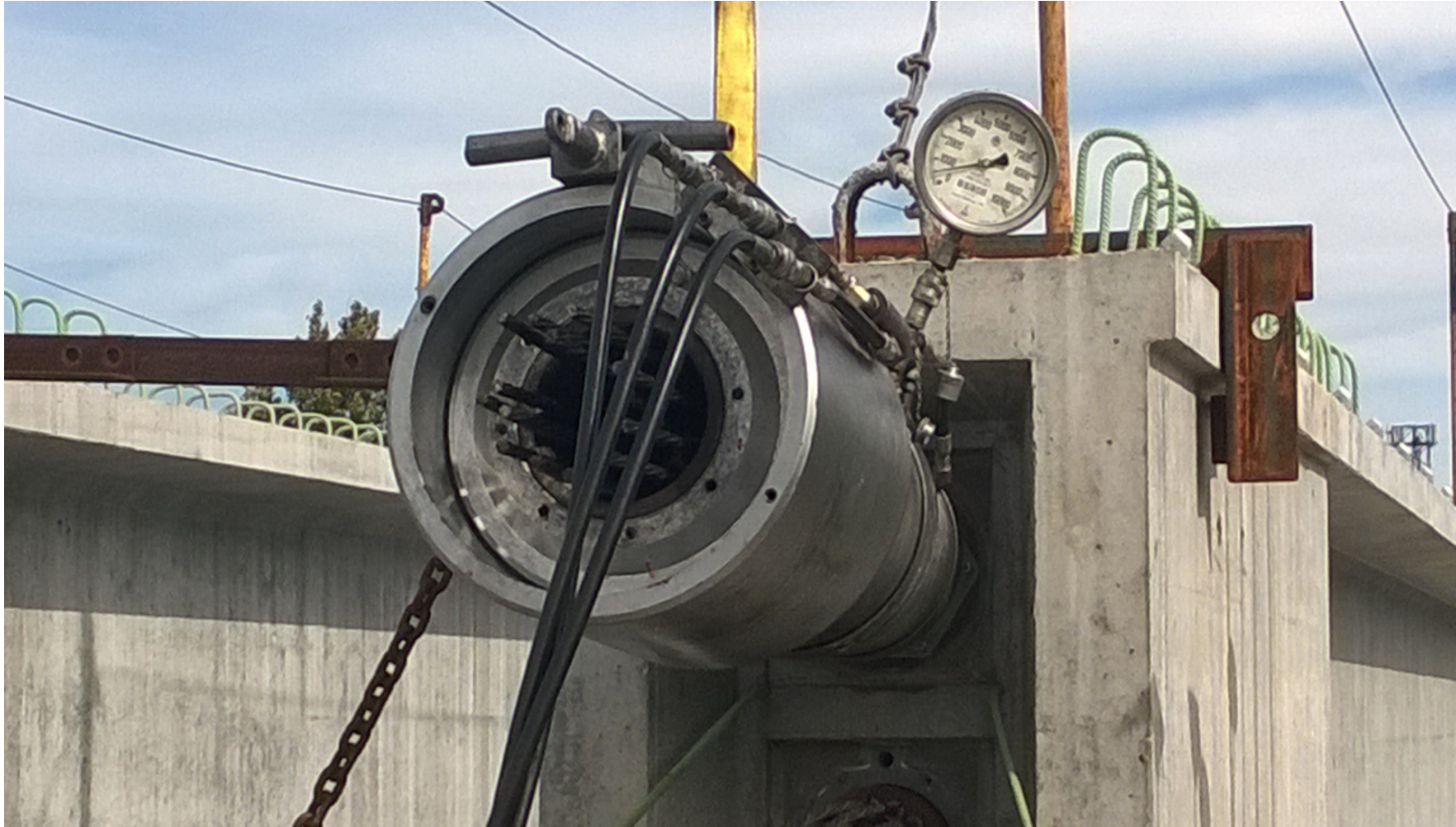
Anchor Head / Wedge Plate-EIT



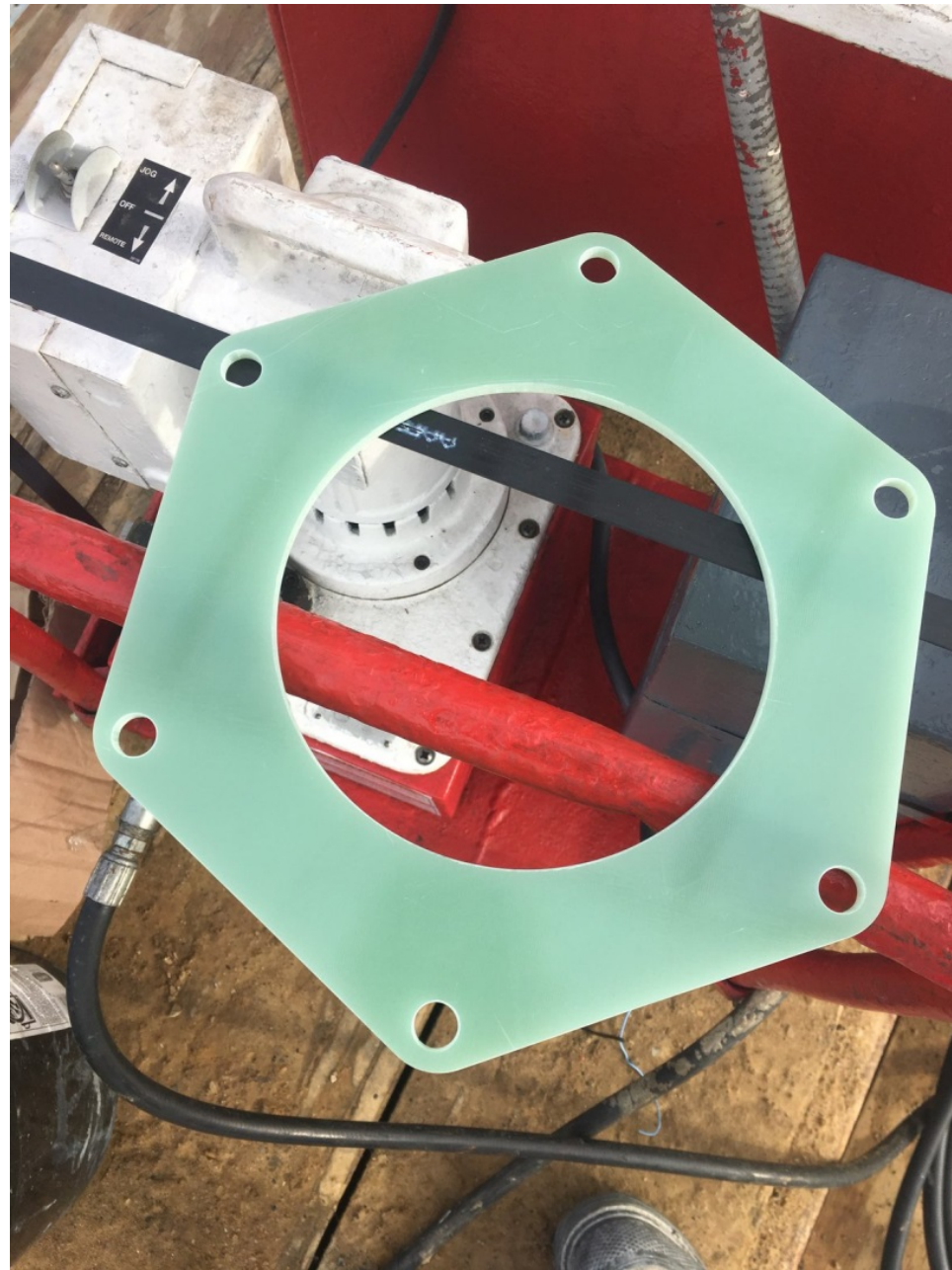
EIT Anchor Head / Isolation Plate



Tendon jack



EIT Isolation Plates



EIT Isolation Plates



EIT System



EIT System installed / Readings



Summary - EIT Usage

- ▶ Design / Review Cost - Nominal (only need to switch a few components in the post tension system)
- ▶ Material Procurement - Nominal (only the increase in cost for EIT components / currently from overseas)
- ▶ Beam Production - Nominal (similar components for PT)
- ▶ Post Tension Operation - Nominal (basically no differences from standard PT)

Construction Time Lapse

