Bridge Falsework Forum- Welcome & Introduction

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Deputy Division Chief

Offices of Structure Construction

Welcome & Introduction

- Introduction of Key Participants
- Purpose of Forum
- Notes & Action Items

Introductions- Key Participants

- Facilitator – Mike Halverson
- Falsework Manager – John Babcock
- OSC F/W Senior Engineers:
  - North = John Walters
  - South = Ken Burkle
- OSC F/W Technical Team
- CT/Industry Joint F/W Advisory Team

Falsework Forum - Purpose

- High Risk F/W Operation:
  - Contractors, OSC, public
- Joint Responsibility for public safety
- High profile incident – new definition
- Time to discuss:
  - Best Management Practices
  - Revised Specifications?

Falsework Forum Notes

- Action Items will be captured
- All notes will be posted on Internet
- http://www.dot.ca.gov/hq/esc/construction/construc.htm
  - Division of Engineering Services
  - Structure Construction

PROGRESSION OF MEETINGS RELATED TO FALSEWORK STABILITY (John Babcock)

- **INTERNAL FALSEWORK TEAM**
- **JOINT CALTRANS/INDUSTRY FALSEWORK ADVISORY TEAM**

Bridge Falsework Forum

- Series of three meetings to address falsework stability

Bridge Falsework Forum

- Offices of Structure Construction Technical Team, Falsework
  - Issues Identified
  - Solutions suggested

Bridge Falsework Forum

- Joint Caltrans / Industry Falsework Advisory Team
  - Issues Identified
  - Solutions recommended

INTRODUCTIONS

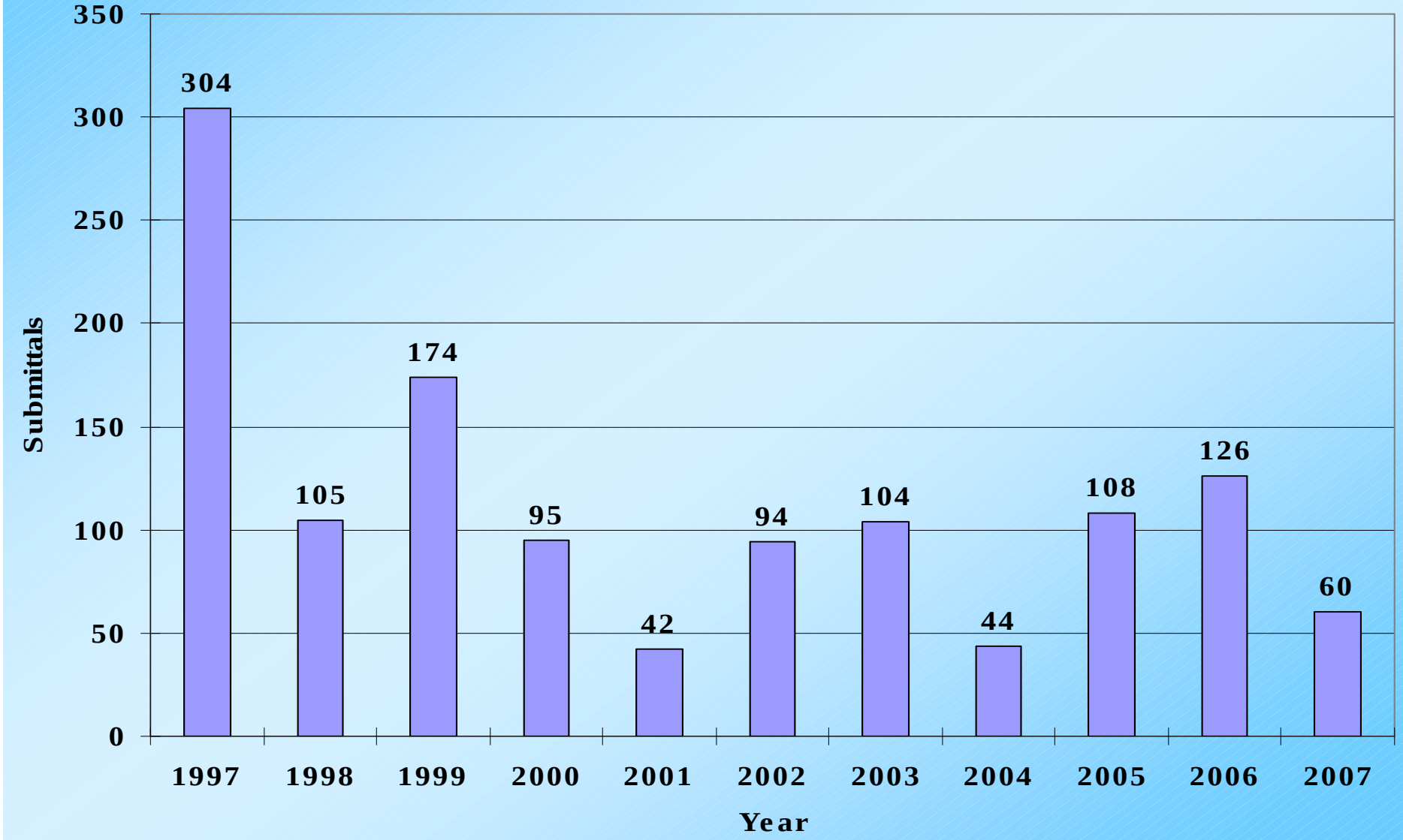
Agenda

- REGISTRATION
- FORUM INTRODUCTION (Dolores Valls)
- INTRODUCTIONS
- PROGRESSION OF MEETINGS (John Babcock)
- BACKGROUND
- ADVISORY TEAM RECOMMENDATIONS FALSEWORK STABILITY
  - TRAFFIC OPENING REQUIREMENTS
  - COMMUNICATION/PARTNERING/FALSEWORK DESIGN PLANS
  - FALSEWORK ENGINEER PRESENCES AND APPROVALS
  - BEST PRACTICES (Internal by Contractor)
  - REWRITE FALSEWORK MANUAL, BRIDGE CONSTRUCTION MEMOS, SPECIFICATIONS

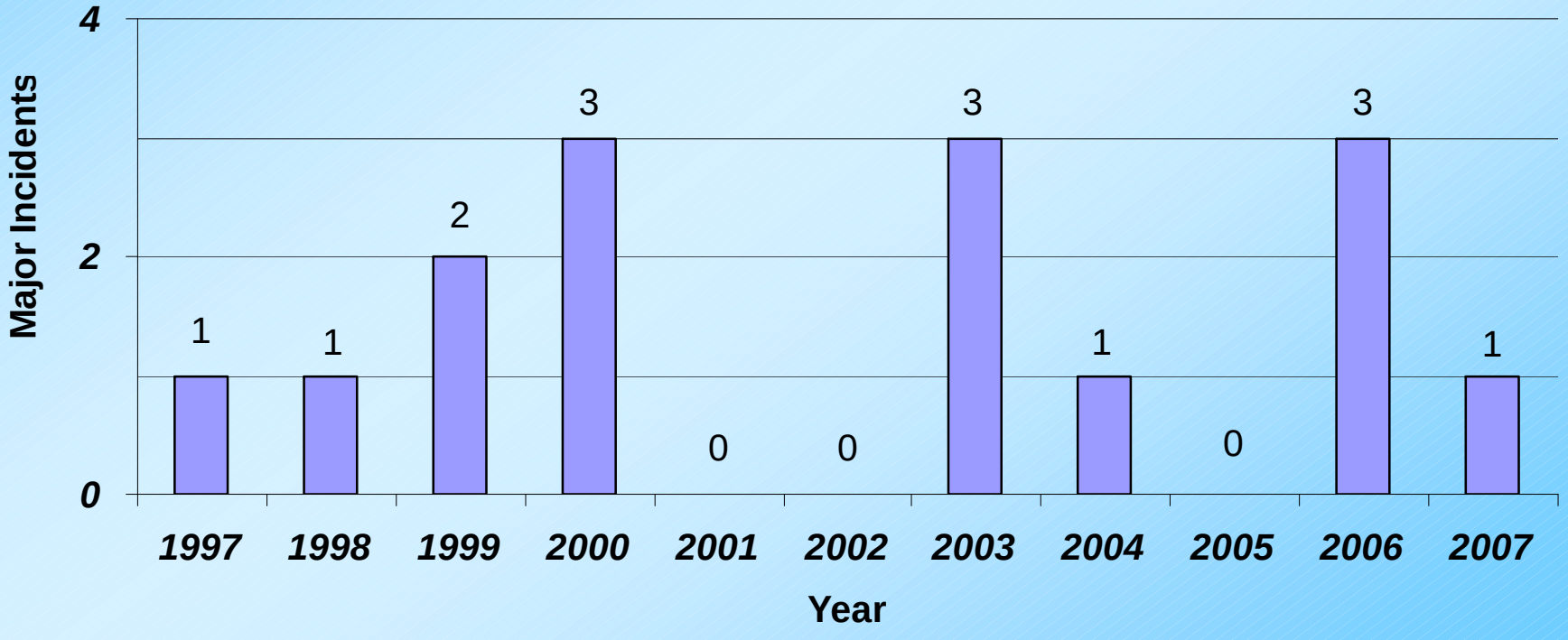
Agenda

- **ADVISORY TEAM RECOMMENDATIONS WINCHES FOR FALSEWORK REMOVAL**

FALSEWORK SUBMITTALS



MAJOR FALSEWORK INCIDENTS



FALSEWORK STABILITY

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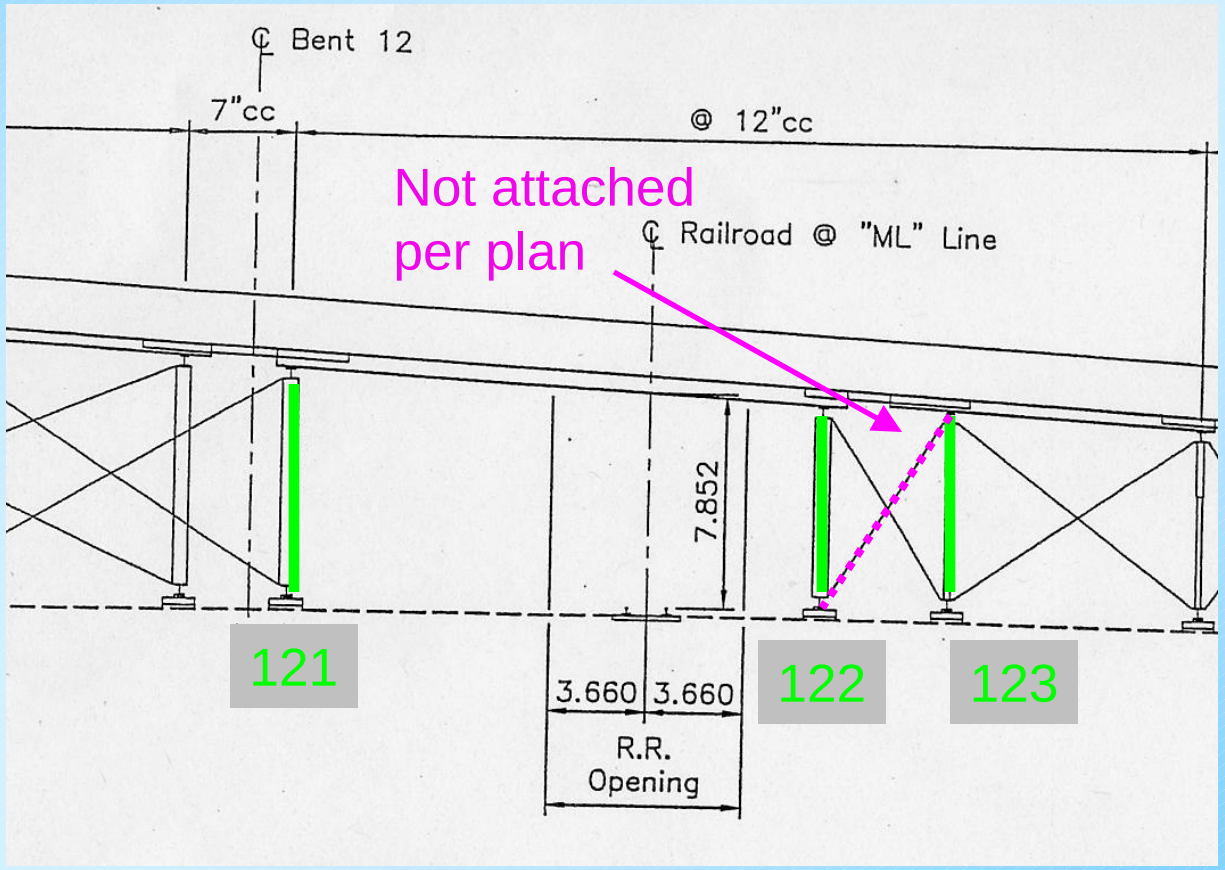
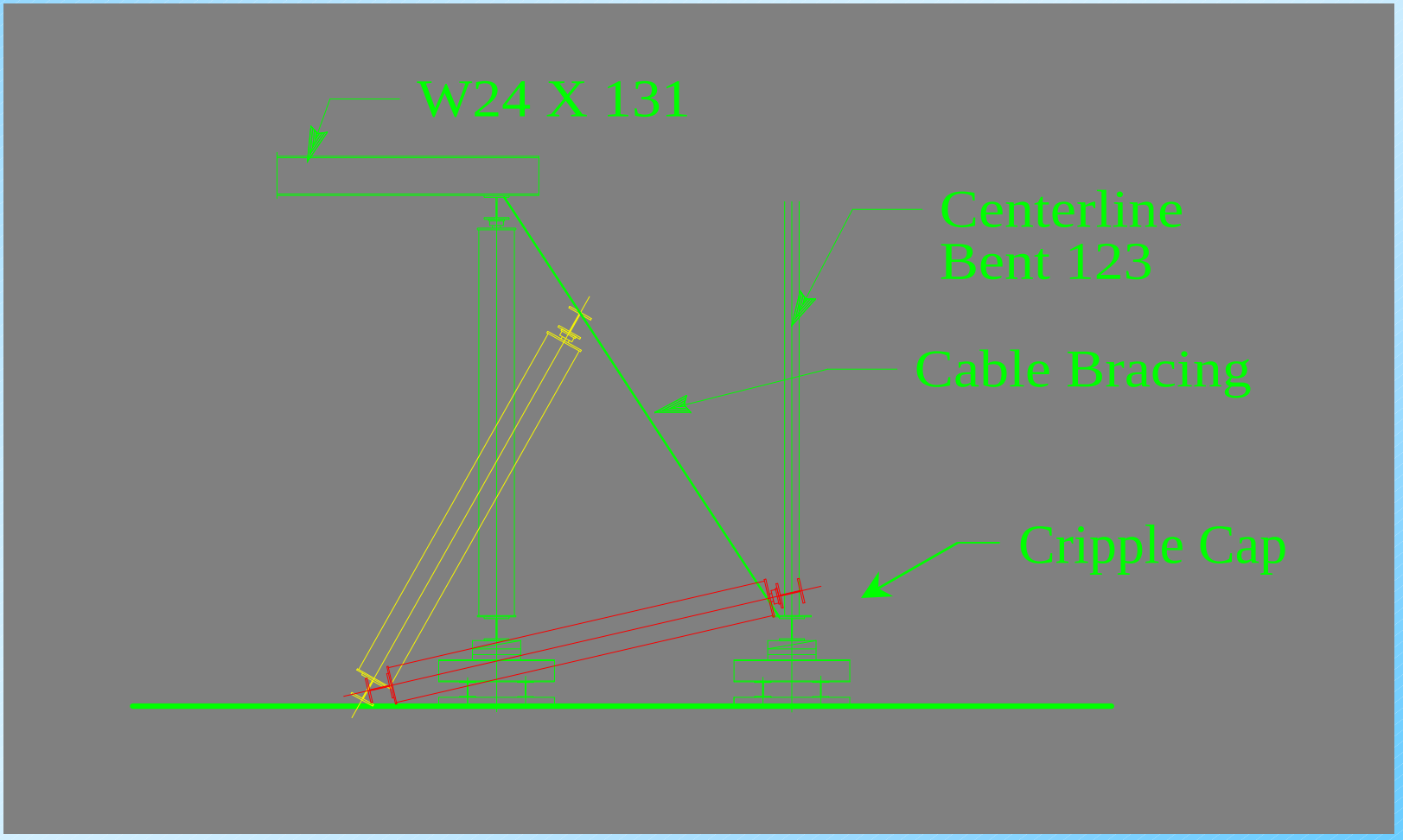
CASE 1

Falsework Elevation View



Contractor grading Bent at time of incident.

Falsework Bent Elevation



CASE 1

CASE 2

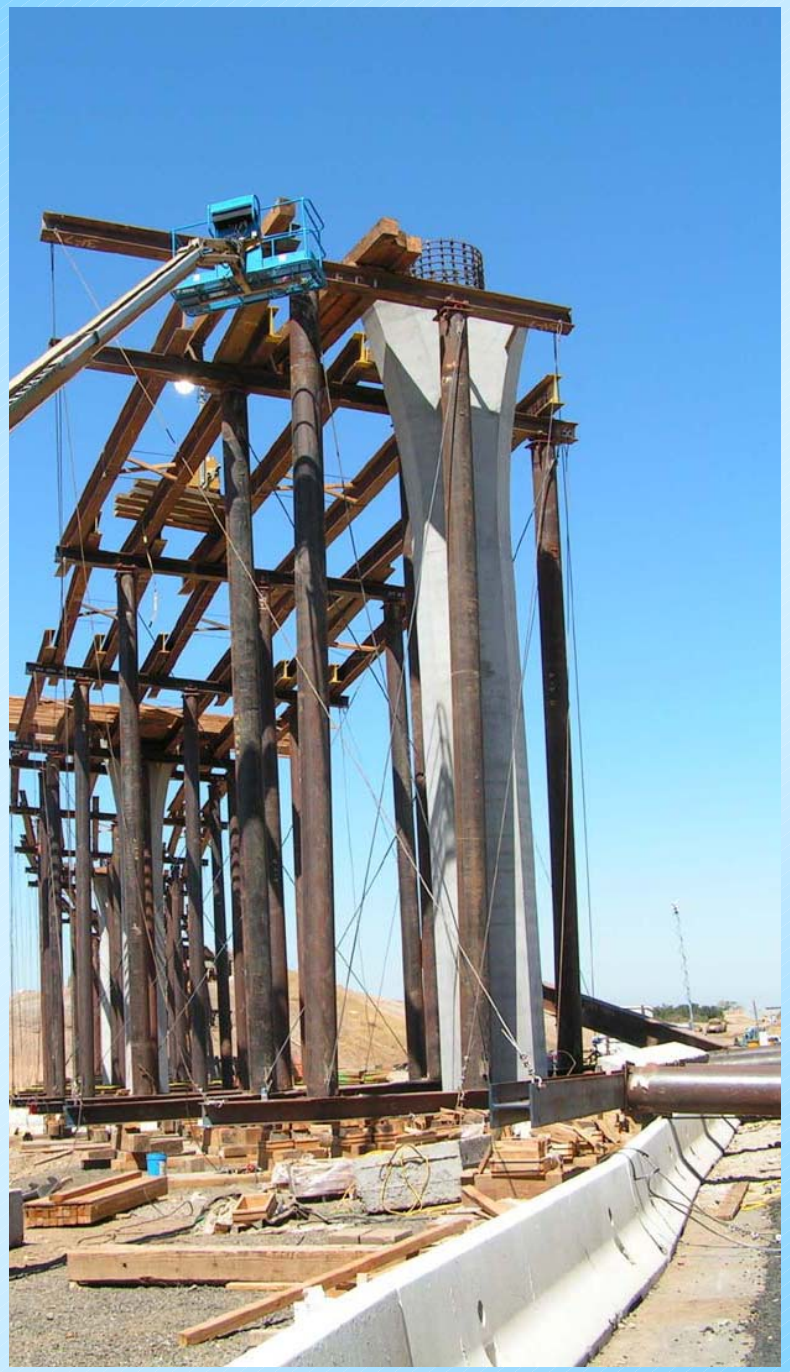
CASE 2

CASE 2

CASE 3

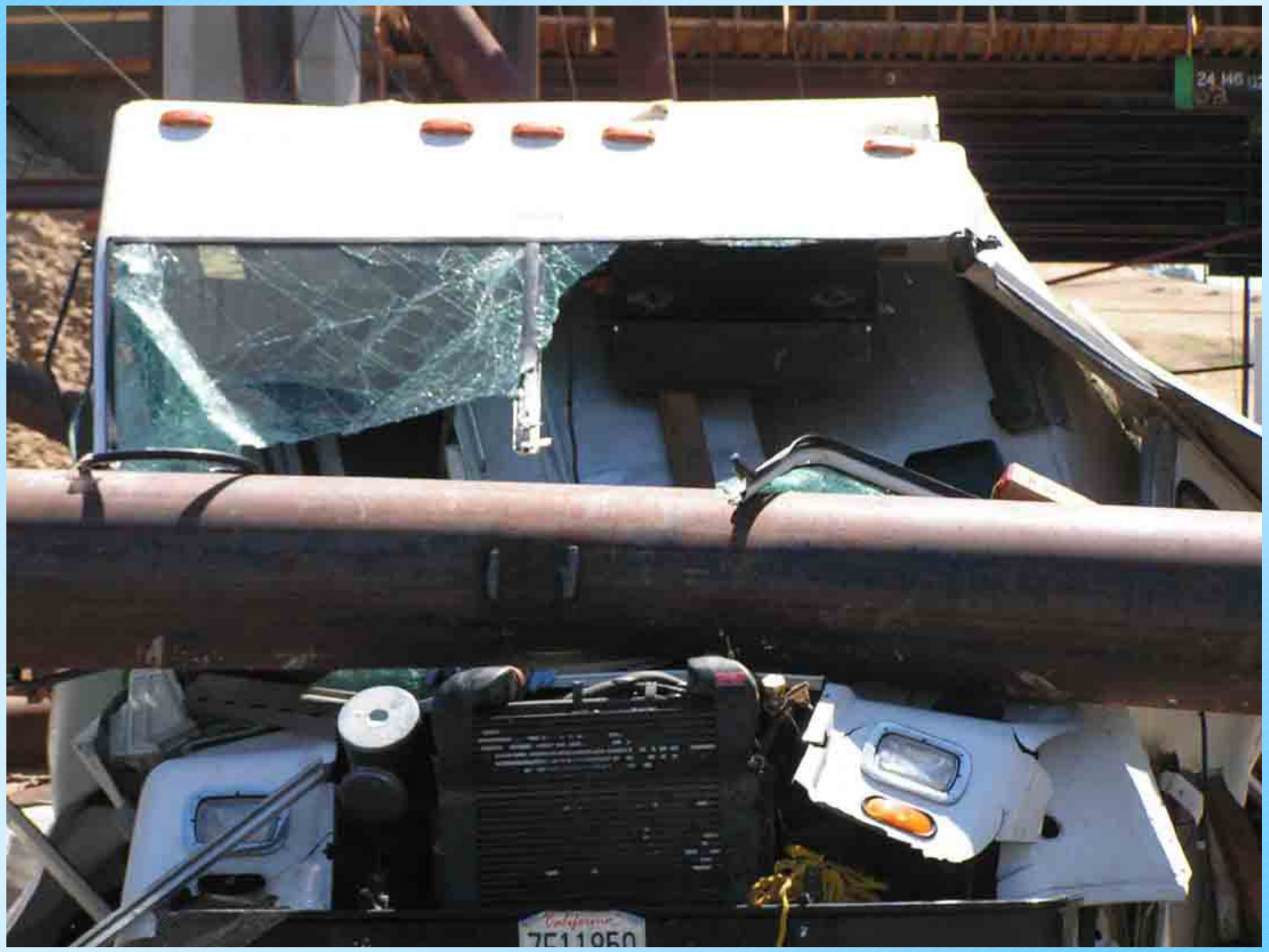
CASE 3

CASE 3



CASE 3

CASE 3



LESSONS LEARNED

- **Stability measures must be in place at all times**
- **Multi-tiered systems require special attention**
- **Don’t adjust falsework over or adjacent to traffic**

DON'T ADJUST FALSEWORK OVER OR ADJACENT TO TRAFFIC

Contract Special Provisions "Maintaining Traffic"

Erection and removal of falsework at locations where falsework openings are required shall be undertaken one location at a time. During falsework erection and removal, public traffic in the lanes over which falsework is being erected or removed shall be routed around the work area on adjacent roadways or where 2 falsework openings are called for at one location, by means of a local detour as shown on the plans. Erection shall include all adjustments or removal of falsework components prior to concrete placement that contribute to the horizontal stability of the falsework system. Removal shall include lowering falsework, blowing sand from sand jacks, turning screws on screw jacks, and removing wedges.

HOW DO WE MAINTAIN FALSEWORK STABILITY?

Or

WHAT IS IT THAT CAUSES FALSEWORK TO BECOME UNSTABLE?

ADVISORY TEAM RECOMMENDATIONS - STABILITY

1. Traffic Opening requirements

1.1 Independently stable/ stand alone frames

1.2 Connection criteria

1.3 Customary to increase load with increased risk

1.4 Continuity between structure columns

1.5 Implementation:

- 1.5.1 Falsework Manual
- 1.5.2 Specifications

2. Communication/Partnering/ Falsework Design Plans

2.1 Require meetings at critical benchmarks

- 2.1.1 Erection
- 2.1.2 Grading
- 2.1.3 Removal
- 2.1.4 Prior to opening to traffic (for falsework over traffic)

2. Communication/Partnering/ Falsework Design Plans

2.2 Erection and Removal Plans

2.2.1 General at time of falsework plan submittal

2.2.2 Detailed at pre-activity meeting

2.3 Implementation

3. Falsework Engineer of Record Presence and Approvals

3.1 At Critical benchmarks

- 3.1.1 Certify prior to traffic opening (for falsework over traffic)
- 3.1.2 Onsite during grading operations
- 3.1.3 Progressive stages of construction

3.2 Implementation

4. Best Practices (Internal by Contractor)

4.1 Training

4.2 Company Certification

4.3 Implementation

5. Rewrite Falsework Manual, Bridge Construction Memos, Specifications

5.1 Longitudinal Stability Analysis

5.2 Friction Transfer Capacity (FTC) Allowance

5.3 Testing and use of clamps

WINCHES FOR FALSEWORK REMOVAL

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- Traffic window limitations
- Operation cannot be reasonably done otherwise
- Does not encroach upon the vertical and horizontal traffic clearances

WINCHES FOR FALSEWORK REMOVAL

- Will not cause a traffic disruption
- Work is performed at night with a closure
- Load is static to structure soffit

ADVISORY TEAM RECOMMENDATIONS

Winches for Falsework Removal

ADVISORY TEAM RECOMMENDATIONS

1. Redundant systems are used

    1.1 Use High Strength rods or strands and winches

    1.2 High strength rods or strands

        1.2.1 Requires redundant system

        1.2.2 Requires use of new strand

ADVISORY TEAM RECOMMENDATIONS

1.3 Winches only

1.3.1 Safety factor (5:1)

1.3.2 Certification

1.4 Inspection of critical elements (NDT)

ADVISORY TEAM RECOMMENDATIONS

2. Implementation
    - 2.1 Provide additional direction
    - 2.2 Update Falsework Manual

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Discussion

Adjourn