NCHRP 20-07 Problem Statement
Submitted to TRB AFF10/AFF10(1) & AASHTO T-12

Anchor Road and End Plate Bolt Connection Tightening Procedures

T-12 Committee Meeting
2015 AASHTO SCOBS Annual Meeting

Michael Garlich, S.E., P.E.
RESEARCH PROBLEM STATEMENT

- Field inspection identified loose/missing anchor rod nuts & end plate connection bolts
  - *Recurring installation defect*

- Improper installation and overlooked Inspection
  - *Increased stresses in other rods/bolts & in base plate/end plate*
  - *Fatigue cracking / failure*

- FHWA Guidelines provide installation guidance
  - *No sufficient detail for contractor/inspector with limited knowledge and experience*
Problem

Improperly tightened anchor rods and end plate bolts reduce fatigue life leading to failure.
Failed Mast Arm
Connection Bolt Not Seated Properly
Loose Anchor Rod Nuts
Loose Leveling Nuts
Anchor Bolt Nut Not Seated Properly
Fractured Anchor Rod
From field inspections, not uncommon to find 15-20% and anchor rod nuts loose, i.e., turned with fingers or hand wrench
Problem

- Traffic structure installation contractors are not knowledgeable in proper bolt tightening procedures.
  - Electrical contractor
  - Miscellaneous metals
How to Achieve Required Pretension

• Proper tightening requires correct equipment and procedure
  – “Slugger” wrenches
  – Hydraulic wrenches

• HS bolts in blind holes—how tight?

• New Technology
Tightening Anchor Rod Nuts
Tightening Anchor Rod Nuts
RESEARCH OBJECTIVE

- Utilize existing knowledge on anchor rod/end plate connection performance.

- Proposed installation guide would give detailed tightening procedures and associated equipment requirements.

- Provide “Pocket” type installation manual for tradesmen, supervisors, inspectors.
  - Step-by-step procedure
  - New installation and existing retightening
ESTIMATE OF FUNDING AND PERIOD

• $58,000 plus any direct travel expenses for project review meetings (NCHRP 20-07 $100,000 max.)

• 12 months
Questions?