

2015 Ohio Bridge Conference

Anthony Wayne Bridge









West Approach Suspension Span and Truss



- Former site of over 15 + Conrail Railroad tracks
- Toledo Metroparks: Middlegrounds Metropark Project

Bridge Highlights

- Built: 1931
- Bridge Rehabilitations:
1961, 1996
- Spans over the navigable
Maumee River



Bridge Highlights



Overall Length: 3,215 feet

Tower Height 215

Existing Nos. Spans: 28

Proposed Nos. Spans: 30

Bridge Types:

Suspension Spans: 3 totaling 1,252 feet

1 main span: 785.0 feet

2 back spans: 233.5 feet

Bridge Highlights



Deck Truss Approach Spans:
2 totaling 407 feet, 203.5 feet

Approach Multi-girder: 9 spans
Ranging from 20 feet to 45 feet
Approach Twin-girder: 5 spans
Ranging from 69 feet to 165 feet

Project Goals

Asset Preservation

- Rehabilitation vs. Replacement
- Incorporate Low Maint. Details
- Cost Effective Rehabilitation
- Historical significance (Anthony Wayne Trail)

Reduce Asset Risks

- Incorporate Acoustic Monitoring Technology
- Bridge Load Rating
- Future Work in logical projects



Scope of Work

Phase 1:

Condition Field Inspection
Deck Replacement
Superstructure Steel Repairs
Substructure Repairs
Truss Replacement Spans (2)
Approach Roadway and Drainage
Acoustic Monitoring

Phase 2:

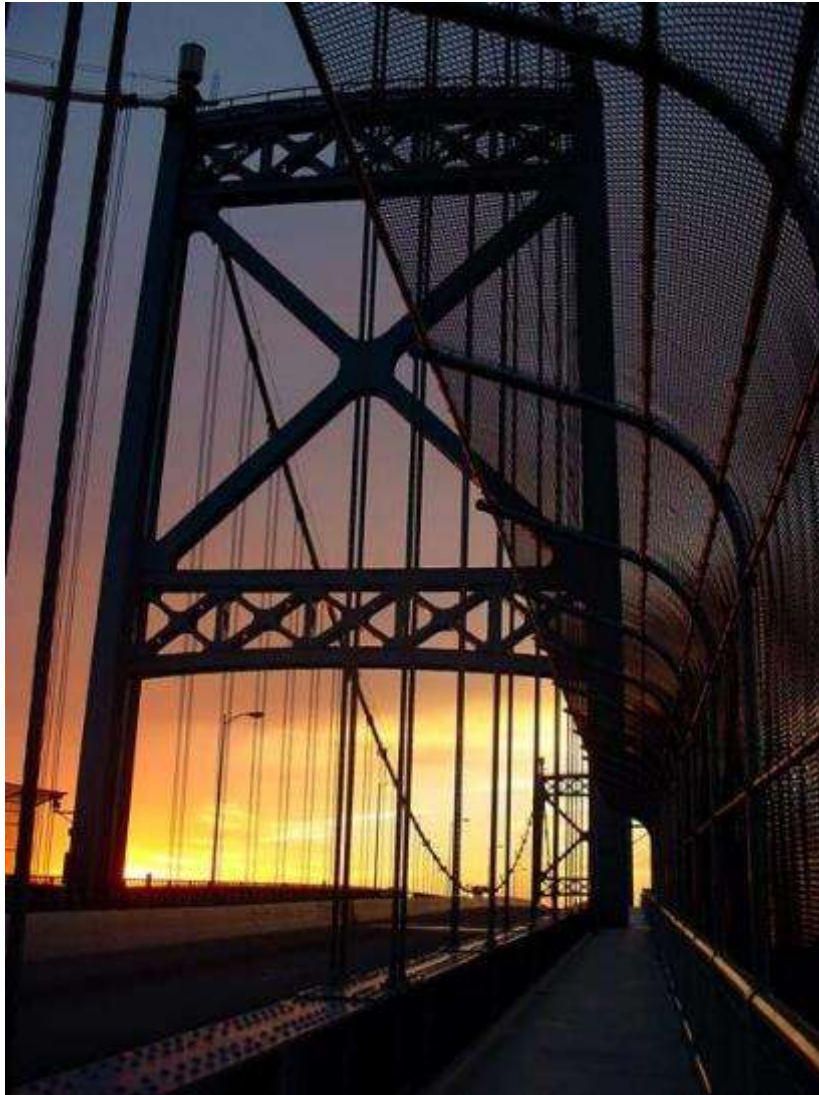
LED Lighting Upgrade
Overall Bridge Painting

Phase 3:

Cable Dehumidification
Acoustic Monitoring
renewal (3 years)



Superstructure Repairs



Tower Repairs

- Struts and X-bracing
- Lacing and Lattice work
- Concrete base patching



Truss Replacement Evaluation



Truss Replacement

Two Steel Deck Trusses

Rehabilitation vs. Replacement
Analysis

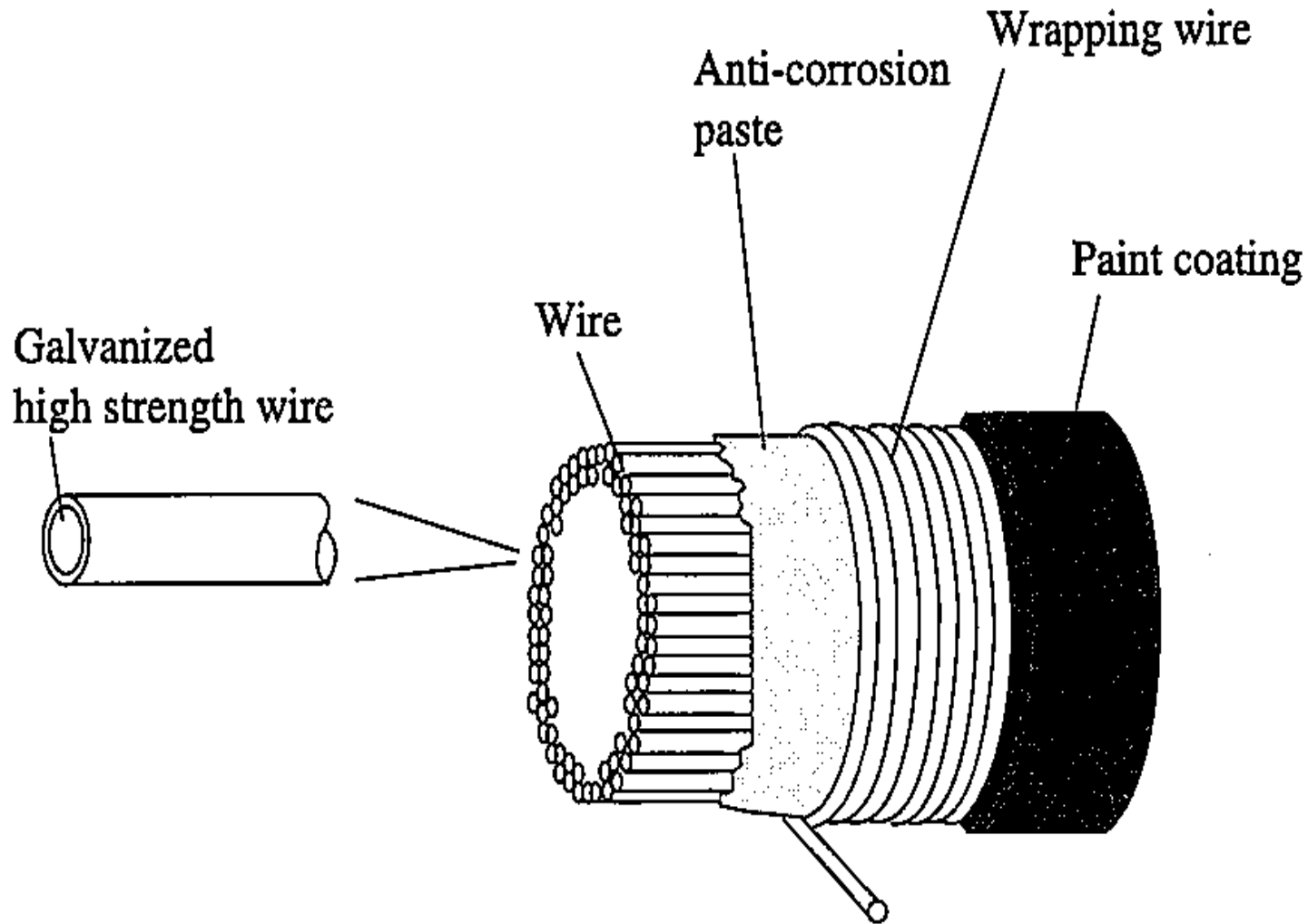
Replaced with a Two Span Steel
Multi-girder Bridge Structure



Cable Health



Original Cable Cross Section

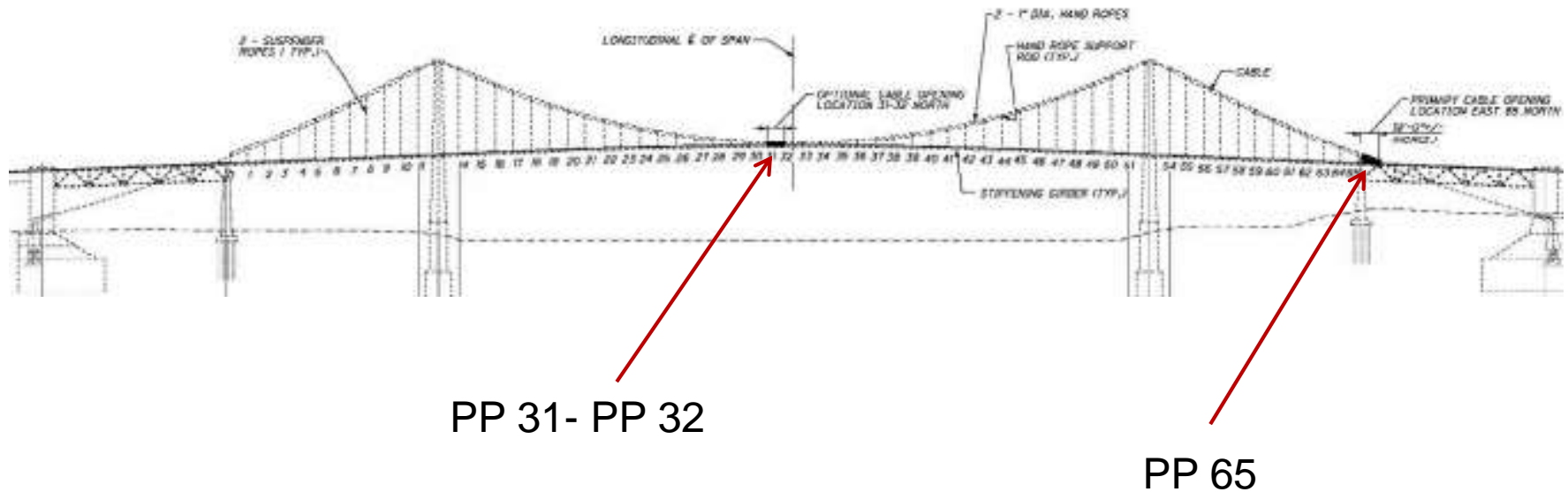


Cable Strength Evaluation



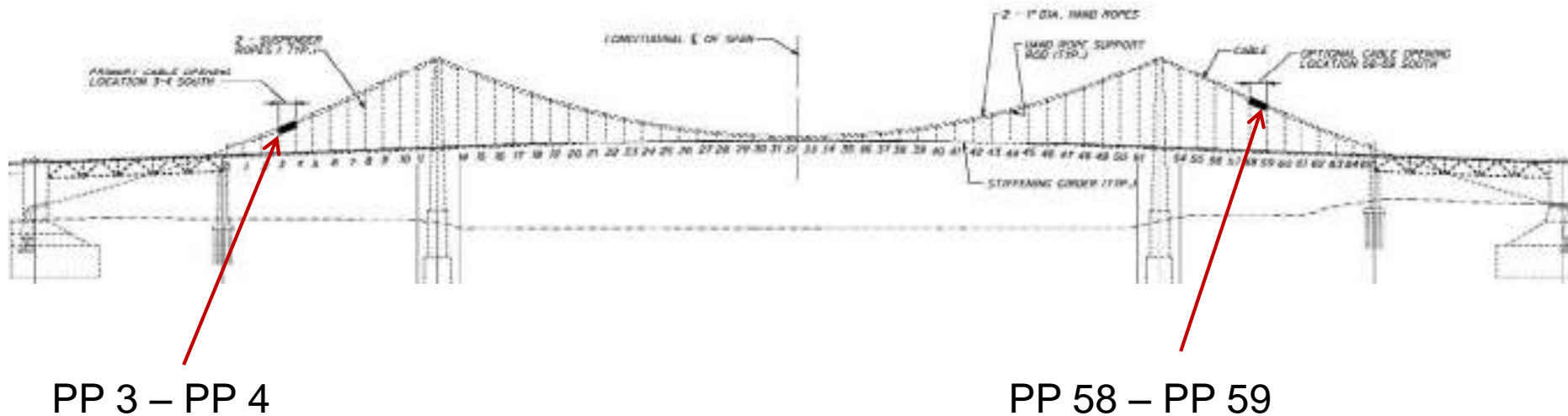
Cable Opening

- How many locations and where?
 - North Cable



Cable Opening

- How many locations and where?
 - South Cable



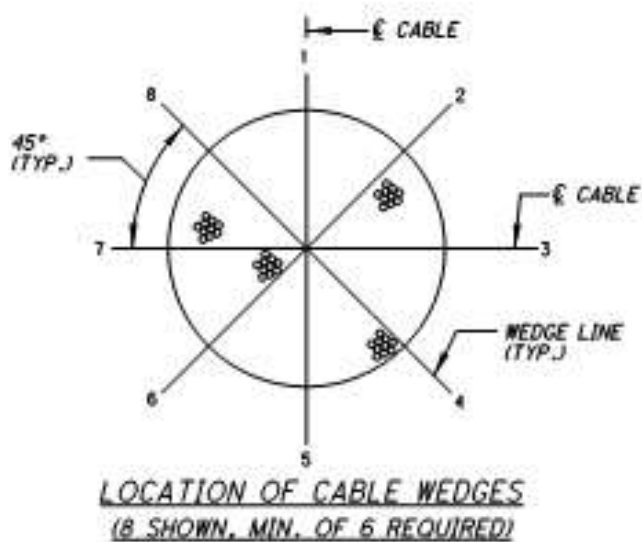
Cable Access



Cable Access/ Inspection

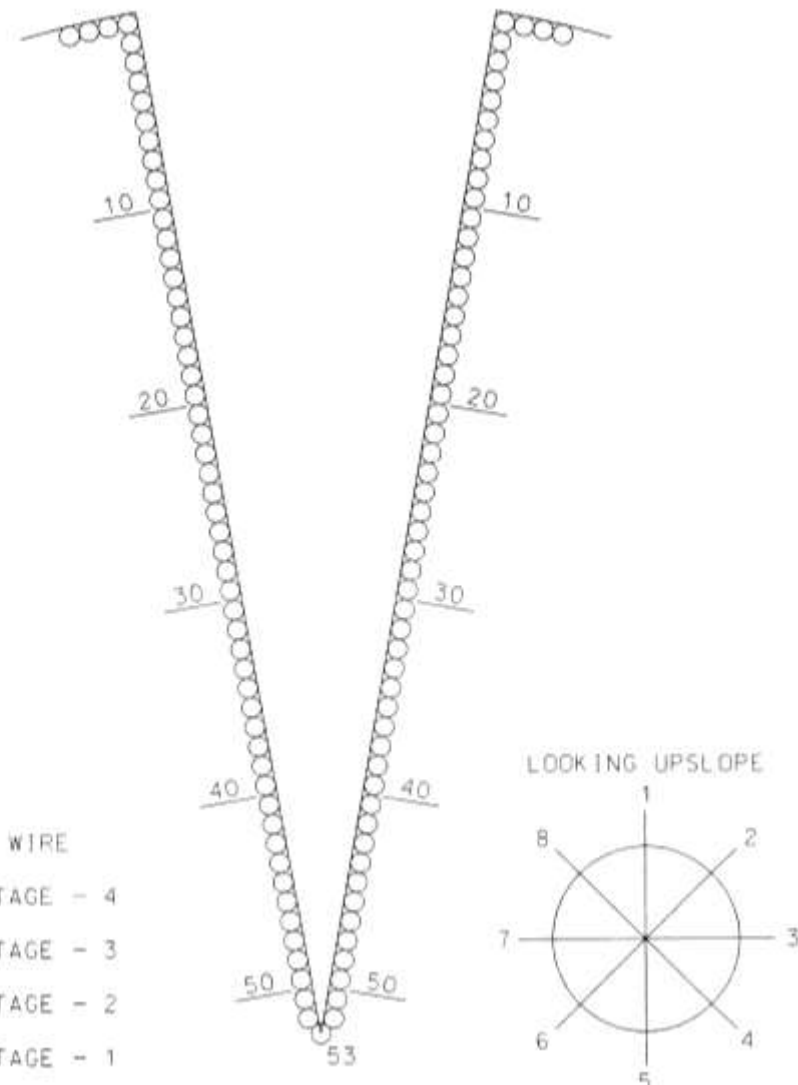
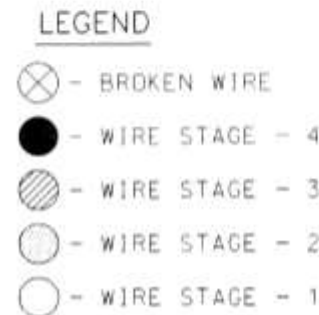
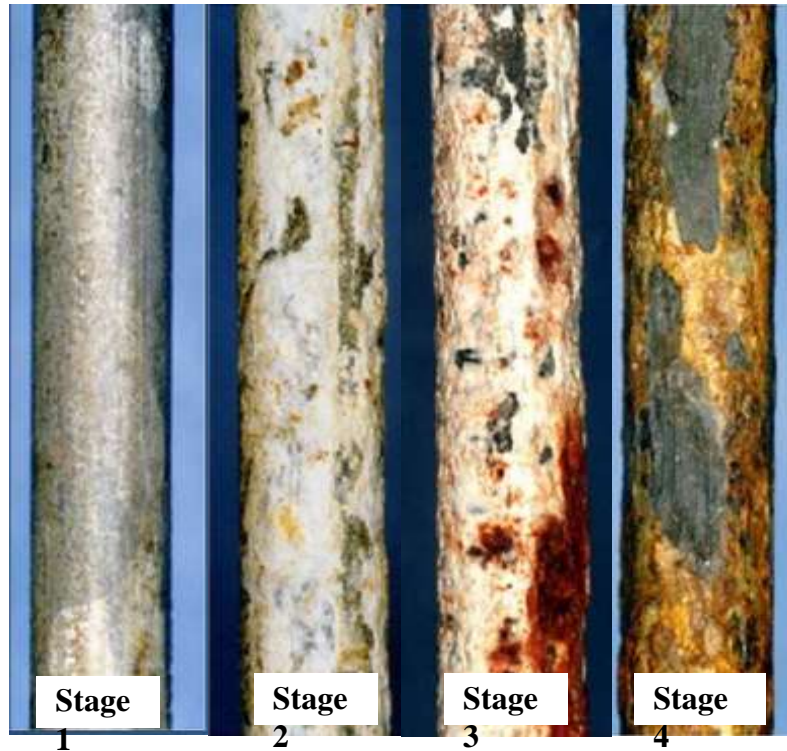


Cable Wedging





Wire Inspection



- Corrosion Stages of Cable Wires
(Figure 1.4.2.2-1 of NCHRP Report 534)

Wire Inspection PP3-PP4 South



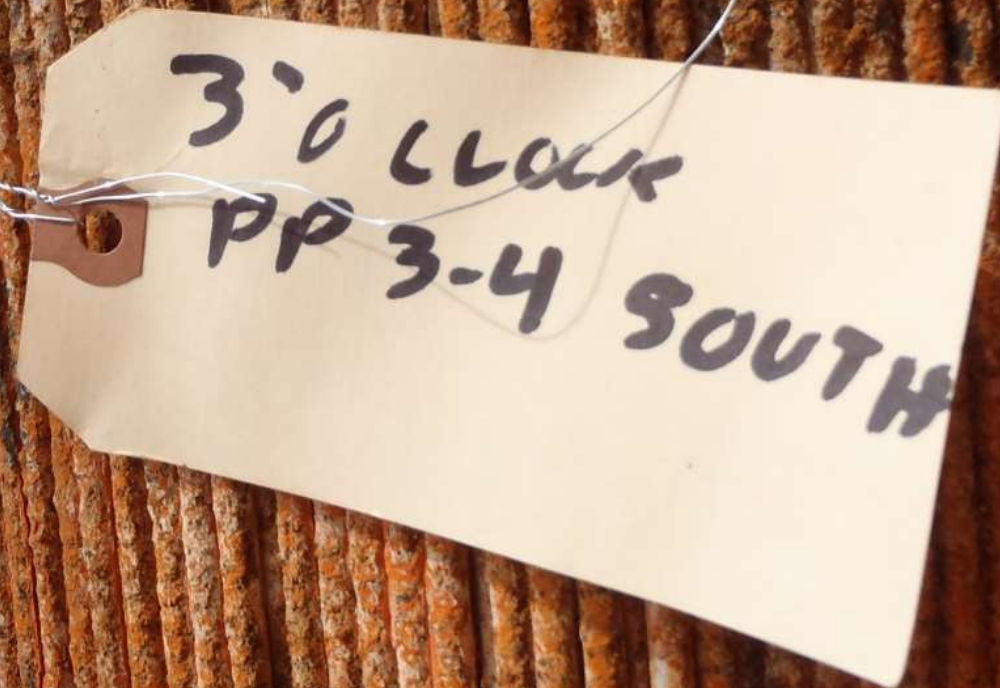
Wire Inspection PP58-PP59 South





Wire Inspection PP31- PP32 North

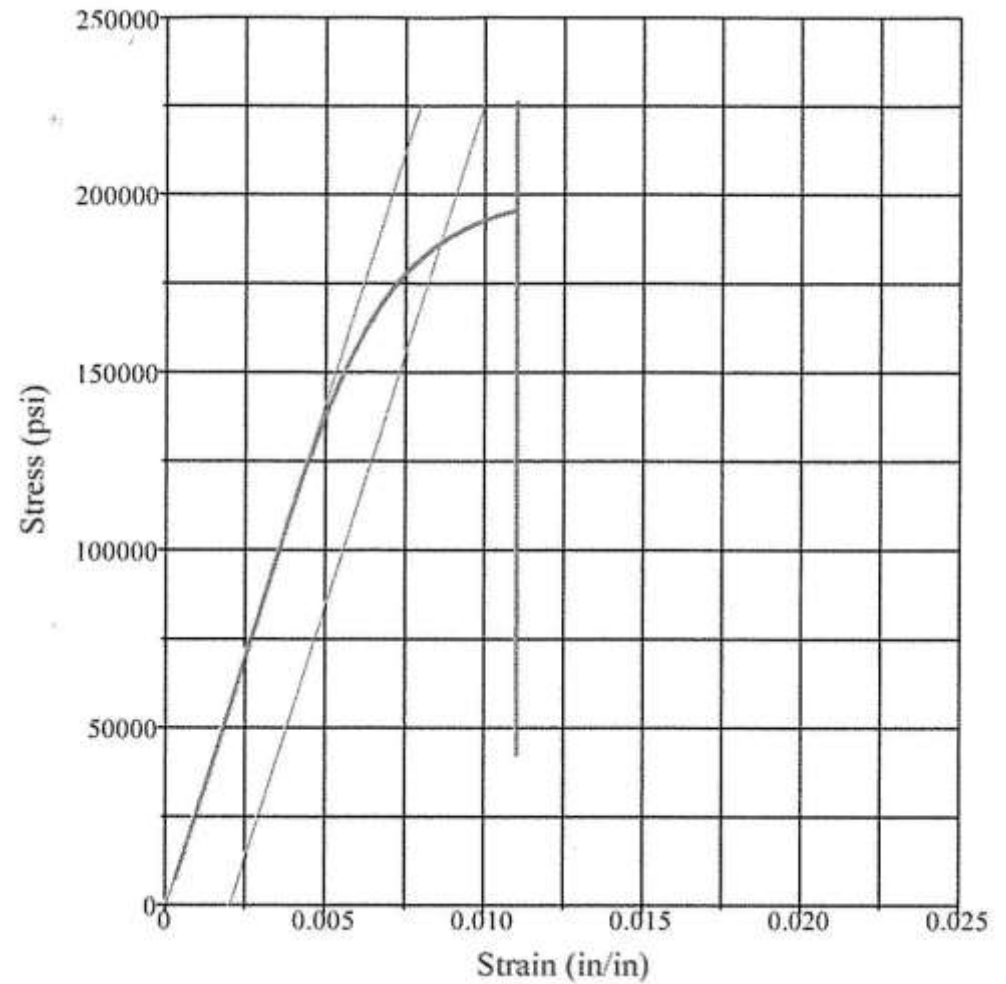
Wire Sample PP3- PP4 South



Wire Replacement

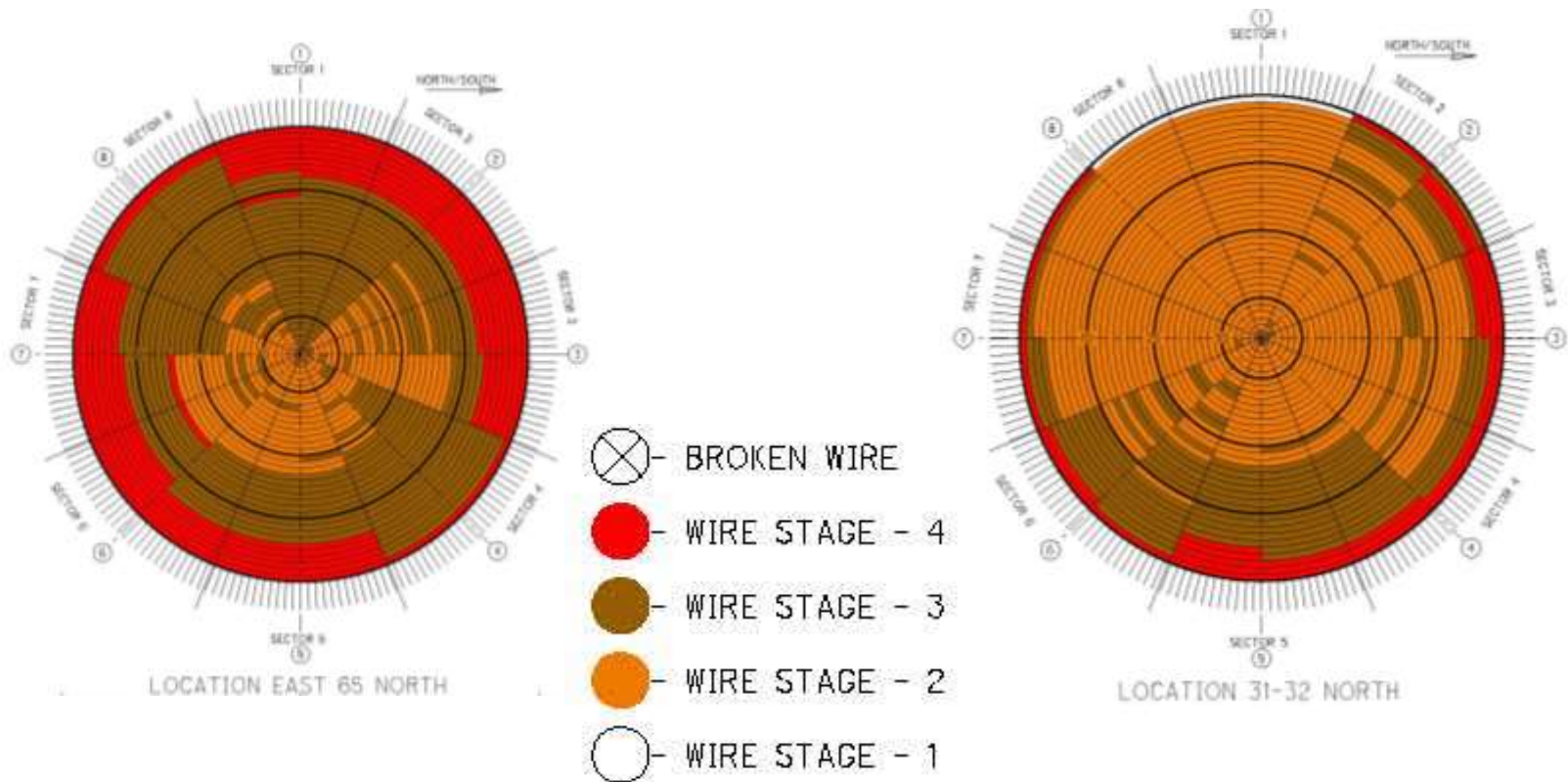


Wire Testing



Cable Strength Calculation

- Estimate # of wires at each stage of corrosion



Cable Strength Calculation

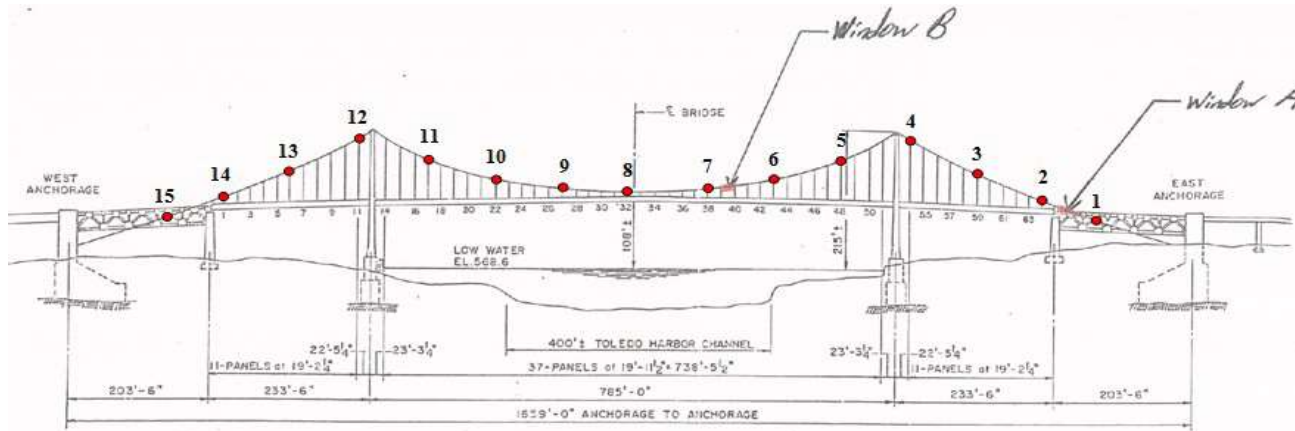
- Estimate # of wires at each stage of corrosion



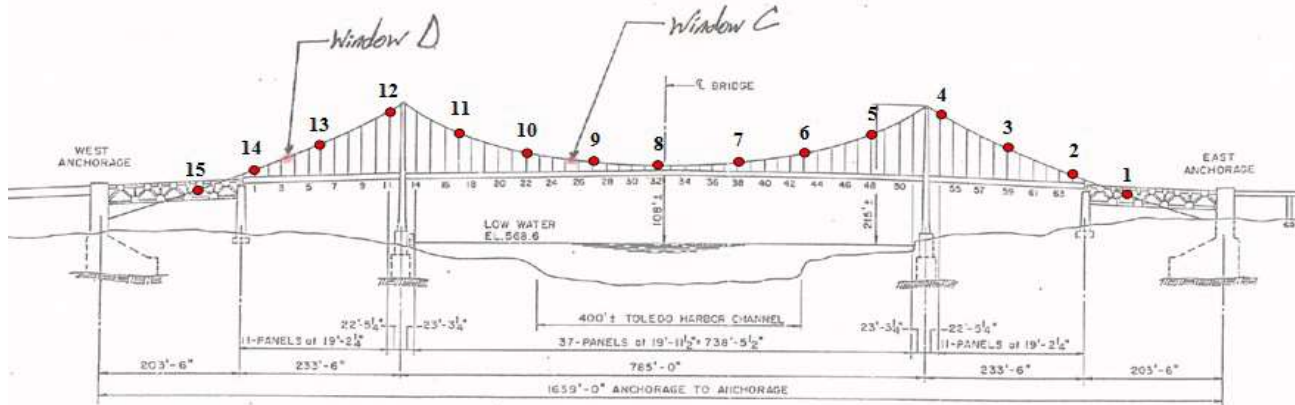
Acoustic Monitoring System



Acoustic Monitoring System



ELEVATION
LOOKING NORTH
North Cable



ELEVATION
LOOKING NORTH
South Cable

Cable Health - Future

Factor of Safety Action level 2.15 versus 2.41

- Only 3% of total cable length investigated
- ODOT
 - Continue Acoustic Monitoring Program
 - Future
 - Remove and replace wire wrap full length
 - Install Main Cable Dehumidification System

Construction: Phase 1



Contract Awarded to: E.S. Wagner

Bid Price: \$30M

Contractor NTP: May 2013, End late 2015

Construction Duration: 30 months estimated

Estimated Bridge Detour: 19 months, start Spring 2014

Construction: Bridge Closure



- Consideration given to phase construction
- Deemed not feasible due to unbalanced loading of the suspension cables.
- Existing deck comprised of standard weight concrete
- Proposed lightweight Concrete deck

Construction: Lightweight Concrete Deck



Construction: Deck Edge



- Cathodic Protection incorporated into deck edge design.
- Concerns about interface of Suspension Girder and reinforced concrete deck.
- Heavy concentration of saltwater in bridge deck gutter line.

Construction: Lightweight Concrete Deck



Construction: Expansion Joints



Construction: Steel Repairs



Suspension Girders

Floorbeam moment plates and connections

Challenge: Bolt spacing of large moment plates are variable



Construction: Tower Repairs



Construction: Remove Deck/ Steel Repairs

