

# QC / QA of Bridge Inspection Data

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# Overview

- ▶ **National Direction on Bridge Inspection QC/QA**
- ▶ **Oregon Bridge Inspection QC Program**
- ▶ **Oregon Bridge Inspection QA Program**
- ▶ **Questions?**

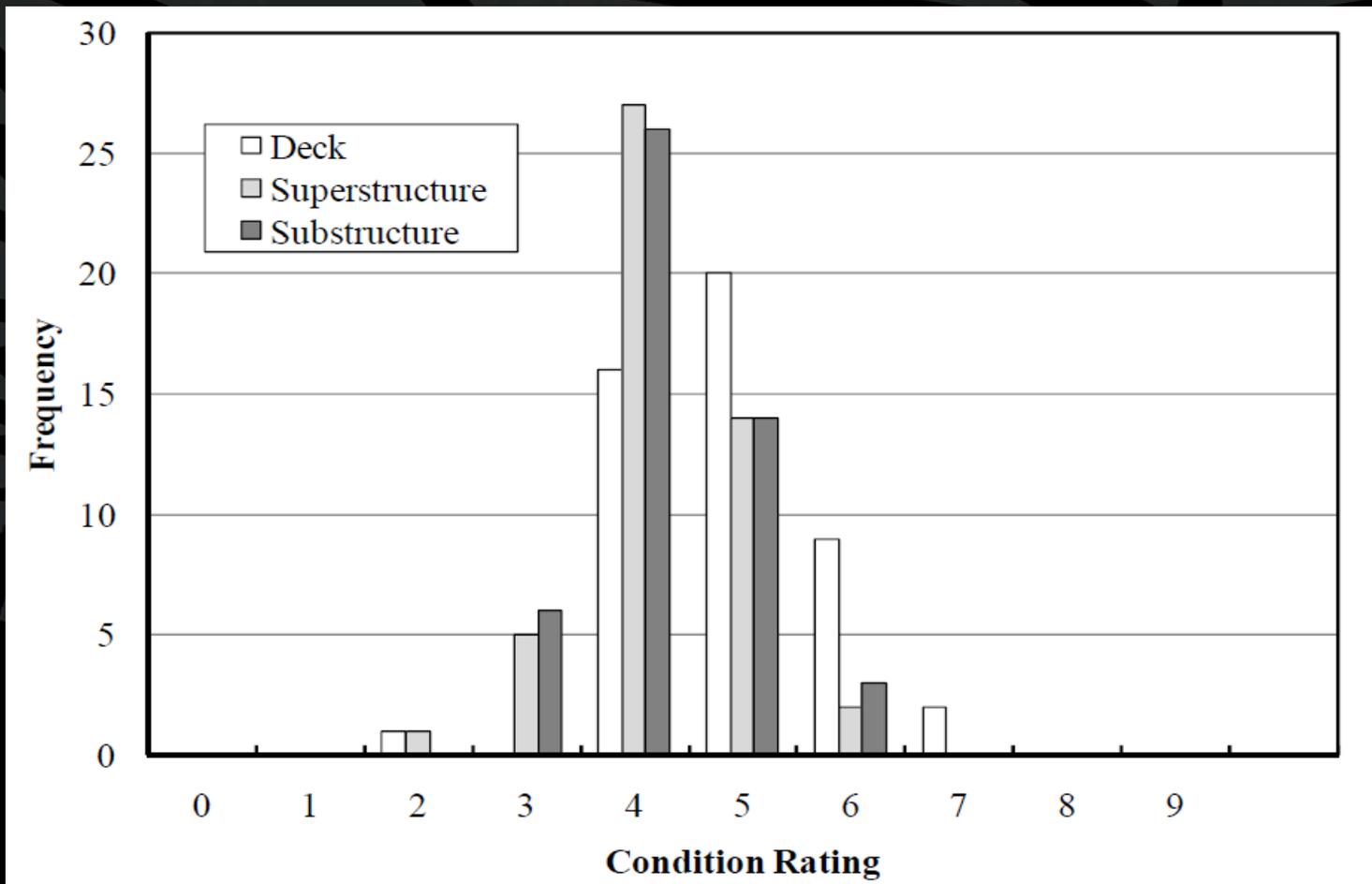
# National Direction

**23 CFR 650.305 , 650.307, & 650.313**

**BIRM – Topic 1.3 (Link to FHWA Bridge Technology Web Page)**

**Guideline for Implementing Quality Control and Quality Assurance for Bridge Inspection (NCHRP 20-07)**

# Visual Inspection Can Be Subjective



# Quality vs Variation

Quality



Variation

NCHRP Project 20-07

# Quality Control (QC)

- ▶ Procedures that are intended to maintain the quality of a bridge inspection and load rating at or above a specified level



# Quality Control Measures (QCM)

- ▶ **Bridge Inspection**
- ▶ **Qualification & Certification**
- ▶ **Bridge Inspection Manuals**
- ▶ **Training/Continuing Education**



# Bridge Inspection

- ▶ Inspectors enter their own data
- ▶ Inspectors inspect same bridges
- ▶ Use “Pick lists” where possible
- ▶ Use QA results to improve QC
  - Share QA “Questions and Answers”
  - Specific feedback to the inspector



# Qualification & Certification

- ▶ **Inspection Personnel Meets CFR's**
- ▶ **Inspectors pass "ODOT Bridge Inspection Proficiency Exam"**

## Acceptable Thresholds:

**NBI Coding associated w/SR =Exact**

**NBI Conditions ratings +/- 1**

**Element list and Quantities = Exact**

**Element Condition State Ratings +/- 1**

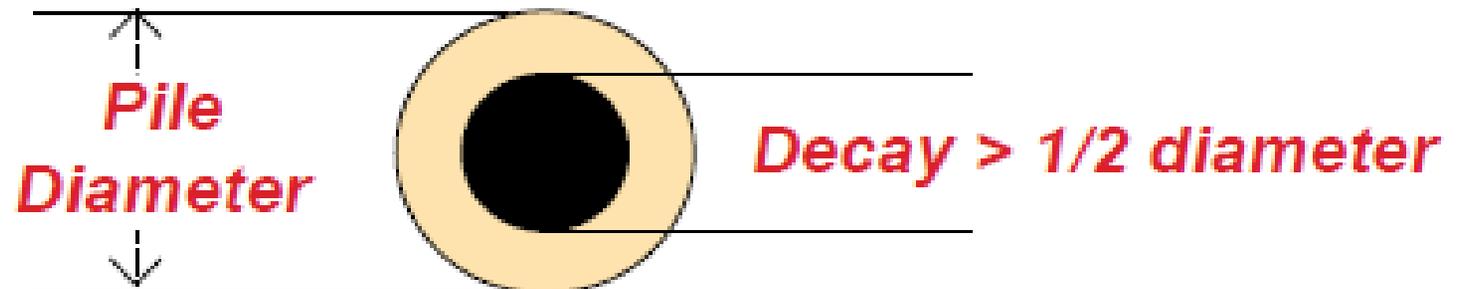
# Bridge Inspection Manuals

- ▶ Integrate specific supplemental guidelines to help clarify subjective terms
- ▶ Inspection manuals are kept current by integrating issues brought up in QA reviews.

# Bridge Inspection Manuals

**NBI Fair (5) – Sound, but may have minor section loss, cracking, spalling, scour**

**Condition State 3** Decay not sufficient to affect bridge  
- Decay is  $> 1/2$  pile diameter and the shell is  $> 2$   
(NBI item 60 condition rating of 5)



# Bridge Inspection Manuals

## NBI Item 59

### Superstructure Condition Assessment

#### Concrete Superstructure Supplemental Rating Guideline

### 3 SERIOUS CONDITION

Severe disintegration of concrete. Large structural cracks may be present. Generally, reinforcing steel exposed with advanced stages of corrosion. Local failures or loss of bond possible.

# Bridge Inspection Manuals



**Note:** *It's up to the above water bridge inspector to assure that the underwater bridge inspection is being performed and to incorporate the results of the underwater inspection into the overall condition assessment of the bridge.*

# Bridge Inspection Manuals



If the structure has a Y-Leg or K-frame Substructure, the Y-Leg SPAN directly above the Y-leg footing will carry that bent / span number, along with an "A" designation. The next ensuing span will carry the bent number along with a "B" designation.

# Training and Continuing Education

- ▶ Annual bridge inspection orientation
- ▶ Pacific NW Bridge Inspection Conf
- ▶ Continuing education requirements
  - QA Reviews, Conferences
  - Fracture Critical Inspection Class
  - Non-Destructive Training Class
  - NHI Underwater Bridge Inspection

# Quality Assurance (QA)

- ▶ The use of sampling and other measures to assure the adequacy of quality control procedures in order to verify or measure the quality level of the entire bridge inspection and load rating program.



# Data Validation

- ▶ **Cursory check of incoming inspection reports**
- ▶ **5% get 18 point review**
- ▶ **FHWA Edit/Update Program**
- ▶ **FHWA Submittal**
  - Past due inspections
  - Critical Follow-up Status Report



# QA Field Review

- ▶ Bridge selection criteria
- ▶ QA team selection criteria
- ▶ QA review preparations
- ▶ Perform the field review
- ▶ Review results



# QA Bridge Selection Criteria

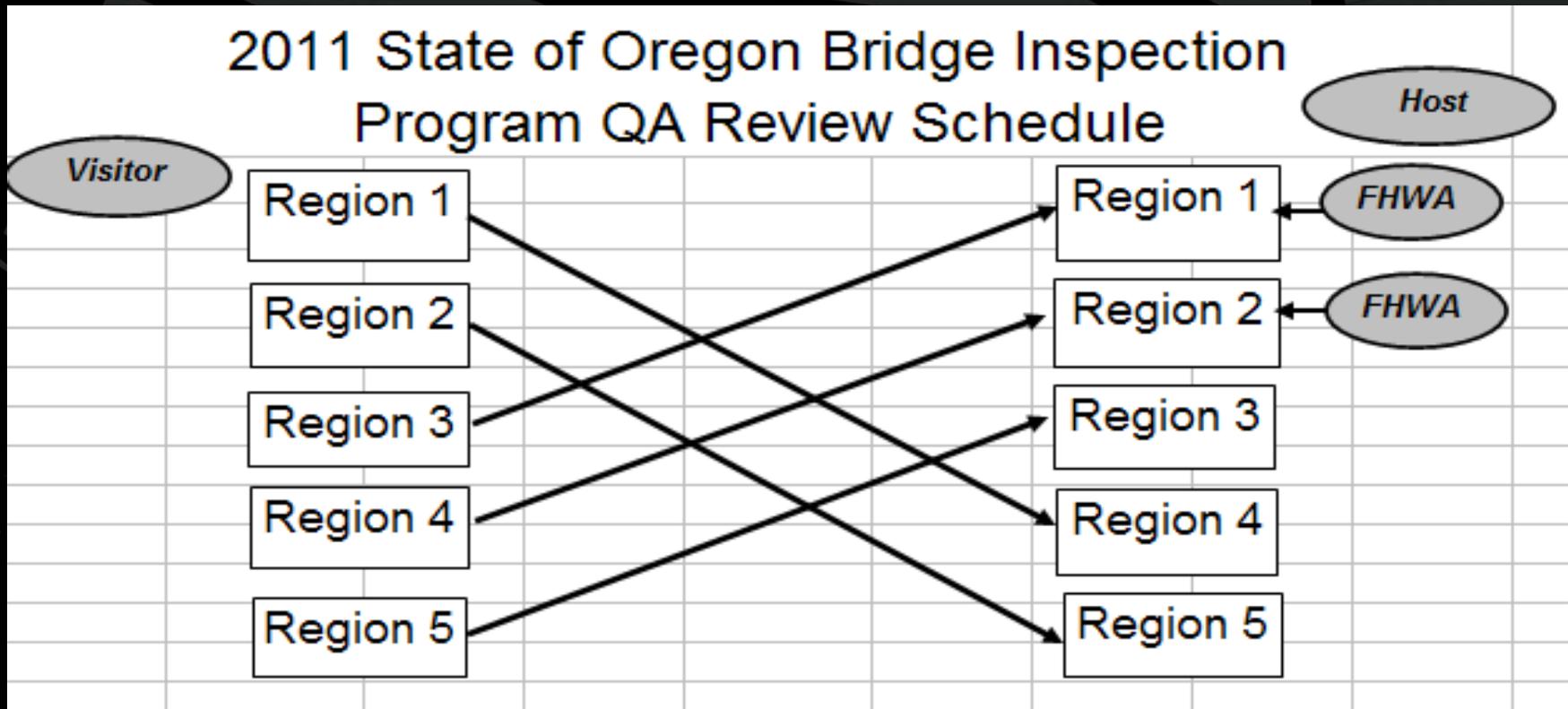
- ▶ **Critical follow-up list**
- ▶ **“Urgent” or “Critical” maintenance**
- ▶ **Load restrictions/load posting**
- ▶ **Temporary repairs**
- ▶ **Considered for rehab/replacement**
- ▶ **New structures**
- ▶ **Complex or unusual details**
- ▶ **5 percent sample size**

# QA Team Selection Criteria

- ▶ Senior bridge inspector – lead
- ▶ Bridge inspector – host
- ▶ Bridge inspector – guest
- ▶ New bridge inspection staff
- ▶ Other staff
- ▶ Bridge owners (Local Agency)



# QA Review Preparations



# Perform QA Field Review

- ▶ Independent inspection
- ▶ Side-by-side comparison
- ▶ Differences highlighted and discussed



# QA Review Form

	Reviewers	Inspector
<b>Deck Condition (58)</b>		
<b>Superstructure Condition (59)</b>		
<b>Substructure Condition (60)</b>		
<b>Channel &amp; Channel Condition (61)</b>		
<b>Culvert Condition (62)</b>		
<b>Temporary Repair (103)</b>		
<b>Wearing Surface Type (108)</b>		
<b>Scour Code (113)</b>		

**12 More NBI Items**  
**List all elements**  
**Maintenance Recommendations**

# Review Results

- ▶ Assess the bridge inspector
- ▶ Amend the report as needed
- ▶ Assess bridge inspection program
- ▶ Assess where additional training or discussion is needed

## Acceptable Thresholds:

NBI Coding associated w/SR = Exact

NBI Conditions ratings +/- 1

Element list and Quantities = Exact

Element Condition State Ratings +/- 1

# Conclusion

- ▶ **Visual Inspection is subjective**
- ▶ **Increase Quality by reducing variability**
  - Bridge Inspection Manual
  - Quality Assurance Reviews
- ▶ **QC and QA requirements are well defined**
- ▶ **There are many different approaches that can be considered**



**Questions?**