Post Installation Inspection - Value Assurance

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Who is this Guy?

31 Years in Construction Materials & Products
- President AZ Precast Concrete Pipe Assoc.
- Registered AZ PE
- 6 years Exec Director AZ Cement Assoc.
- Provided forensics reports on plastic pipe failures
- Const Matls Insp & Test Dept Mgr – Terracon
- 23 year focus on CMP, HDPE, PVC & RCP, working for manufacturers of each
Today’s Discussion Topics

- Overview & Importance of this Topic
- PII - Tools and Techniques
- PII - National Standards & Current Trends
- Practical Considerations for Implementation
- Resources & Additional Training
Why the Growth of PII?

- AASHTO reqmt – recent FHWA memo
- OWNER verification of design compliance
- Contractor/Installer - Improved installation quality
- Producer/Supplier – Proper product handling and installation
- System User – Minimized safety risk
- Tax-Payers - Minimizes lifetime project and unanticipated costs!
PII - Tools and Techniques -

- PII Methods
- Advanced Tools
- Documentation of Conditions
Tools of the Trade

CCTV – Camera
XY Diameter Observations Report
Pipe deflected approximately 14 to 15 percent

Site ID: Oklahoma
City: Oklahoma
Start No: MH 1
Location: Up Stream

Asset No: Wilshire Blvd
Finish No: Creek
Location: Down Stream

Date: 2/11/2013
Material: HDPE
Pipeline Length: 123.4 ft
Internal Diameter (Expected): 35.54 in

Camera tilted at joint causing spike in data.
Pipe round at 103.5 ft.
Pipe deflected approximately 14.6%.

90% - Fractile: (X) 11.7%: (Y) -0.4%. Exceeded limits: 87.6%
XY Diameter Observations Report

Pipe deflected approximately 14 to 15 percent

Site ID
City: Oklahoma
Start No. MH 1
Location: Up Stream

Asset No. Wilshire Blvd
Finish No. Creek
Location: Down Stream

Date: 2/11/2013
Material: HDPE
Pipeline Length: 123.4 ft
Internal Diameter (Expected): 35.54 in

Pipe deflected and changes grade.

Dimple in sidewall at 2 and 7 O’clock.

Severe dimples in sidewalls.

90% Fractile: (X) 11.7% : (Y) -0.4%, Exceeded limits: 87.6%
Tools of the Trade: Deformation/Deflection
Tools of the Trade: Deformation/Deflection
Tools of the Trade: Measurement

Video Micrometer
Post Installation Inspection – National Standards

AASHTO – “LRFD Bridge Construction Specifications”

- CMP – Section 26.5.7
- RCP – Section 27.6.1
- THERMOPLASTICS – Section 30.5.6
Concrete Pipe Culvert - PII Items in AASHTO...

- Misalignment
- Joints
- Cracks
- Spalls
- Slabbing
AASHTO SECTION 27.6.1 - RCP

Cracks
AASHTO SECTION 27.6.1- RCP

Highlights:

• No inspection until 30 days after all backfill placed/completed

• General acceptability of cracks up to 0.10” in non-corrosive environment (soil/water Ph > 5.5)

• Crack pattern, location, size (length & width), all important considerations in determining any required remediation
radial tension failure – “slabbing” – typically caused by point loading
AASHTO - Thermoplastic Pipes / Culverts (PP, PE, PVC)

- Misalignment
- Joints
- Cracks
- Buckling, Bulging, Racking
- Deflection
Wall Crushing/Cracks

Wall Bulging

Deflection/deformation

Wall Crushing/Cracks
DEFLECTION – AASHTO SECTION 30.5.6
Thermoplastic PIPE
DEFLECTION – AASHTO SECTION 26.5.7 - CMP
AASHTO Summary

• Some Inspection Items Same for all pipe
  ▪ PII after Fill & 30 Days
  ▪ PII includes misalignment, cracks, joints

• PII Issue Differences:
  ▪ Thermoplastic Pipe: + buckling, bulging, racking, deformation
  ▪ CMP: + deformation
AASHTO Requires Measurement

Conditions Requiring Measurement

- Crack Width and Location
- Joint Gap
- Deflection/Deformation
Practical Considerations for PII Spec Development

- Specification clarity
- Evaluation criteria
- Inspection & evaluation team preparation
- Installer education
- Communication of processes to all stakeholders
PII Specifications and Evaluation Guidelines

- Techniques, Tools, Certifications
- Evaluation Guidelines
# Tools for Non-Human Entry

## Post Installation Inspections

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Inspection Team Preparation
PACP - Pipeline Assessment and Certification Program

• Standard reporting (CODES)
  ▪ Structural Defects/Condition
  ▪ Operation & Maintenance Conditions
  ▪ Construction Features
  ▪ Misc. Features
  ▪ Condition Rating of Pipeline

• 10,000 Certified

• Municipalities require it

• Data Collection/Reporting Software

• [http://www.nassco.org/training_edu/pdfs/pacp-macp_overview.pdf](http://www.nassco.org/training_edu/pdfs/pacp-macp_overview.pdf)
PACP Reports vs. AASHTO PII Acceptance Criteria

- Visual Vs Measurement
- Cracks
- Storm vs Sanitary Issues
- Resolving Differences

www.concretepipe.org
Installation Training

• Handling & Installation Techniques
  ▪ 99% of issues
May be source of leakage
Stable Foundation - Critical
Bedding Inspection

Do (support on barrels)

Don’t (support on bells)

Don’t (nonuniform support)
Line & Grade

Incorrect

Do
remove pipe section

Don’t
adjust pipe alignment or grade with pipe in the home position.
CONSTRUCTION LOADS!
Evaluation Team

• Thorough training

• Differentiate
  ▪ Cosmetic = Non-ISSUES
  ▪ Minor Damage = Note but No Repair
  ▪ Structural Issue = Evaluate Severity and remedy required
ACPA– Implementation Resources

- PII ePipe - Overview & Summary of State Specifications
- PII Model Specifications
- PII Pipe Evaluation and Repair Guidelines
Over the past decade, the deteriorating state of our nation’s infrastructure has gained increased attention. Great emphasis has been placed on the aging bridges of our nation’s roadways due to several high profile catastrophic failures. Sadly, it took the death of several motorists to spur a public outcry to address the current state of despair of one our nation’s most important infrastructure components.

Our roadway pipe systems demand this very same attention, since they are the “unseen” bridges of our nation’s ground transportation systems. While we must address the existing aging system, to maximize the life of future installations we must act now to ensure quality installations are occurring.

It is apparent that we must fully address the importance of:

- Proper **INSPECTION** of all installations,
- Adequate design life,
- Conservative design approaches,
- Complete and stringent reviews of all critical construction components,
- Strong quality assurance programs throughout the construction process, and
- Diligent and proper maintenance of all the components of our roadway infrastructure.
Post Installation Inspection Resources

Guidelines for PII (model specs)

- “Post Installation Inspection Basics”
- “Post Installation Inspection Methods, Tools, and Reports”
Evaluation and Repair Tools

• “Post Installation Evaluation and Repair Guidelines of Installed RCP”

• “Evaluation & Repair Guidelines for New Drainage Pipe”

• “Sample Specifications for Evaluation of Newly Installed Culvert and Storm Drain Pipe”
Post Installation Inspection Demo. & Plant Tour’s are Available
More Detailed Evaluation
Training Available....
Think of any Questions or Concerns?