

# Trust but Verify

## “Post Installation Inspection (PII) of Storm Pipe”



# Today's Discussion Topics;

- Basic Overview of Tools and Techniques
- National Trends
- WIN-WIN Aspects of PII
- Important Lessons Learned
- Implementation Resources



# Post Installation Inspection

- **Acid Test for Installation**
  - Larger Diameters - Visual Inspection
  - Small Diameters – CCTV
- **Document Issues**
  - Location
  - Defect
  - Severity
  - Documentation, Measurements - Sketches – Photos
- **Advanced Tools**
  - CCTV
  - Laser Profiler
  - Laser Crack Measurement



# Tools of the TRADE

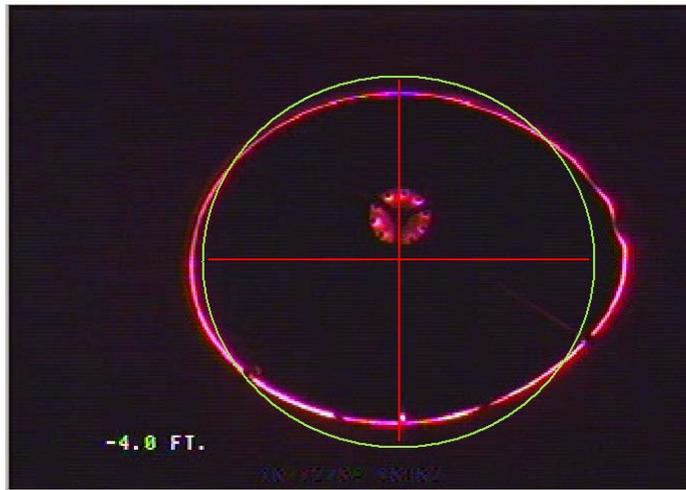


**Camera (Video)**

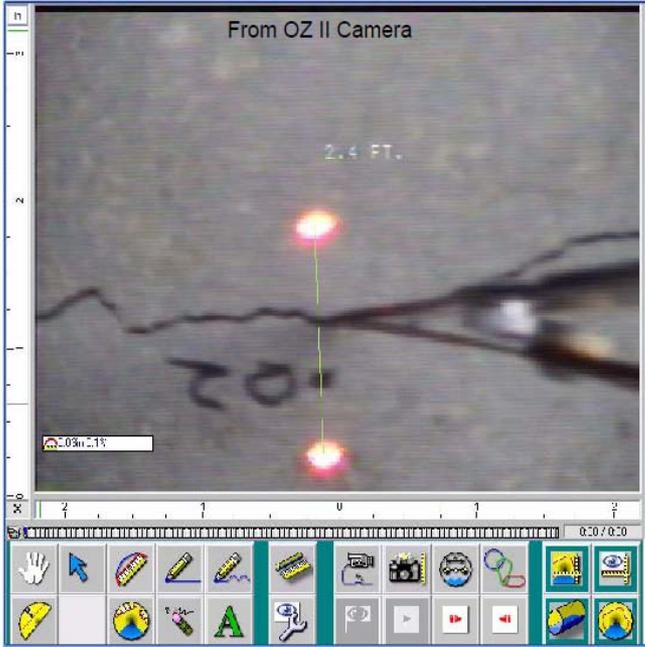
# Tools Cont...



## LASERS....



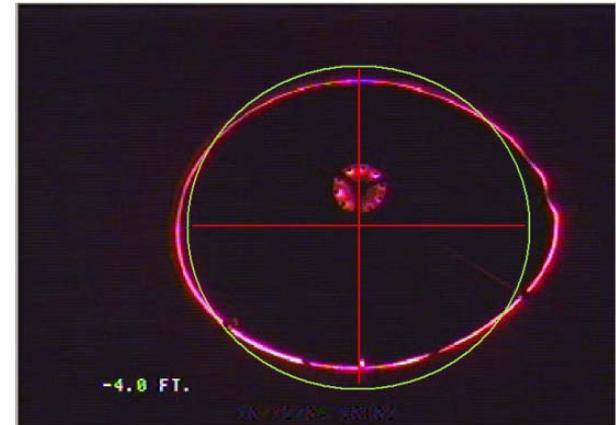
# Tools Cont...



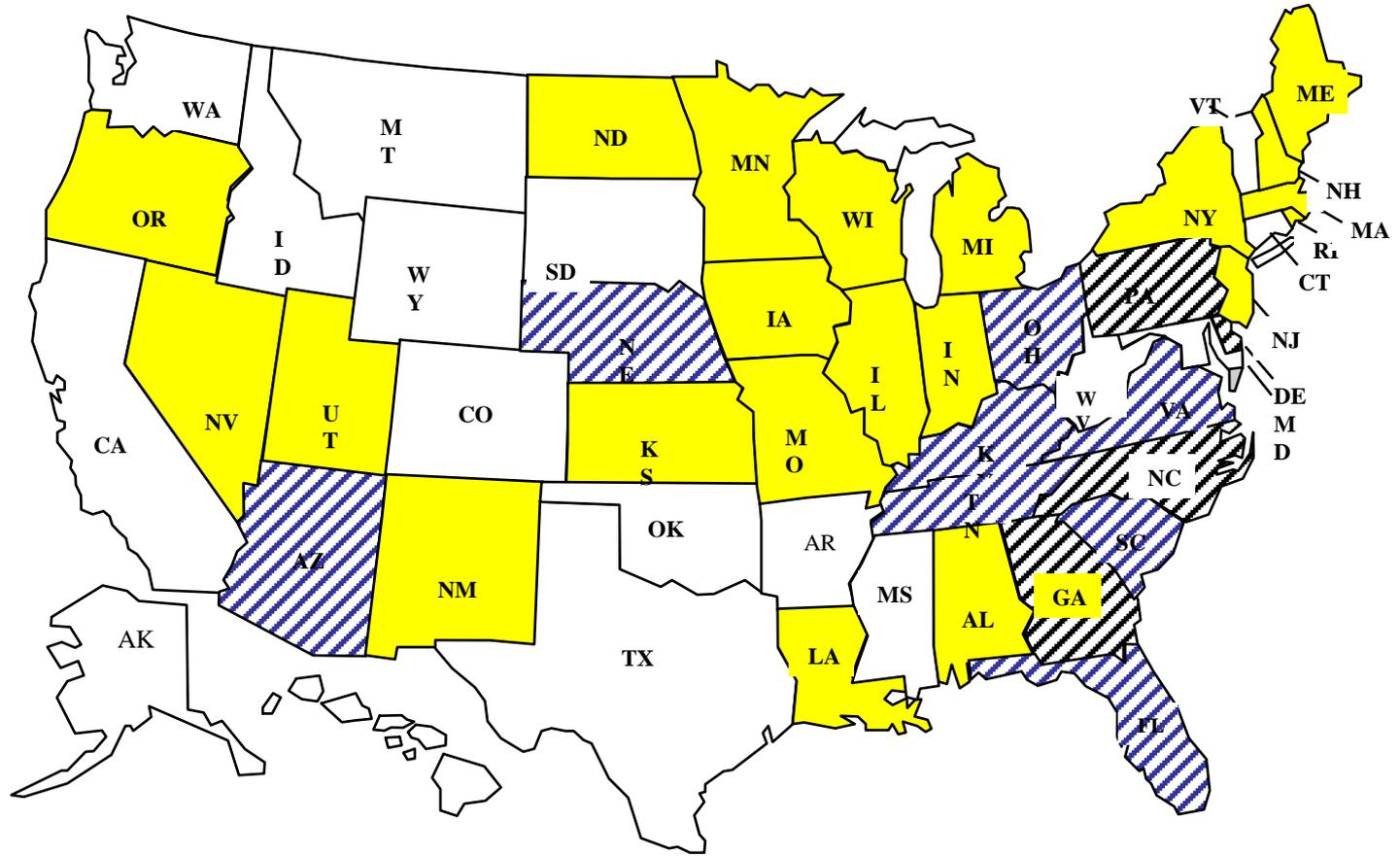
Video Micrometer for measuring other Defects...NEWEST TOOL

# Where we Stand Today

- 2 of 3 of State DOT's Require PII
- 1 of 4 allow or require Advanced Inspection Tools



# PII is Sweeping Across the Country!



**Read More About it – ACPA ePipe - PII**



# WIN-WIN-WIN for Stakeholders

- **OWNER** assumes a **Trust but Verify** Position
- **Provides QA of Completed Installation**
  - **Insures Owner getting what they Pay For**
- Provides Confirmation of **Structural Integrity and Hydraulic Capacity**
- Has Greatly **Reduced Risk for unanticipated Maintenance or Replacement**
- Improved Quality of installations
- **Reduces Lifetime Project Cost!**



# Lessons Learned!

- **Must Prepare DOT/Muni. Inspection & Evaluation Team**
  - **Obtain Clear and good Inspection Data**
  - Develop Standard PII Report Format
  - Develop Clear Evaluation Protocol
- Educate Installers
- Communicate PII Eval. Process to all Stakeholders

# Inspection Team Preparation

- Trained on Proper Use of Inspection Equipment
- Proper Inspection Techniques & Issue Coding  
NASSCO PACP Certification
- Know Limitations
- Provide thorough, clear, quantifiable information**
- Report Format as outlined by owner.**

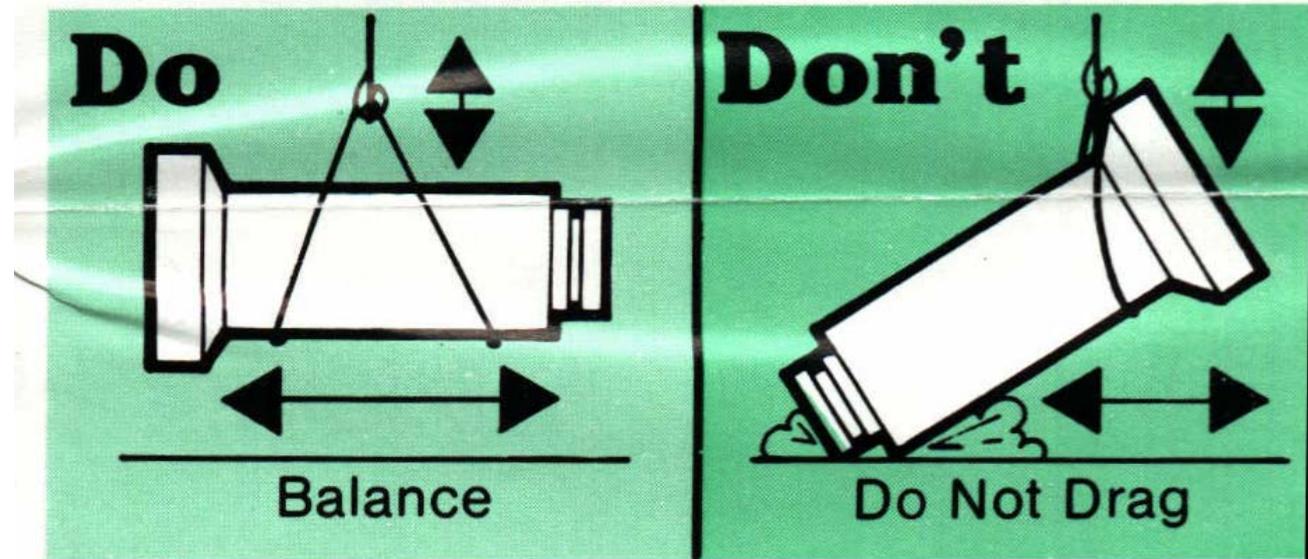


## Inform & Train Installers

- Proper Handling & Installation Techniques are Critical!
- 99% of issues Identified in PII Reports are from damage inflicted during Handling/storage or Installation of pipe!



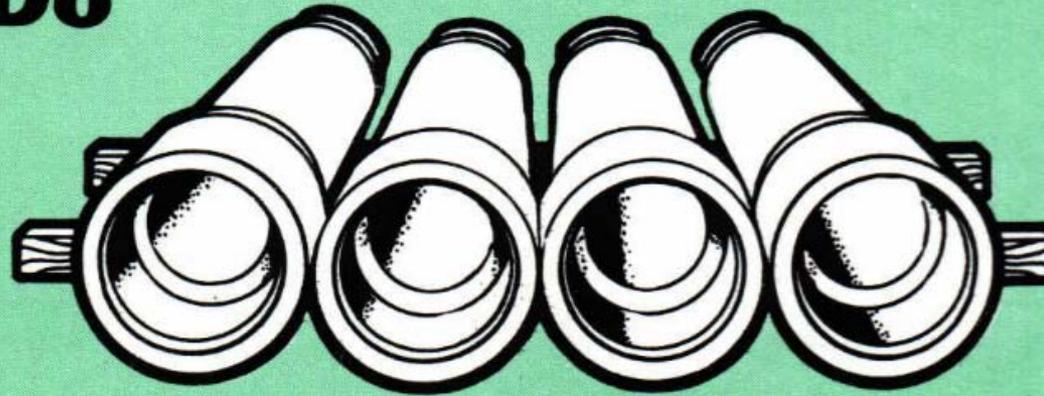
# Handling



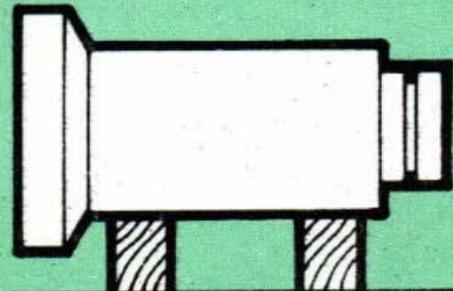
# Stockpiling / Storage



**Do**

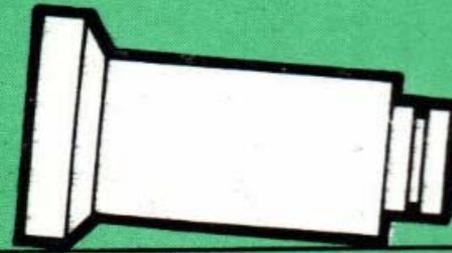


**Do**



Support on Barrel

**Don't**



Support on Bell



# Driving It Like He Stole It!



**Or Speed Kills!!!**



# Just Get it Off the Truck!



# Chip to You, Hole in Pipe In Inspection Notes, Leaking Joint Later!

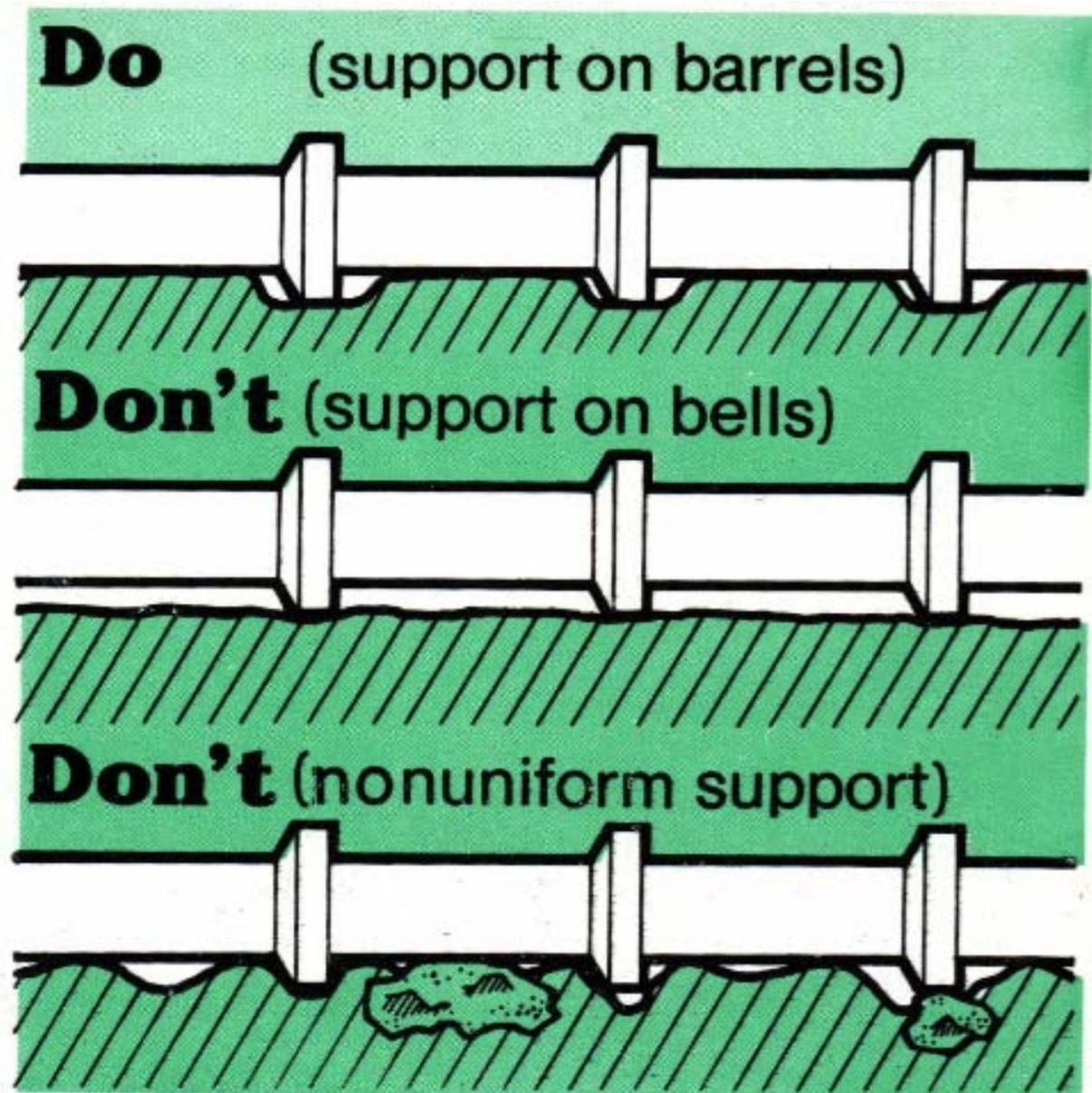


## REPAIR IT!!!

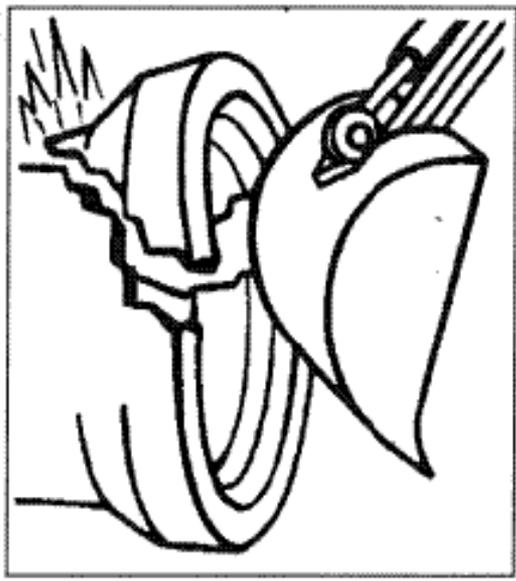
# Stable Foundation - Critical



# Bedding Inspection



# Line & Grade



Incorrect

**Do**  
remove pipe section →

**Don't**  
adjust pipe alignment or  
grade with pipe in the  
home position.



# Evaluation Team

- DOT/Muni Specs. & AASHTO Guidelines
- Differentiate Between
  - Cosmetic = Non-ISSUES
  - Minor Damage = Note but No Repair
  - Structural Issue = Evaluate Severity and determine if acceptable or what remedy required

# PII Specs go Hand in Hand with Pipe Evaluation Guidelines

- Experience/Lessons Learned
  - PII Drives Need for Eval. Guidelines
  - No Guideline = Fire Drills and Lots of Emergency (Intense) Training
  - **Set and Agree on Expectations before Video Cameras Roll!**

# Lessons Learned REVIEW!

- **Must Prepare DOT/Muni. Inspection & Evaluation Team**
  - **Obtain Clear and good Inspection Data**
  - Develop Standard PII Report Format
  - Develop Clear Evaluation Protocol
- Educate Installers
- Communicate PII Eval. Process to all Stakeholders

# ACPA Post Installation Inspection – Implementation RESOURCES

- ACPA - PII ePipe - Overview of PII + Summary of State Standards/Specifications
- PII Model Specifications
- PII Pipe Evaluation and Repair Guidelines

# PII Inspection Tool #1

## **ePipe** Video and Laser Measurement Tools New Storm Pipe Installation Quality Assurance at Its Best



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An educational document from the American Concrete Pipe Association for users and specifiers

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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 of 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.

# ePipe – “Video and Laser Measurement Tools”

- Home Page [www.concrete-pipe.org](http://www.concrete-pipe.org) – ePipe’s
- Content
  - Overview & Benefits
  - ASTM/AASHTO Stds.
  - DOT Acceptance
- Format = Print Brochure (Available Now) or **Fully Electronic Version** (90% Complete)

# Post Installation Inspection Resources

- Guidelines for PII (Model Specs)
  - “Post Installation Inspection Basics”
  - “Post Installation Inspection Methods, Tools, and Reports”
- [www.concrete-pipe.org](http://www.concrete-pipe.org) – Home Page  
– What’s New, Guidelines for PII

# Evaluation and Repair Tools

- “Post Installation Evaluation and Repair Guidelines of Installed RCP”
  - [www.concrete-pipe.org](http://www.concrete-pipe.org) – home page – What’s New – “Post Installation Evaluation and Repair of Installed RCP”
- “Evaluation & Repair Guidelines for New Drainage Pipe”
- “Sample Specifications for Evaluation of Newly Installed Culvert and Storm Drain Pipe”

# Evaluation Tool #1

**Post Installation  
Evaluation and Repair  
of Installed Reinforced Concrete Pipe**

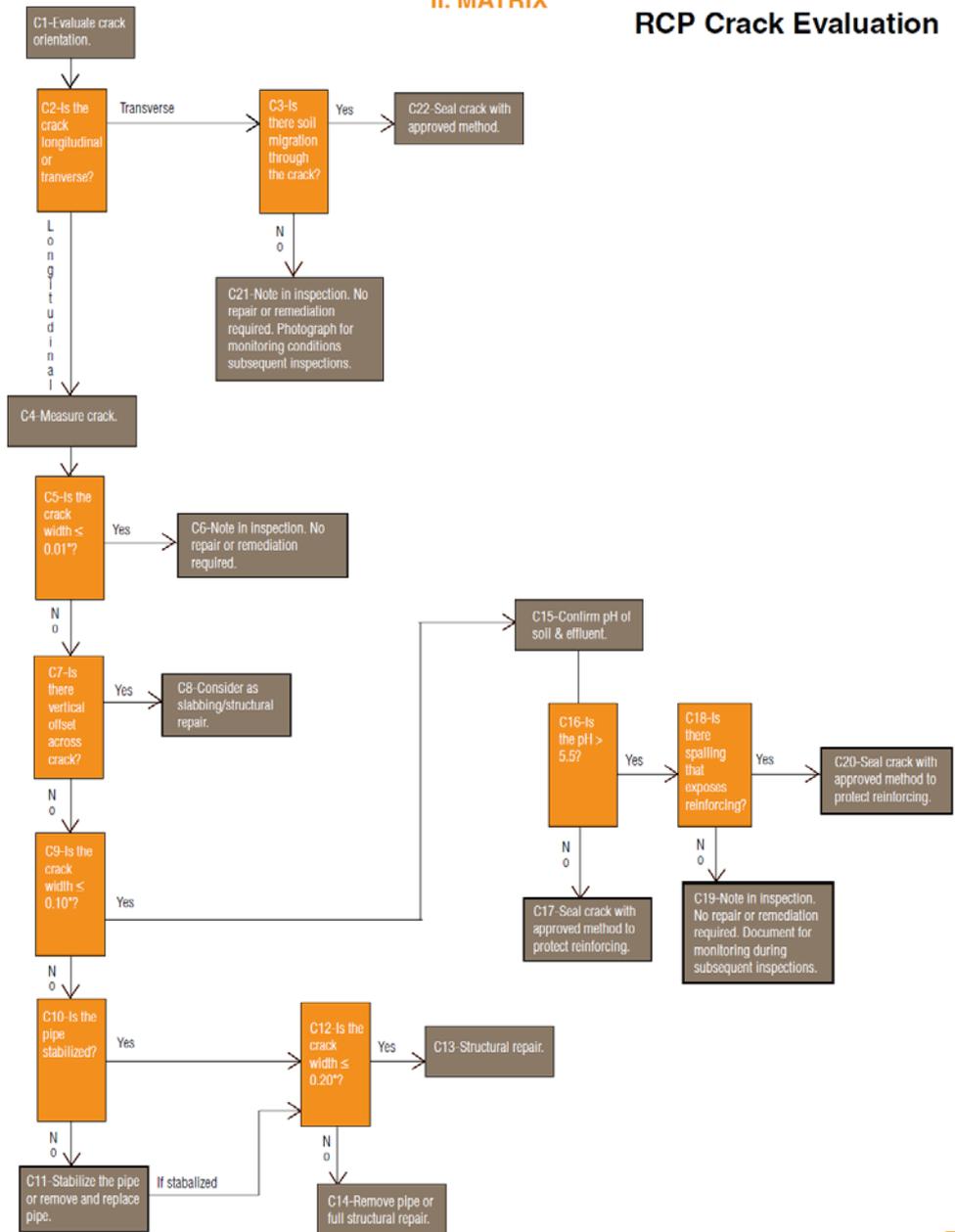
  
American  
Concrete Pipe  
Association  
info@concrete-pipe.org  
www.concrete-pipe.org

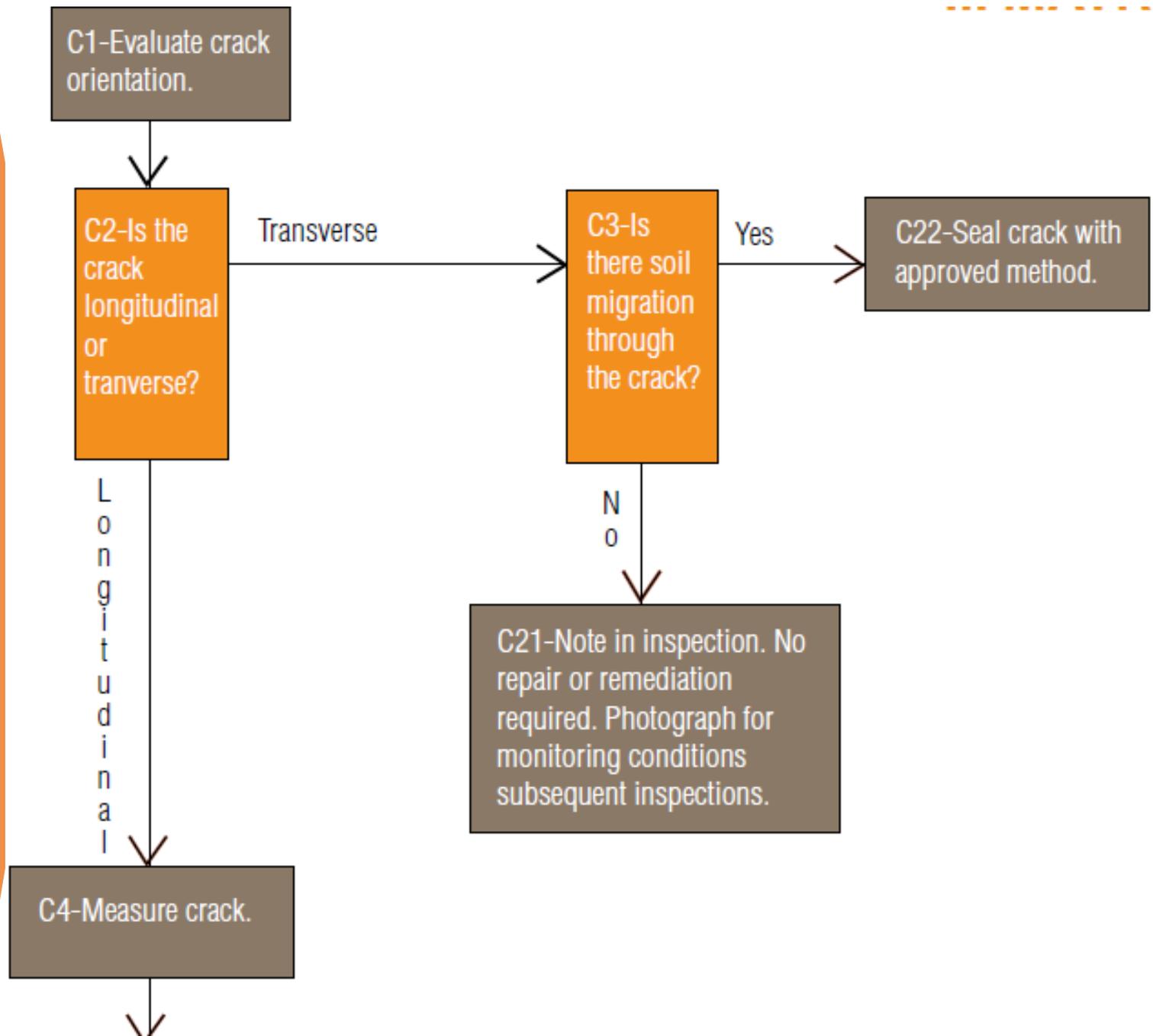
# Evaluation and Repair Manual Details...

- Post Installation Evaluation and Repair of Installed RCP
  - Background
  - Contents
  - Target Audience
  - Opportunities to Learn More

# CONTENTS Of Manual

- **Background on RCP Loads, Design, Structural Confirmation, & Joint Performance**
- **Decision Matrix**
  - Crack Eval. & Repair
  - Joint Eval. & Repair
  - Spalling and Slabbing Eval. & Repair
- **Commentary for all Matrix ?'s & action suggestions**
- **References & Supporting Documents**





### III. CRACK EVALUATION AND REPAIR

#### C1 (CRACK INSPECTION), C2 (LONGITUDINAL /TRANSVERSE CRACKS)

It is important to understand that the orientation of a crack in the pipe wall will assist in determining the severity and possible cause of the crack. There are excellent references to better understand crack orientation, crack severity, and possible causes of issues that may be found in pipe inspections. The **AASHTO LRFD Bridge Construction Specification Section 27.6.4 & 5** contains several brief explanations in the commentary portions of that document about the cause of various crack location or crack patterns. The following is an excerpt from FHWA Culvert Inspection Manual<sup>(7)</sup> that discusses possible causes of certain crack locations and or patterns one might find in installed RCP:

## Eval. Tool #2

“Evaluation & Repair Guidelines for New Drainage Pipe” (Short Simple...)

## Eval. Tool #3 -

“Sample Specifications for Evaluation of Newly Installed Culvert and Storm Drain Pipe” (More Detailed Approach)

- **Located on Home Page of ACPA Website**
  - **What’s New – Guidelines for PII**

# WANT MORE DETAILS MORE DEPTH

## Post Installation Inspection & RCP Evaluation Tools DEMO & Plant Tour



# Goal

- Introduce Attendees to PII Tools and Procedures, RCP Strength & Quality
- Provide Knowledge and Tools to obtain Correct Evaluation of Installed RCP
- See RCP Pipe Production and Structural Testing Procedures



# I Am All Ears....for your ?'s

