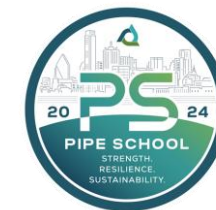


Pre & Post Pour Inspection



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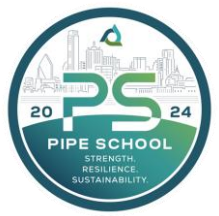
Overview

- Documentation
- Pre-Pour Inspection
 - Equipment
 - Reinforcement
- Post-Pour Inspection
 - Stripping & Handling
 - Visual & Dimensional





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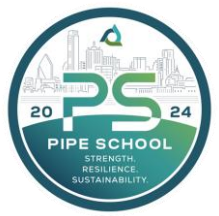
Why Document?

- Not just for future generations
- Documentation is a legal record
- Quality Control means nothing without it
- Allows others to:
 - Duplicate our successes
 - Analyze our failures
 - Prove our compliance
- Benefits our company & industry





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Sample Documentation Forms

Q-Cast Appendix A

- Joint forming equipment
- Pipe, manhole and pre-cast reinforcing
- Pipe, manhole and pre-cast post-pour
- Box culvert equipment set-up
- Box culvert reinforcing
- Box culvert post-pour





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DOCUMENTATION

Section IV PLANT CERTIFICATION

JOINT SHEAR TEST CALCULATIONS

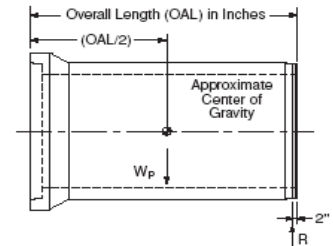
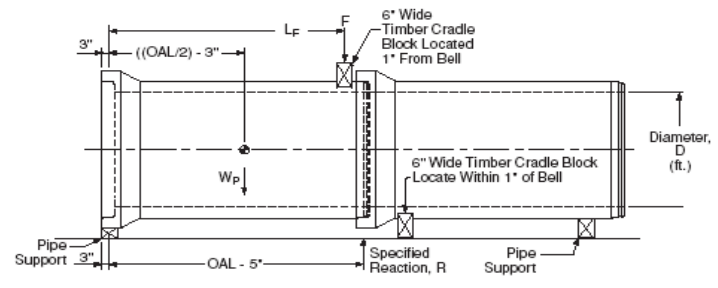


Fig. 4 Simplified Center of Gravity of Pipe



$R = \text{Test Requirement}$
 $W_p = \text{Nominal Weight of Test Pipe}$
 $F = \text{Additional Test Force}$

$$R = 4000 \text{ lbs.} \times \text{Internal Diameter in Feet}$$

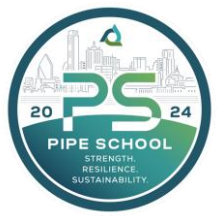
$$F = \frac{[(OAL) - 5"]R - [(OAL/2) - 3"]W_p}{L_f} \text{ (lbs.)}$$

Fig. 5 Joint Shear Test





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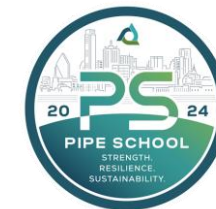
Pre-pour Inspection

- Measure incoming equipment
 - Form equipment
 - Joint forming equipment
- Proper storage/maintenance
 - Store headers/pallets flat
 - Cover/coat during storage
 - Prime/re-paint
 - Clean after each use



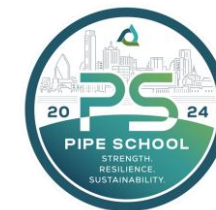


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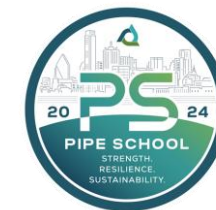


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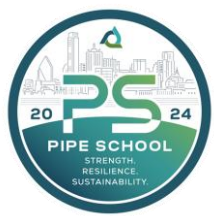


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Pre-pour Inspection

Inspect equipment prior to each use for:

- Cleanliness
 - Excess build-up, rust, other impurities
- Condition
 - Chips, cracks, damage
- Dimensions
 - Roundness
- Vibrator mounts, Seams, Gates, Lifting lugs, Latching devices, Bolts and welds



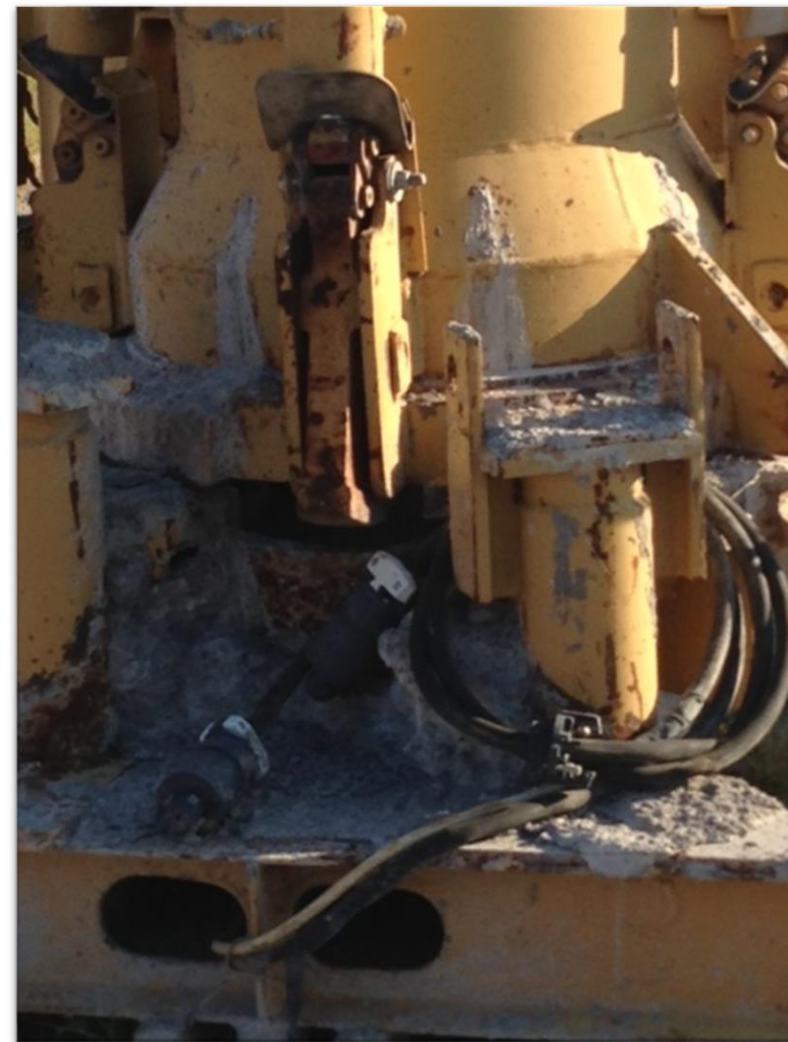


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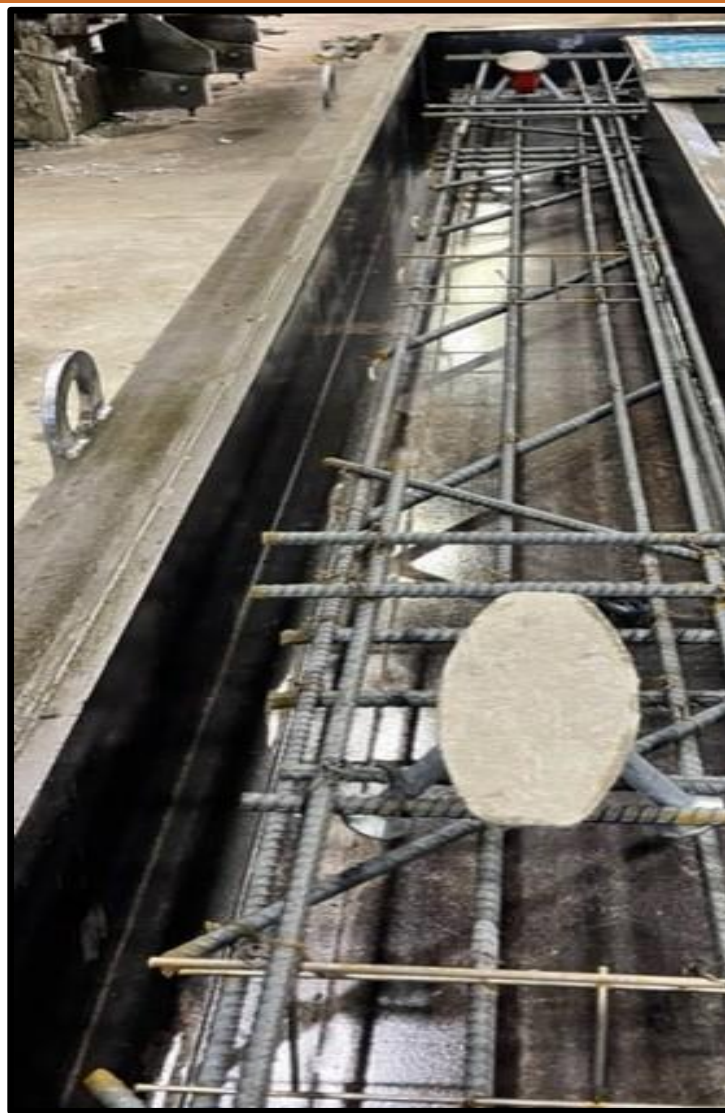
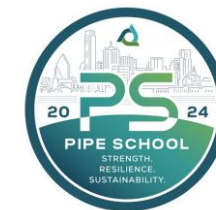


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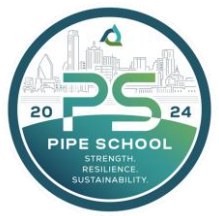


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Pre-pour Inspection

Additional inspection for box culvert equipment

- Thickness of top, bottom and side walls
- Core rise & span
- Both core diagonal measurements
- Document measurements





Pre-pour Inspection

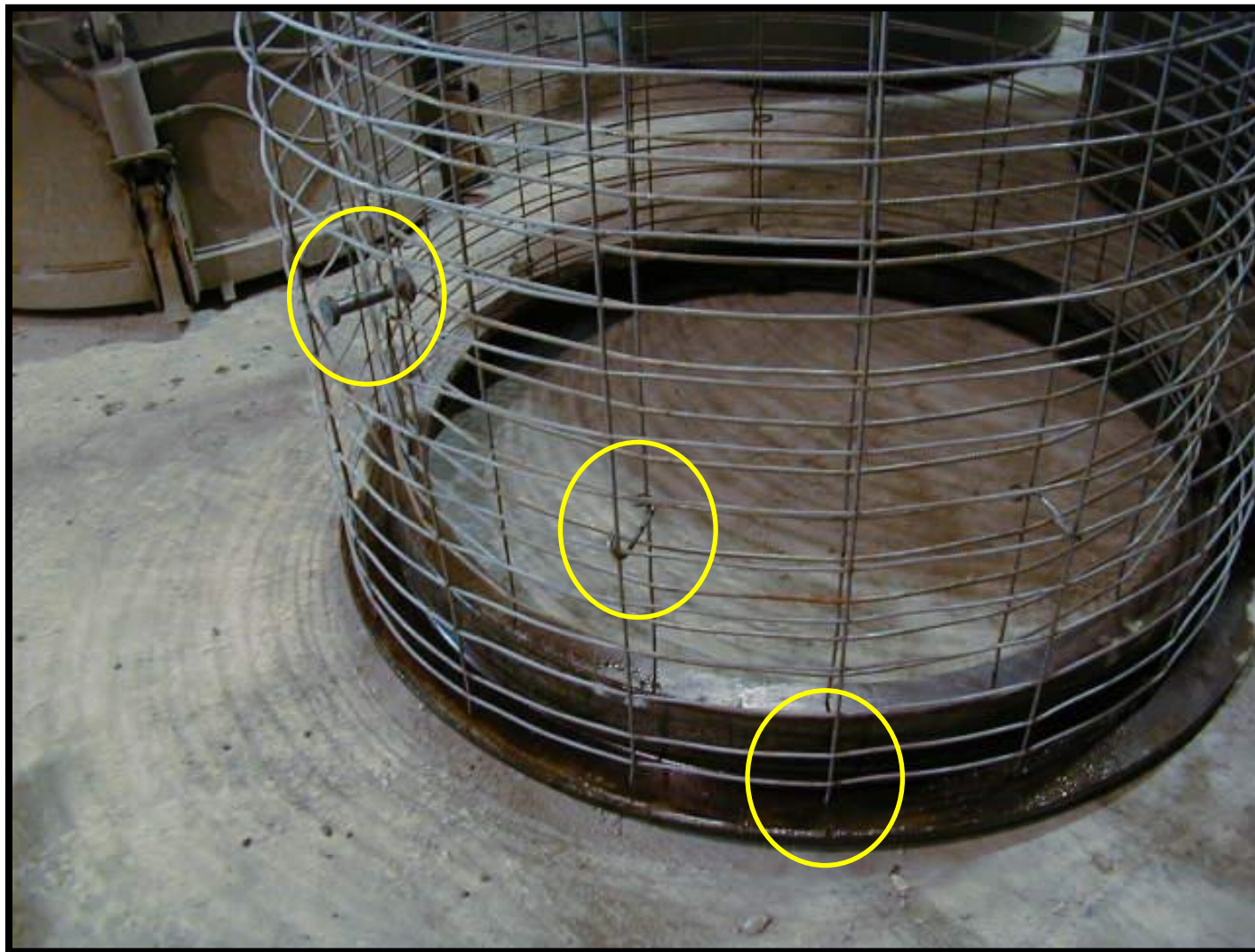
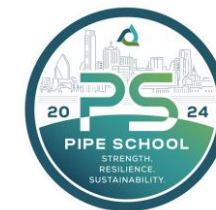
Inspect Reinforcement for:

- Style, steel area, dimensions
- Cage diameter, length, location
- Lap, welds/ties
- Bell reinforcing
- Spacers
- Shear steel
- Document one cage at the start of production and after each shift change



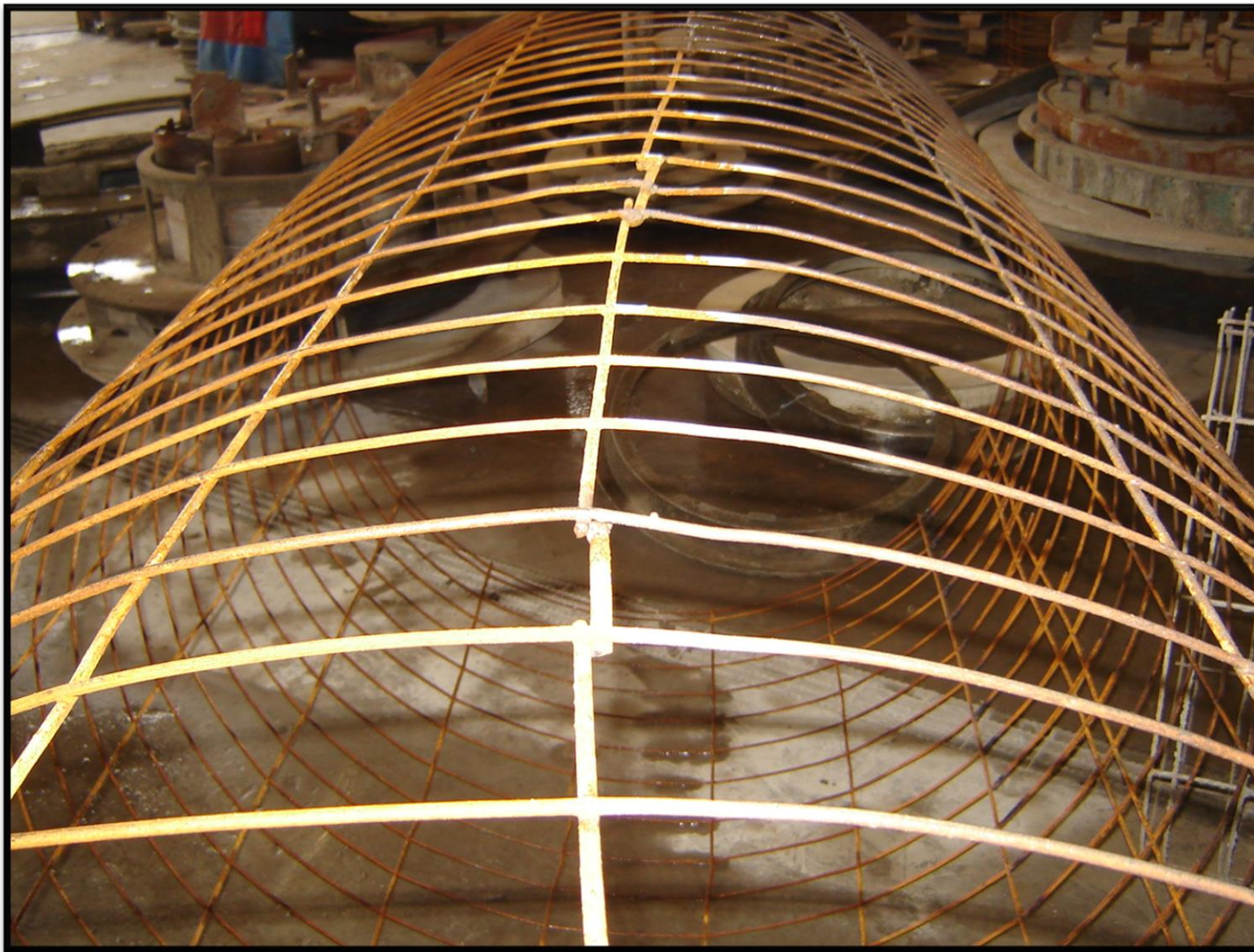
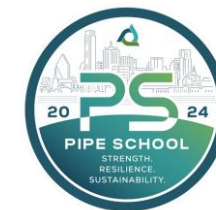


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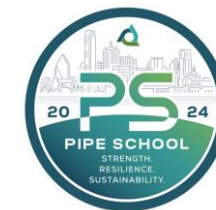


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Pre-pour Inspection

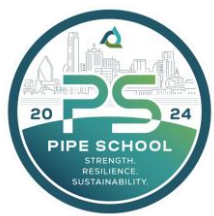
Additional inspection for each box culvert produced

- Cage orientation
- Form release (correct, good coverage)
- Embedded items
- Cleanliness
- Reinforcing cover, spacers, chairs
- Document inspection





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Pre-pour Inspection

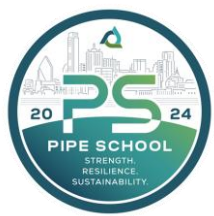
Additional inspection for Manhole and Pre-cast structures

- Location of embedded items
- Location of blockouts
- Document by initialing the shop drawing





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Pre-pour Inspection

Blockouts

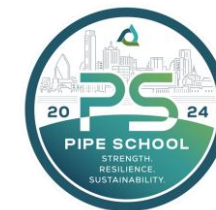
Must be properly designed and secured to the cage

- Withstand placement stresses
- Achieve design location of the hole
- Achieve adequate concrete cover for all reinforcement





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Pre-pour Inspection

Form Release

Purpose is to

- Prevent hardened concrete from adhering to the form
- Provide form protection
- Improve product appearance





Categories of Release Agents

- Barrier (non-reactive)
- Chemically Active
- Combination of above





Barrier (non-reactive)

- Examples
 - Petroleum-based diesel, heating oils
- Advantages
 - Creates a physical barrier between form and fresh concrete
- Disadvantages
 - Need heavy application for easy release (200-400 ft²/gal)
 - Can cause staining and bugholes
 - *May not meet VOC requirements*
 - *Can cause buildup on forms*





Chemically Reactive

- Examples
 - Fatty acids (vegetable and mineral oils) are chemically reactive agents that combine with calcium in fresh cement paste to produce a soap-like film between the concrete and the form
- Advantages
 - Prevents bonding of concrete to form
 - Ultra-thin Layer ($\approx 0.005''$)
 - Reduce bugholes, stains, dusting
 - *Typically meets VOC requirements (verify)*
- Disadvantages
 - Typically more costly per gallon





Seasoning

1. Remove protective coating to prevent staining, sticking, poor finish
 - Wear off during production
 - Solvents
 - Grind
 - Blast
2. Apply high fatty acid concentrate release agent; Let it react (forms metallic soap barrier). If using a barrier agent, use it for seasoning.
3. Ideally allow 24-hr sit-time
4. Apply release agent
5. Put into use





Pre-pour Inspection

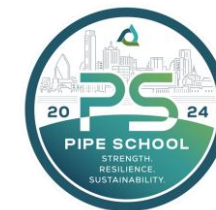
Form Release

- Application methods
 - Brush, spray
- How much is enough??
 - Too Little
 - Concrete sticks, patching/repairs, form damage
 - Too Much
 - Affects concrete finish, may affect curing





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Post-pour Inspection

- Stripping & Handling
 - Minimum strength
 - Form disassembly
 - Proper rigging
- Product identification and documentation





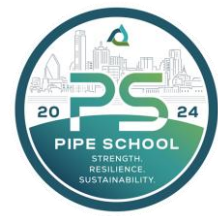
Post-pour Inspection

Pipe, manhole and pre-cast inspection

- Cracks
- Slumping, segregation
- Voids, bleeding, excessive bugholes
- Exposed steel
- Cage twist
- Joint smoothness
- Ruffing, Slabbing, flashing
- Size & location of embedded items, blockouts



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- Cracks





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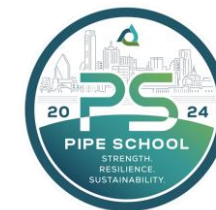


- Slumping, slabbing, segregation



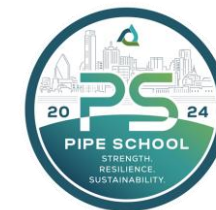


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- Voids, bleeding, excessive bugholes





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- Exposed steel

11.2. Pipe Barrel Visual Inspection

Criteria for inspection shall include, at a minimum, inspection for barrel cracks, slumping, voids, bleeding, **exposed steel**, cage twist, segregation, swedging, slabbing, and flashing. Refer to local specifications.

11.2. Manhole Visual Inspection

Criteria for inspection shall include, at a minimum, inspection for barrel cracks, slumping, voids, bleeding, **exposed steel**, cage twist, segregation, swedging, slabbing, and flashing. Refer to local specifications.





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- Joint smoothness





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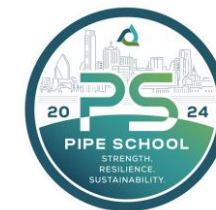


- Flashing





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- Size & location of embedded items, blockouts





Post-pour Inspection

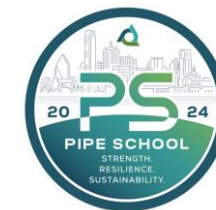
Box culvert inspection:

- Appearance
- Cracks
- Voids/bleeding
- Flashing
- Slumping
- Exposed steel
- Bug holes





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Post-pour Inspection

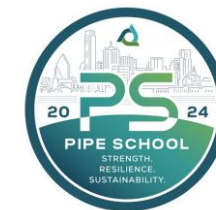
Pipe and manhole joint inspection

- Before patching - inspect for cracks, smoothness of bell and spigot, snap ring positioning
- After patching - inspect patching technique and quality, smoothness of bell and spigot, uniform snap ring width and depth, no concrete ridges in the recess
- Go/no-go or similar required for sanitary





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Post-pour Inspection

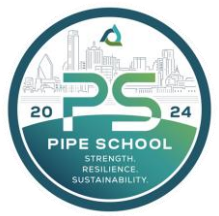
Pipe and manhole dimensional check

- One for each size per shift
- Measure and record pipe and manhole length, diameter, wall thickness
- Calculate and record minimum difference in length of two opposite sides
- Maintain dimensional reports for each pipe section on which a 3-edge-bearing test has been performed





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Post-pour Inspection

- Record for 20% of all boxes produced each day, for each form used that day
 - minimum of one per form per day
- Dimensional record for:
 - Thickness of top and bottom slab
 - Thickness of both side walls on both ends
 - Inside rise on both ends
 - Inside span on both ends
 - Inside length: top, bottom, both side walls





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QUESTIONS?

