

Illinois Department of Transportation

Photographs:
Acceptable, Unacceptable, and Unacceptably Repaired Precast Concrete
Products

A Visual Aid For:
Central Bureau of Materials' s (CBM) Policy Memorandum, "Quality
Control/Quality Assurance Program for Precast Concrete Products"

Revision History and Document Control

Photographs: Acceptable, Unacceptable, and Unacceptably Repaired Products will be reviewed by the Concrete Products Engineer annually and updated as necessary to reflect current policy. Updates are made to the electronic file as needed and hard copies are uncontrolled. Archive versions are available to examine in the Central Bureau of Materials (CBM).

Revision Date	Description	Approval
1/1/10	Revised annotations to existing photos.	JAB
1/1/10	Added approximately 30 new photos with annotations.	JAB
3/15/13	Added 2 new photos with annotations.	JAB
3/15/13	Revised annotations to existing photos.	JAB
3/7/14	Revised annotations to existing photos.	JAB
5/14/19	Added new photo with annotations and revised annotations to existing photos. Changed "BMPR" to "CBM".	JAB



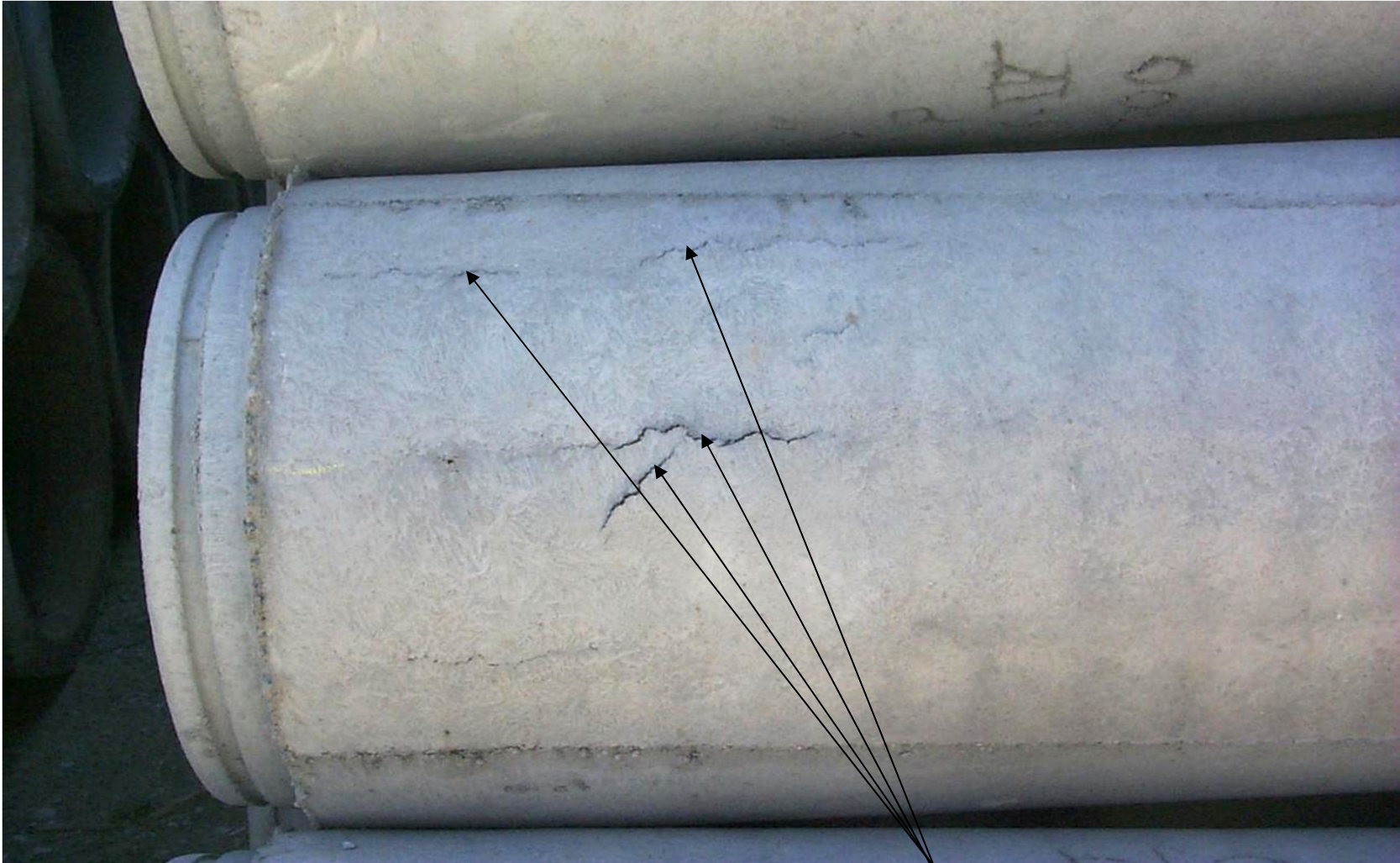
REINFORCED CONCRETE PIPE - CRACKS

Unacceptable Product: Cracks passes entirely through wall of pipe. See CBM Policy Memo, Section 25, Point 2.a.



REINFORCED CONCRETE PIPE – CRACKS

Unacceptable Product: Width of surface crack in pipe is 0.01 in. (0.30 mm) or greater and exceeds 12 in. (300 mm) in length. See CBM Policy Memo, Section 25, Point 2.c.



REINFORCED CONCRETE PIPE – CRACKS

Unacceptable Product: Width of surface cracks in pipe are 0.01 in. (0.30 mm) or greater and summation of crack lengths exceed 24 in. (600 mm) in length. See CBM Policy Memo, Section 25, Point 2.c.



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Unacceptable Product: Crack passes entirely through wall of pipe. See CBM Policy Memo, Section 25, Point 2.a.



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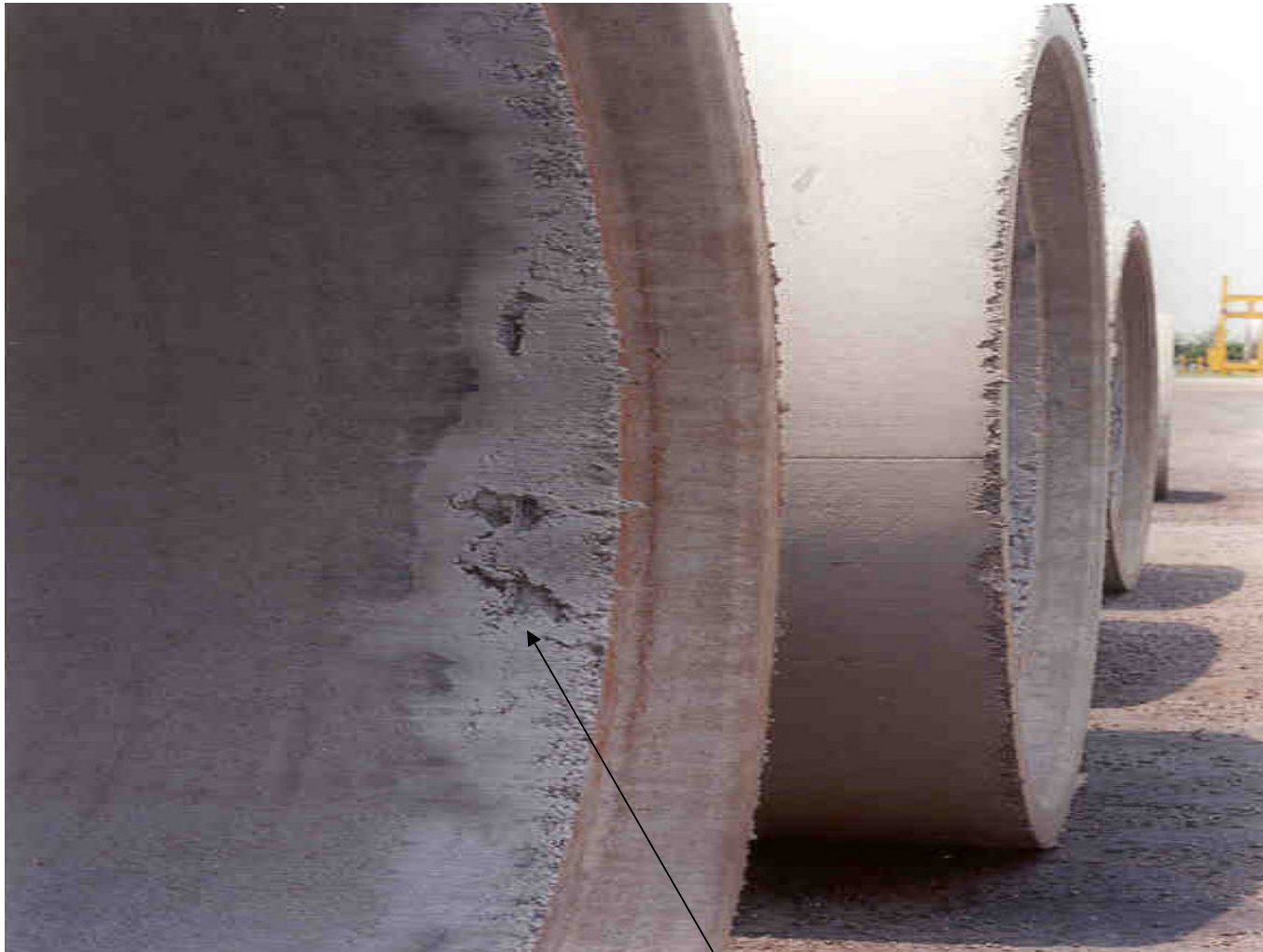
FLARED END SECTION OF CULVERT - CRACKS

Unacceptable Product: Crack passes entirely through wall of end section. See CBM Policy Memo, Section 25, Point 2.a.



REINFORCED CONCRETE PIPE – HONEYCOMB (Outside)

Unacceptable Product: Honeycomb or voids are deeper than 3/4 the depth of the coarse aggregate and exceeds 5 percent of the surface area of the pipe. See CBM Policy Memo, Section 25, Point 3.



REINFORCED CONCRETE PIPE - HONEYCOMB (Inside)

Unacceptable Product: Pipe with honeycomb or voids on the inside. See CBM Policy Memo, Section 25, Point 3.



REINFORCED CONCRETE PRODUCT – IMPROPER REINFORCEMENT PLACEMENT

Unacceptable Product: Reinforcement is exposed on exterior of pipe. See CBM Policy Memo, Section 25, Point 5.



REINFORCED CONCRETE PIPE – IMPROPER REINFORCEMENT PLACEMENT

Unacceptable Product: Reinforcement is exposed on exterior of pipe. See CBM Policy Memo, Section 25, Point 5.



REINFORCED CONCRETE PIPE – IMPROPER REINFORCEMENT PLACEMENT

Unacceptable Product: Shadowing (ghosting) may indicate insufficient concrete cover over reinforcement. Further investigation of this pipe determined that the depth of cover did not meet the **Specification** requirements. One method to verify adequate cover is to remove the concrete and expose the reinforcement at one location. See CBM Policy Memo, Section 25, Point 5.



REINFORCED CONCRETE PIPE – IMPROPER REINFORCEMENT PLACEMENT

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REINFORCED CONCRETE BOX CULVERT – IMPROPER REINFORCEMENT PLACEMENT

Unacceptable Product: Reinforcement is exposed on inside of culvert. See CBM Policy Memo, Section 25, Point 5.



MANHOLE CONE (EXTERIOR) – BUGHOLES (VOIDS)

Unacceptable Product: Bugholes is the surface feature resulting from entrapped air against the form during concrete placement. Bugholes on this manhole cone exceed 5 percent of the surface area. See CBM Policy Memo, Section 25, Point 3.



MANHOLE CONE – IMPROPER REINFORCEMENT PLACEMENT

Unacceptable Product: Reinforcement is exposed on outside of manhole cone. See CBM Policy Memo, Section 25, Point 5.



REINFORCED CONCRETE PIPE – IMPROPER REINFORCEMENT PLACEMENT

Unacceptable Product: Reinforcement is exposed on inside of pipe. See CBM Policy Memo, Section 25, Point 5.



REINFORCED CONCRETE PIPE – PROPER REINFORCEMENT PLACEMENT

Acceptable Product: The exposed ends of longitudinal steel, stirrups, lift holes, or spacers used to position the reinforcement (cage) during concrete placement is not a cause for rejection of this pipe. See CBM Policy Memo, Section 25, Point 5.



REINFORCED CONCRETE PIPE – CHIPPED OR DAMAGED ENDS

Unacceptable Product: The damage is more than halfway into the pipe joint and has a length more than 10 percent of the end circumference or perimeter. See CBM Policy Memo, Section 25, Point 6.



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CHIPPED OR DAMAGED ENDS**

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**REINFORCED CONCRETE PIPE -
CHIPPED OR DAMAGED ENDS**

Repairable Product: The damage is more than halfway into the joint, but the length is less than 10 percent of the end circumference or perimeter. See CBM Policy Memo, Section 25, Point 6.



REINFORCED CONCRETE PIPE – CHIPPED OR DAMAGED ENDS

Repairable Product: The damage is more than halfway into the joint, but the length is less than 10 percent of the end circumference or perimeter. See CBM Policy Memo, Section 25, Point 6.



REINFORCED CONCRETE PIPE – CHIPPED OR DAMAGED ENDS

Repairable Product: The length of the damage is more than 10 percent of the end circumference or perimeter but is less than halfway into the joint. See CBM Policy Memo, Section 25, Point 6.



REINFORCED CONCRETE PIPE – CHIPPED OR DAMAGED ENDS

Repairable Product: The damage is more than halfway into the joint but has a length of less than 10 percent of the end circumference or perimeter. See CBM Policy Memo, Section 25, Point 6.



REINFORCED CONCRETE PIPE – OTHER DEFECTS

Unacceptable Product: Concrete fell off of reinforcement due to too wet of a mixture. See CBM Policy Memo, Section 25, Point 10.



REINFORCED CONCRETE PIPE - OTHER DEFECTS

Unacceptable Product: Example of concrete defect. See CBM Policy Memo, Section 25, Point 10.



REINFORCED CONCRETE PIPE - OTHER DEFECTS

Unacceptable Product: Example of concrete defect. See CBM Policy Memo, Section 25, Point 10.



OFFSET MANHOLE CONES – OTHER DEFECTS

Unacceptable Product: This is known as a “blow out” – concrete sticking to interior form or falling out during form removal. See CBM Policy Memo, Section 25, Point 10.



FLARED END SECTION OF CULVERT – OTHER DEFECTS

Repairable Product : Damaged end section may be repaired. See CBM Policy Memo, Section 25, Point 10.



REINFORCED CONCRETE PIPE – PHYSICAL MEASUREMENTS

Unacceptable Product: Overpacking is excess material being present in the bell end due to concrete pipe equipment problems. See CBM Policy Memo, Section 25, Point 1.



REINFORCED CONCRETE PIPE – PHYSICAL MEASUREMENTS

Unacceptable Product: Example of overpacking and featheredge. Excess material is present in bell end of pipe caused by mix packed past the end of barrel during production. See CBM Policy Memo, Section 25, Point 1.



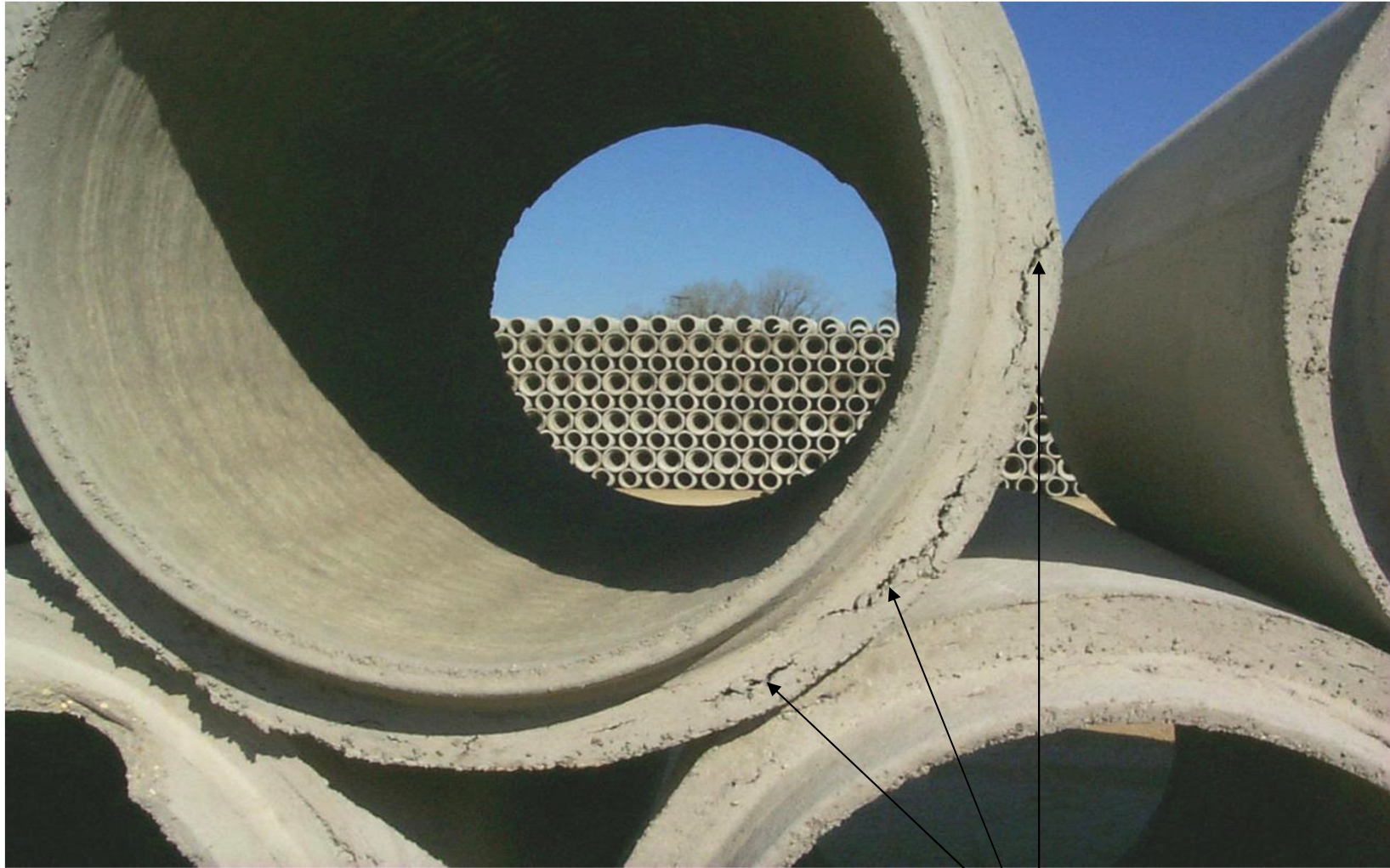
REINFORCED CONCRETE PIPE – PHYSICAL MEASUREMENTS

Unacceptable Product: Pipe spigot is out of round and does not meet dimensions or dimensional tolerances. See CBM Policy Memo, Section 25, Point 1.



REINFORCED CONCRETE PIPE – PHYSICAL MEASUREMENTS

Unacceptable Product: Pipe exhibits interior delamination. In this case, also called blow out of concrete. See CBM Policy Memo, Section 25, Point 1.



REINFORCED CONCRETE PIPE –PHYSICAL MEASUREMENTS

Unacceptable Product: Pipe exhibits delamination. See CBM Policy Memo, Section 25, Point 1.



REINFORCED CONCRETE PIPE – SMOOTHNESS

Acceptable Product: Rough interior of pipe is caused by dry casting moisture levels not at optimum. Voids may be approaching exceedance of 1 percent of the interior surface area. Very borderline on being substantially free from surface roughness. In this case, however, inspector can accept product. See CBM Policy Memo, Section 25, Points 3 and 4.



REINFORCED CONCRETE PIPE – SMOOTHNESS

Unacceptable Product: Interior of pipe is not substantially free from surface roughness. See CBM Policy Memo, Section 25, Point 4.



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Unacceptable Product: Interior of pipe is not substantially free from surface roughness. See CBM Policy Memo, Section 25, Point 4.



REINFORCED CONCRETE PIPE - SMOOTHNESS AND OTHER DEFECTS

Unacceptable Product: Example of unacceptable workmanship of pipe tee collar. See CBM Policy Memo, Section 25, Point 4. Other Defects for this case include mortar used in joint contaminated with a foreign substance. The pipe tee collar looked acceptable when it arrived on jobsite but became unacceptable when mortar in joint of pipe tee collar expanded after being buried and exposed to ground moisture.



REINFORCED CONCRETE PIPE - ELBOW

Acceptable Product: Example of good workmanship on elbow.



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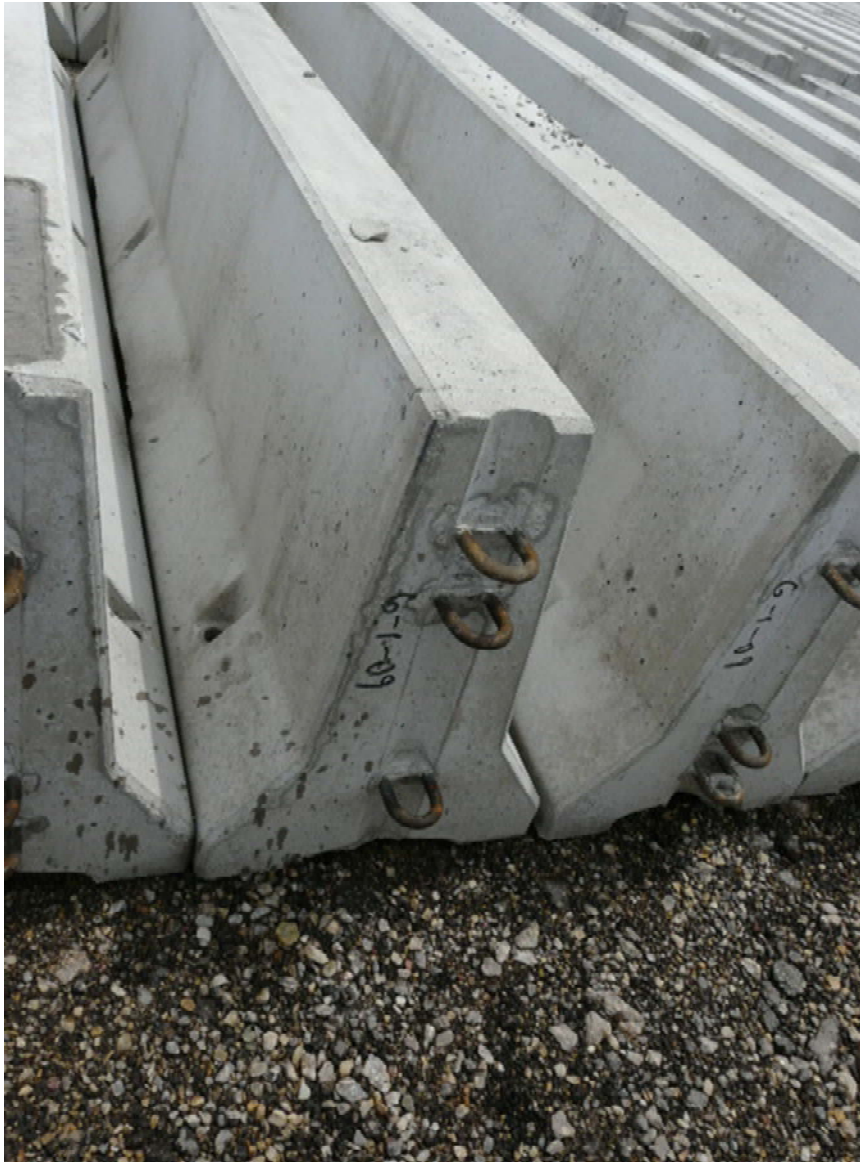
REINFORCED CONCRETE PIPE - ELBOW

Unacceptable Product: Concrete material failure in joint resulting in cracks that pass entirely through wall of pipe. See CBM Policy Memo, Section 25, Point 2.a.



REINFORCED CONCRETE PRODUCT - FLARED END SECTION OF CULVERT

Acceptable Product: Example of an acceptable flared end section with grate and toe wall.



TEMPORARY CONCRETE BARRIER -

CONNECTION DETAIL

Acceptable Joint: Example of IDOT's joint design detail for temporary concrete barrier. See Highway Standard 704001-08.



REINFORCED CONCRETE PIPE -

REPAIRS

Acceptable Repair: Pipe joint repair shows good bond and conformance with physical dimensions. See CBM Policy Memo, Section 26, Points 2 and 4.



REINFORCED CONCRETE PIPE – REPAIRS

Unacceptable Repair: Pipe joint repair indicates a poor bond and cracking. See CBM Policy Memo, Section 26, Points 2 and 4.



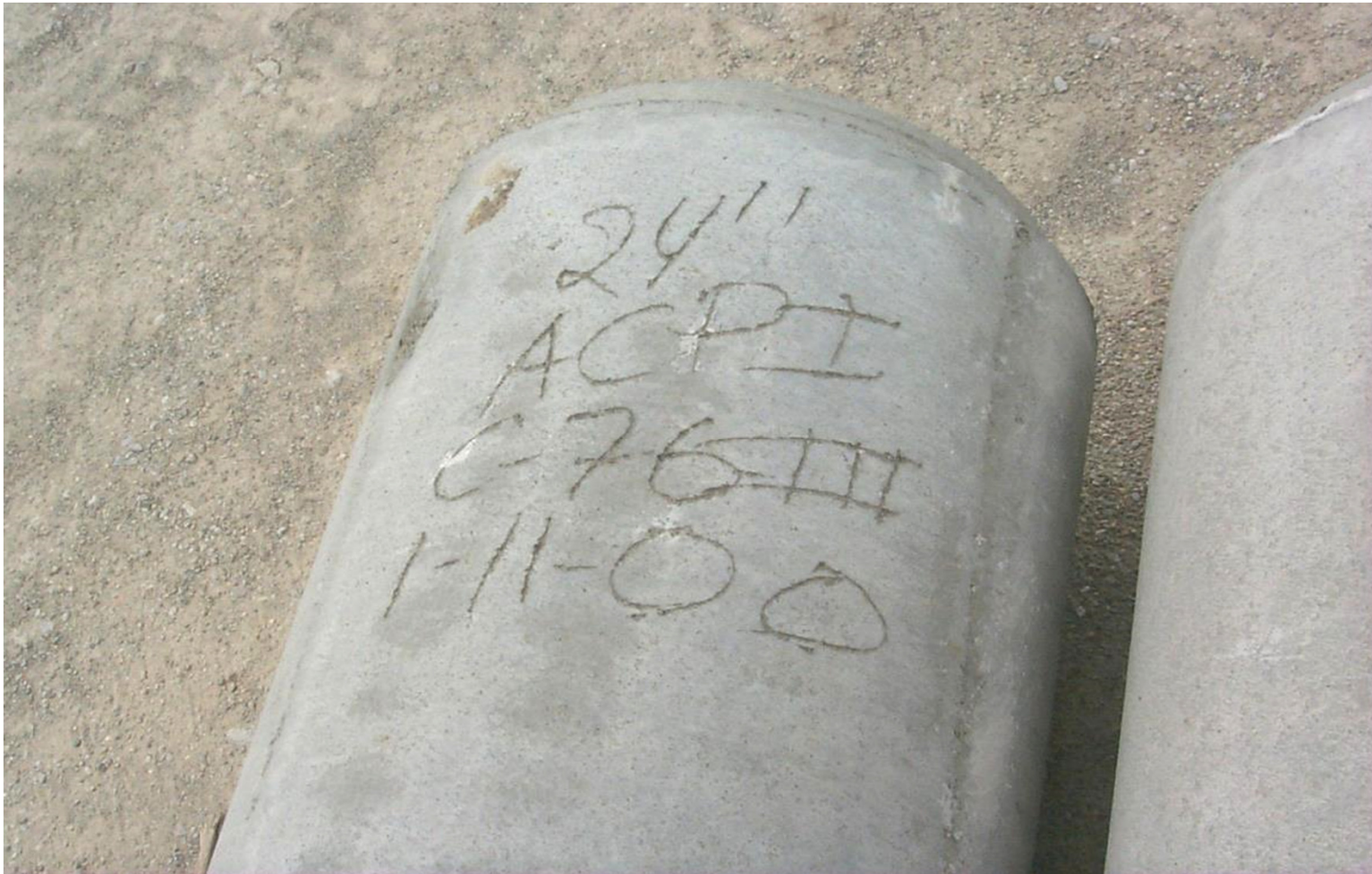
REINFORCED CONCRETE PIPE – REPAIRS

Acceptable Repair: Example of acceptable patch. See CBM Policy Memo, Section 26, Points 2 and 4.



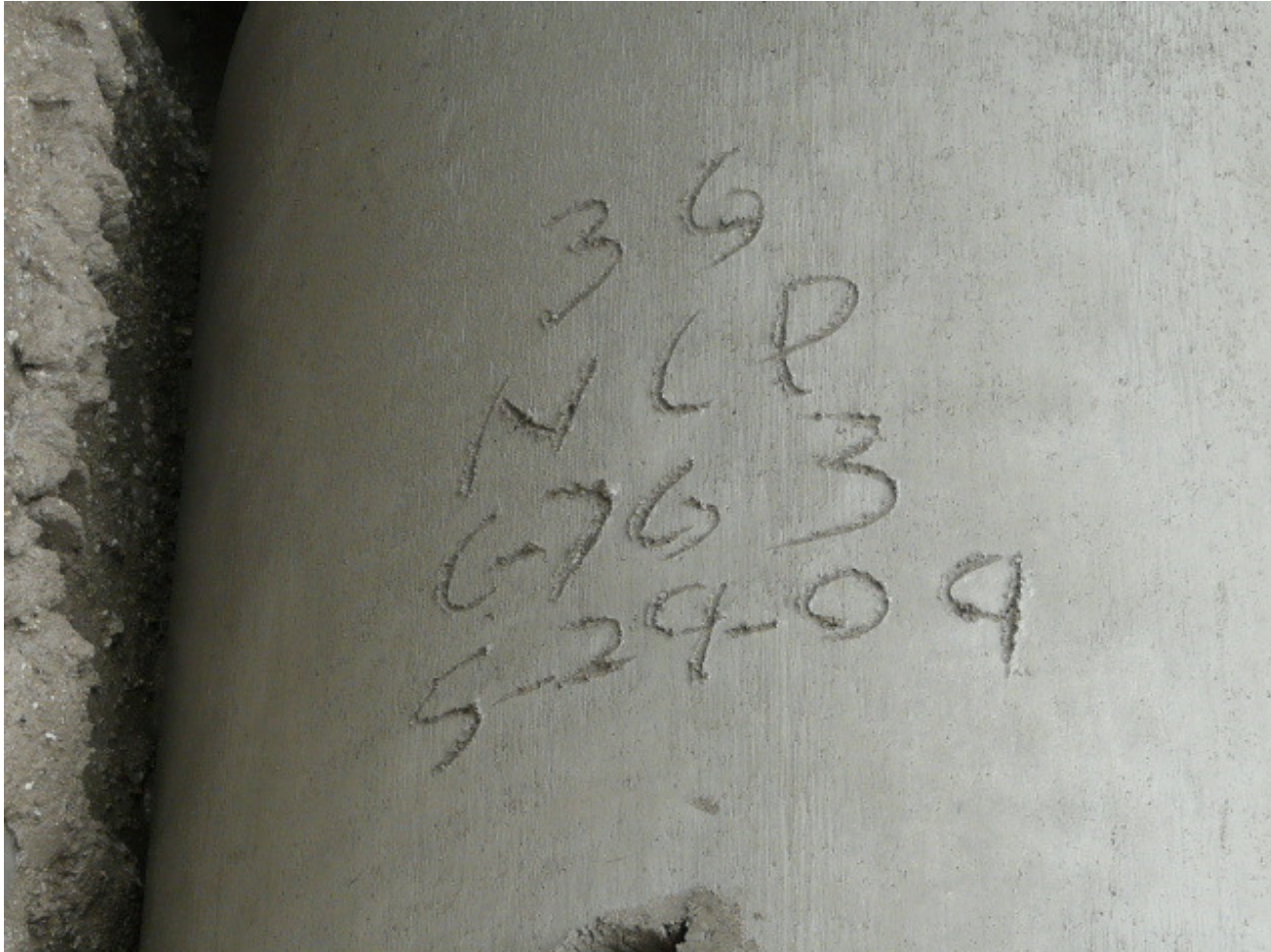
REINFORCED CONCRETE PIPE – REPAIRS

Acceptable Repair: Example of acceptable patch. See CBM Policy Memo, Section 26, Points 2 and 4.



REINFORCED CONCRETE PIPE - IDENTIFICATION MARKINGS

Acceptable Markings: Example of complete and legible identification markings. Read pipe diameter (24"), producer mark (ACPI), specification (C 76), class (III) and date (1-11-00). Reject product if the identification markings are not legible or absent. See CBM Policy Memo, Section 21.5, Section 25 - Point 8 and Attachment C.



REINFORCED CONCRETE PIPE – IDENTIFICATION MARKINGS

Acceptable Markings: Example of complete and legible identification markings. Read pipe diameter (36"), producer mark (NCP), specification (C 76), class (3) and date (5-29-09). Reject product if the identification markings are not legible or are absent. See CBM Policy Memo, Section 21.5, Section 25 - Point 8 and Attachment C.



MANHOLE CONES - IDENTIFICATION MARKINGS

Acceptable Markings: Example of complete and legible identification markings. Read producer mark (MBM), specification (M 199), pipe diameter (48"), and date (4-22-00). Reject product if the identification markings are not legible or are absent. See CBM Policy Memo, Section 21.5, Section 25 - Point 8 and Attachment C.



TEMPORARY CONCRETE BARRIER - IDENTIFICATION MARKINGS

Unacceptable Markings: Example of illegible markings for barrier. See CBM Policy Memo, Section 21.5, Section 25 - Point 8 and Attachment C.



REINFORCED CONCRETE PRODUCT – REJECTED PRODUCT MARKINGS

Acceptable Practice: Example of acceptable rejected product markings. See CBM Policy Memo, Section 2.3.



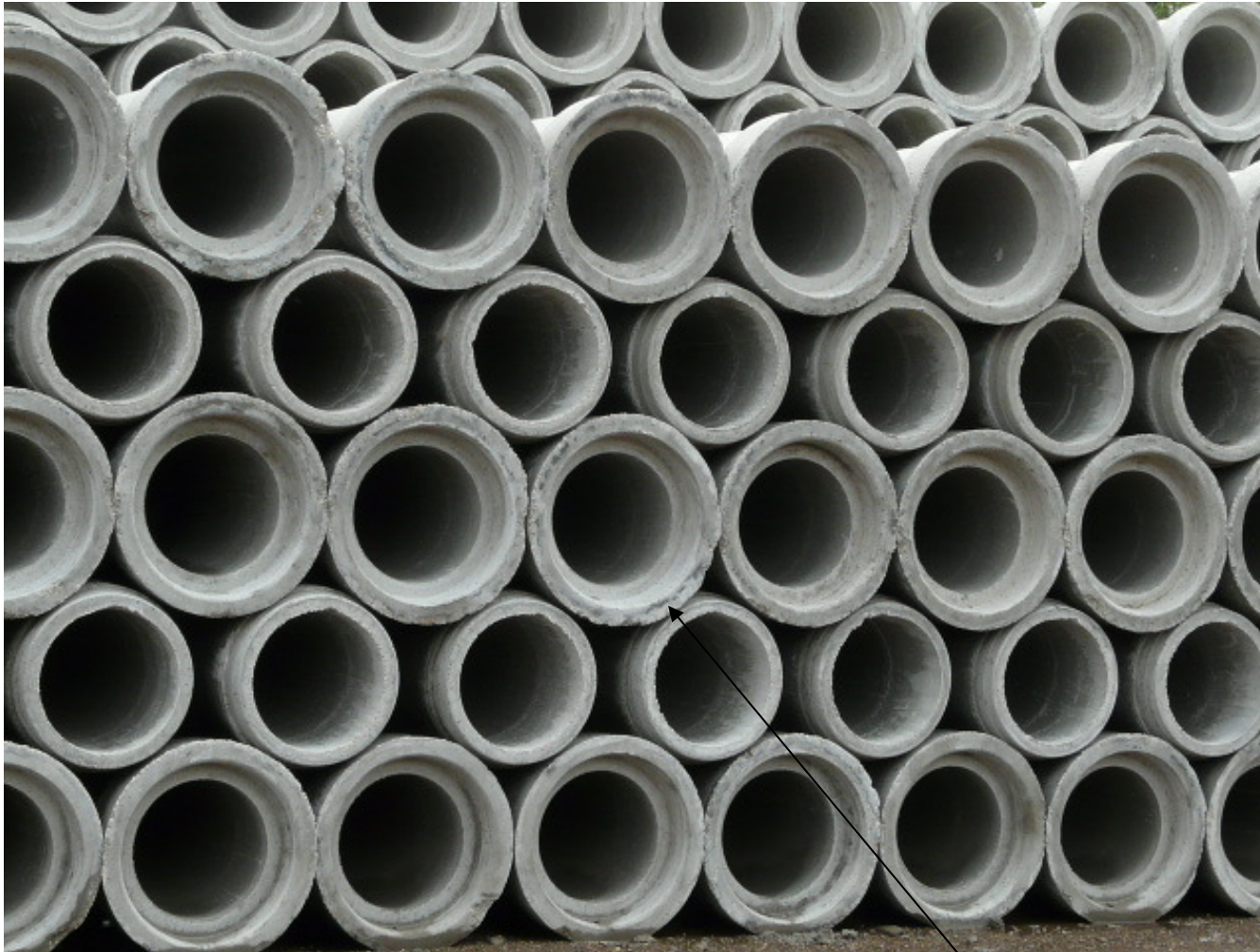
REINFORCED CONCRETE PRODUCT – REJECTED PRODUCT MARKINGS

Acceptable Practice: Example of acceptable rejected product markings. See CBM Policy Memo, Section 2.3.



REINFORCED CONCRETE PIPE – PRODUCT STORAGE

Acceptable Practice: Pipe storage yard. See CBM Policy Memo, Section 23.



REINFORCED CONCRETE PIPE – PRODUCT STORAGE

Poor Practice: Example of poor practice. Excessively high pipe stacking can cause damage. See CBM Policy Memo, Section 23.



REINFORCED CONCRETE PIPE – PRODUCT STORAGE

Acceptable Practice: Example of acceptable pipe stacking. See CBM Policy Memo, Section 23.



MANHOLE CONES - PRODUCT STORAGE

Acceptable Practice: Good yard stacking with gravel base. See CBM Policy Memo, Section 23.



RISER COLLARS – PRODUCT STORAGE

Acceptable Practice: Example of assembled stack of riser collars. See CBM Policy Memo, Section 23.



CATCH BASINS – PRODUCT STORAGE

Acceptable Practice: Good yard stacking with gravel base. See CBM Policy Memo, Section 23.



TEMPORARY CONCRETE BARRIERS – PRODUCT STORAGE

Acceptable Practice: Example of temporary concrete barrier yard. See CBM Policy Memo, Section 23.



TEMPORARY CONCRETE BARRIERS – PRODUCT STORAGE

Acceptable Practice: Example of temporary concrete barrier yard. See CBM Policy Memo, Section 23.