

4300201 PIPE CULVERTS

COMMENTS FROM INTERNAL/INDUSTRY REVIEW

Ananth Prasad
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Comments: (Industry 9-6-23):

What is the background on requiring the inspection of 60 inch pipes?

Response:

The current specification language simply states: For pipes installed under the roadway, inspection is to be conducted when backfill reaches 3 feet above the pipe crown or upon completion of placement of the stabilized subgrade.

The intent of the current Section 430 is for all pipe to be inspected and all pipe 48” in diameter and smaller are inspected with CCTV and the videos, images, measurements etc. are recorded and submitted for review. Larger pipes are more easily accessed for visual inspection and any defects can be noted and repaired without the formality of having to obtain and submit videos or photos. Pipes over 48” must still be inspected and the proposed language includes requirements for visual inspection, including the preparation of the pipe prior to entry and written information and photos of any defects found during the visual inspection. The proposed requirement for measuring joints and recording defects found during the visual inspection is necessary to ensure the Department has a record of these larger pipes condition post installation.

Action: The revision to pipe size for inspection purposes has been removed and will remain at 48”. Minor changes to the language have been made to clarify visual inspection requirements.

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Comments: (Industry 9-13-23):

It is time to consider an across-the-board joint performance specification (infiltration: yes or no) for all pipes. This proposal would expand the reporting of joint gap measurements to include large diameter pipes above 48 inches. If this proposal proceeds, contractors and CEIs will soon be haggling over the accuracy or acceptability of 1/16 inch – or smaller - beyond the joint gap criterion of 72-inch diameter or larger pipe. The roots of FDOTs joint gap criteria date back to at least 1973. At that time, the joint gap was measured likely as the pipe was being laid and prior to the soil envelope. The gap measurement specification was conceived in a pre-CCTV inspection era and was presumably a surrogate or indicator for joint performance once the pipe was operational. In the present, the use of CCTV inspections allows the observation of the joints’ performance in lieu of a gap measurement. It is a common means and methods of pipe installation that contractors inspect the joint gap as the pipe is set, and then make adjustments to the joint before placing the soil envelope. The joints are also wrapped with a geotextile having a specified opening size amongst other parameters. In 1973, it was less burdensome to re-home a pipe joint because circumstances where that it was done before the soil envelope and backfill were placed. Now, 50 years later, it is much more burdensome for a contractor to replace a pipe for a joint gap infraction – regardless of joint performance - after it has been backfilled. Present inspection methods allow for the installed joint of all types of pipes to be inspected based on performance, at which point the Repair Matrix and engineering judgment can be applied. The Department has the duty to inspect all pipes

to observe present performance and attempt to forecast service life. All gasketed pipe joints – whether concrete, metal, plastic, or hybrid - perform based on gasket compression. Some pipes even indicate a homing mark for this reason. The contractors understand the means and methods of inserting pipe joints. We have modern inspection practices to verify pipe joint performance. It's time to consider eliminating the burden on the contractors caused by the 1973-era requirement to measure concrete pipe joint gaps.

Response: Post installation inspection of joint gaps is an important consideration for the overall performance and service life of the pipe. Inspection equipment technology is capable of precise measurements, well within the 1/16" noted above.

Action: No further action.

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Comments: (Industry 9-13-23):

The following comments/recommendations are made with the desire to reduce the reliance on engineering judgement and standardize the approach to pipe inspections and repair recommendations: 1.) The department could consider specifying the number of measurements per joint in video inspection. It is common that only 1 is provided which may or may not be the maxima. We suggest providing 3 or 4 measurements at equal spacing on the pipe radius but not at chips or spalls as this leads to inaccuracies of the actual joint gap. 3 Points is the minimum number of measurements to accurately represent a 3D plane. Without this, we rely on engineering judgement and estimation to determine if the joint gap has exceeded 33% of the diameter. 2.) The department could consider providing guidance on recommendations based on acceptable tolerances of joint gap measurements. For example, if a gap is reported to slightly exceed the allowable, is remediation still necessary (e.g. is there a tolerance on joint gap measurements due to possible inaccuracies of the reported measurements)? 3.) The department could consider revising the requirement from: "that joint gaps outside of the tolerances listed shall be removed at no expense to the department" to: " that joint gaps outside of the tolerances listed shall be remediated at no expense to the department". In practice most excessive joint gaps are remediated in one way or another instead of removal of the pipe segment (e.g. FDOT 430-001 Misc. Drainage Details provides a detail for dissimilar joints and dissimilar pipe materials which are joined with a concrete jacket. In video inspections, these would all exhibit excessive joint gaps.) 4.) The department could consider allowing joint gaps that exceed the allowable tolerance over less than 1/3 the circumference of the pipe not only for manufacturing defects, but also for minor skews in the laying of the pipe. It is not possible to determine if a joint gap is due to a skew in the pipe end or a skew in the pipe. The resultant gap is the same regardless. 4.1) The department could consider elaborating on the requirement that "the rubber gasket is 1/4 inch or more past the pipe joint entrance taper". It is unclear how this can be determined in the field or if manufacturer literature should be consulted for theoretical distances. 5.) The department could consider releasing a list of modifications to existing specifications for reinforced concrete pipe defects (e.g. ASTM C1840 is a concise document that clearly lists a vast array of pipe observations and example photos, and provides recommendations on whether or not the observation is in need of remediation). FDOT could accept or revise portions of this document as needed to provide the necessary guidance and provide standardized repair recommendations (e.g. the department could consider providing acceptable repair procedures for each of the defects listed in ASTM C1840). 5.1) For example, hinge cracking in multiple quadrants (as described in ASTM C1840) is indicative of serious failure of the concrete due to an unforeseen vertical load (like construction equipment). In this case, chemical grout injection is clearly not acceptable in

accordance with the FDOT pipe repair matrix. Is a pipe liner or concrete collar acceptable? 5.2) The department could consider specifying a maximum allowable joint gap when remediating with: Chemical grout injection, mechanical repair sleeve, and/or internal joint seal, etc. Are these limits affected by observed infiltration in the video inspection? 5.4) The department could consider providing more specific criteria regarding the use and requirements of structural pipe liners. Can a properly designed pipe liner (For a fully deteriorated condition) be considered a full pipe replacement in the event of substantial failure of the pipe wall? If so what are the requirements? ASTM F1216 Appendix A1 provides guidance on exactly this. Our firm has provided pipe repair recommendations across many projects in the state of Florida. We would be happy to discuss our reasoning and methodology for determining recommendations with the department in the shared interest of standardizing this process.

Response: The provided recommendations may be considered for the next revision cycle.

Action: No further action.

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Comments: (Industry 9-12-23):

Greetings, please see my responses below to each of the items on the proposed changes to 4300201. Please feel free to reach out for further discussion. 1.Are changes in line with promoting and making meaningful progress on improving safety, enhancing mobility, inspiring innovation, and fostering talent; explain how? Agree 2.What financial impact does the change have; project cost, pay item structure, or consultant fees? There will be a financial burden suffered by the Inspection Contractors, which would obviously trickle up the ladder. There are setups available with certain manufacturers of CCTV equipment that would comply with DOT specifications. However, that equipment is expensive and currently is not readily available since there is very low demand. CCTV companies that do have the ability (financially and mechanically) to obtain the necessary equipment will initially suffer the cost of the equipment. Additionally, with the low supply the companies may not be able to obtain (financially or logistically) the required equipment for all of the CCTV crews and trucks. Thus, adding travel time, mobilizations, and overnight fees to the project. Finally, The larger the pipe the longer the inspection takes. The per foot rates of inspecting the large diameter pipe would certainly be more than the current market allows for 48” and below. 3.What impacts does the change have on production or construction schedules? Limited supply would certainly slow down the construction as CCTV companies struggle to keep up with projects that have 54” - 60” pipes requiring inspection. 4.How does this change improve efficiency or quality? Do not disagree with the quality improvement. Efficiency would certainly go down initially. It is hard to forecast the long term effects of efficiency. 5. Which FDOT offices does the change impact? Agree 6. What is the impacts to the districts with this change? Agree 7. Does the change shift risk and to who? Pipes over 60” are often not going to be able to be inspected in compliance with CCTV specs for FDOT remotely (especially in the next couple years). The only option available is going to be man-entry pipe inspections. More often than not, pipes over 60” present extremely unsafe environments for man-entry work. A strict specification for pipes over 60” would also have a trickle-down effect within the state of Florida. Many cities and counties refer to the FDOT spec to govern their infrastructure. Many times those cities and counties do not have a complete understanding of the spirit of the specifications. Thus, they aren’t always as lenient on certain aspects. On an FDOT job; a CEI, Contractor, and Subcontractor may meet to discuss safety risks and devise a safe an effective manner to accomplish a task. Whereas, the city or county often simply refers to FDOT and requires that contractors meet those specific standards set forth. Any strict guidance on pipes over 60” would lead to “trickle-down” safety concerns that I do not believe is good for the industry in the state of Florida. Furthermore, I think if more time and thought is not given on

inspection specs involving pipes beyond 48" (but not beyond 60") – I think the same safety concerns would be present as those of over 60" pipes. 8. Provide summary and resolution of any outstanding comments from the districts or industry, 9. What is the communication plan? 10. What is the schedule for implementation? No thoughts on 8 – 9

Response: The questions above have all been considered and addressed.

Action: No action.

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Comments: (Industry 9-6-23):

Televising RCP over 48" will only create additional costs to the Contractor since FDOT (CEI Teams) when trying to comply with the exact wording of the specifications, get caught on all the minimum details that are captured by the new CCTV systems requesting unnecessary repairs that the Contractor ends up correcting with an Internal Metal Band that costs a fortune because it is faster than trying to convince the CEI that these minor defects in the pipe will not affect hydraulics. If joints are within tolerance, that is all that matters.

Response: Increasing the inspection requirement from 48" to 60" has been removed and will remain at 48".

Action: Revisions to the pipe size for inspection purposes have been removed and will remain 48".

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Comments: (Industry 9-1-23):

Pipe larger than 48" can be easily inspected visually for deficiencies on the hill prior to placement. At that point, if an inspector is on the project and active in his or her roll to monitor installation, there is no need a second look. From what I recall, the reason 48" was established as the size to stop the video requirement at was just for that reason. In addition to those statements, in most instances when 48" pipe or larger is utilized, there is a connection to an outfall. That fact would force the contractor to plug the large pipe in some temporary fashion prior to inspection. As any underground contractor will tell you, ALL temporary pipe plugs are very unpredictable. To purposely place anyone inside a pipe behind a temporary plug to inspect something that could have easily been inspected prior to installation is foolish! Forcing people into completely unnecessary/dangerous situations, it is not a matter of if something bad will happen...it is when something bad will happen. There is absolutely no reason for this specification change therefore my team and I are complete against it.

Response: The Department requires post installation inspection of all pipe. Increasing the CCTV to 60" has been removed. Visual inspection of larger pipes has always been a requirement: however, a record must now be kept of that visual inspection. Pipes are installed in dry conditions wherever possible, as is backfill, and inspection is to occur once backfill reaches 3 feet above the crown of the pipe. At this time, man entry for inspection can be accomplished without unnecessary safety risks.

Action: Revisions to the pipe size for inspection purposes has been removed and will remain 48".