SECTION 623

SPECIAL BEDDING FOR MAINLINE STORM DRAIN PIPE
Adding in entirety

½-sack cement CLSM in accordance with MAG Section 728 as

The Contractor **shall** utilize a commercial-source ~~cement enriched slurry aggregate base course~~ bedding from the outside bottom of the pipe to the springline of the pipe for all mainline storm drain pipe, except cast-in-place pipe. ~~The slurry aggregate base course shall be per MAG Specification Section 728. The slurry shall have a minimum 8-inch slump, and a minimum of 25 psi compressive strength and a maximum of 100 psi based on a 28 day test. Cement slurry aggregate base course~~ CLSM bedding is not required for catch basin connector pipes.

CLSM

~~Only commercial source cement enriched slurry ABC will be allowed. Batch mixing of slurry on site by the Contractor will not be allowed.~~ The Contractor shall submit the commercial source mix design ~~for cement enriched slurry ABC~~ at the pre-construction meeting, along with all other required commercial mix designs.

The Contractor, **at his option**, may excavate a trench having a cross-section with a rounded bottom rather than a flat bottom. If this option is chosen, the trench cross-section must maintain a minimum of 6-inches between the outside wall of the pipe and the trench wall. The minimum trench width at the springline for each side of the pipe, as specified in Section 601, may be reduced to 6-inches for all pipe sizes if this option is used.

½-sack cement CLSM

The Contractor, **at his option**, may use ~~cement enriched slurry aggregate base course~~ for the bedding material ~~specified in the City of Phoenix Supplement to MAG Section 601.3.2~~ **from the springline to one (1) foot over the outside top of pipe**.

If the Contractor elects to use corrugated steel (CSP) or high density polyethylene (HDPE) storm drain pipe, the Contractor shall use ~~cement enriched slurry aggregate base course~~ material for the entire pipe bedding, to one (1) foot over the outside top of pipe ~~no option.~~

½-sack cement CLSM

There will be no separate measurement or payment for ~~special cement enriched slurry aggregate base course~~ bedding. The cost shall be considered incidental to the cost of the pipe.

CLSM

The World's Largest Manufacturer of High Density Polyethylene and Polypropylene Pipe

September 5, 2011

Re: Flowable Fill as a Backfill Material

Member of MAG Committee:

This letter addresses flowable fill versus granular fill as a backfill material for high density polyethylene pipe (HDPE). ADS pipe (and most other manufacturer's HDPE pipe) is designed per AASHTO Section 12 Load Resistance Factor Design (LRFD). This design is based on an equation that substantially increases the applied loads using safety factors and load modifiers while reducing the resistance. The design equation is also derived from material properties such as tensile strength and modulus of elasticity.

AASHTO Section 12 uses granular fill as a basis for design. The chapter lists the material properties used in design, and the secant constrained soil modulus for different soil types and compaction efforts. The end result is a standard for polyethylene pipe that has a minimum 50-year design service life. Florida and Pennsylvania Department of Transportation, both have granted a 100 year design service life for HDPE pipe. AASHTO Section 12 does not address or endorse the use of flowable fill for installation.

Mandating the use of flowable fill as a backfill material for polyethylene pipe increases the overall cost of installation and has no added value to the service life of the product.

Sincerely,

Peggy Graham

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Regional Engineer- Product Manager
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September 22, 2011

Maricopa Association of Governments
Standard Specifications & Details Committee

Re: Case 11-21 – Incorporation of PHX Supplement Section 623

Dear Committee Member,

I am writing this letter in regards to Case 11-21 for the inclusion of the City of Phoenix requirements for CLSM backfill into the MAG specifications. I have great concern for this proposed change as it will undoubtedly result in significant project cost increases, installation complications, slowed pipe installation rates, and a greater challenge for MAG's finished pipe installation requirements to be met and provide virtually no additional value with respect to installed performance or service life.

Use of CLSM as pipe backfill results in a much more difficult installation practice as special precautions are necessary to reduce pipe buoyancy forces. This typically necessitates pipe anchoring or the use of temporary ballast and requires the application of CLSM in lifts. Further, each lift must be allowed to set-up before the next lift is applied. These precautions must be carefully executed, or pipe alignment and grade may easily fluctuate beyond the permissible variance. All of these issues typically result in reduced pipe installation rates, increased construction costs, and greater likelihood for installed pipe issues.

The final strength of CLSM is typically equal-to or less-than that of a compacted structural fill material, especially when considering the current backfill materials required in Section 603 of the MAG specification. Additionally, HDPE pipe has a strong successful performance record when installed with standard backfill. While HDPE pipe is successfully backfilled with granular fill across the country, there are countless successful examples within Arizona, and more specifically the Maricopa area. This level of success is further bolstered by the existence of the *AASHTO LRFD Section 12: Buried Structures and Tunnel Liner* design methodology. LRFD Section 12 is the design method used for installed HDPE pipe systems, along with other pipe materials, and incorporates several safety and load factors to accommodate variances in installation quality resulting in an extremely conservative analysis tool.

While CLSM may certainly have a place in unique pipe applications requiring its specific attributes, CLSM is not the most appropriate material for use in general pipe installations as it has significant negative cost, installation, and performance implications with very little benefit. I recommend continued use of the current MAG backfill specification based on the successful track record and supporting AASHTO LRFD design method.

I ask for your consideration on this matter and your support against the implementation of CLSM backfill as a requirement for pipe installation.

Very Truly Yours,

Carl Douglass, P.E.
Director of Engineering
Prinsco, Inc.