USE GUIDELINES FOR CRUSHED GLASS FOR PIPE BEDDING AND BACKFILL

These Use Guidelines accompany ITEM b06011 SECTION 601.2(d) SPECIAL PROVISION (SP) for the use of crushed glass for pipe bedding and backfill applications.

GENERAL

Laboratory research indicates that crushed glass meets all Pub. 408, Section 703.2(a) Table B; Type C requirements. Crushed glass and blends of crushed glass with natural aggregate have been determined suitable for select construction and maintenance projects such as drainage material, pipe bedding and backfill, flowable fill and embankment fill.

There are two main sources of crushed glass: glass cullet and waste industrial glass.

Glass cullet, as defined in Act 101 “post consumer material” is comprised of the mixed colored glass fragments resulting from the breakage of colored glass containers (predominantly food, juice, beer and liquor bottles), typically collected at municipal recycling centers through curb recycling programs. Occasionally, glass cullet will contain fragments of broken ceramics (coffee mugs, china plates, pottery) in very small quantities. Crushed glass generated from recycling programs is a source separated recyclable material and is excluded from being a waste by definition (25 PA Code Chapter 271.1) and therefore no permit is required for use (25 PA Code Chapter 271.101 (b)(2)).

Waste industrial glass includes such materials as broken, obsolete, and/or off-specification glass from the manufacturing of plate, window and analytical glassware, etc. Waste industrial glass is not excluded from being considered a waste, and therefore, PADEP approval is required for its use. Furthermore, any blend of waste industrial glass and glass cullet also require PADEP approval.

GRADATION REQUIREMENTS

Crushed glass that meets the minus 9.5-mm (3/8-inch) gradation requirement is suitable for pipe bedding as a 100 percent substitute to AASHTO No. 8 aggregate. For pipe backfill material, minus 3/8-inch crushed glass blended up to 20 percent by mass (by weight) with conventional aggregates has been found to satisfactorily perform as pipe backfill material.

Most recycling centers that perform glass crushing operations can achieve this gradation through single or double crushing passes. In addition, crushed glass meeting the minus 3/8-inch gradation no longer resembles broken shards, and is more consistent with angular to rounded gravelly sand material, while still retaining key engineering characteristics and minimizing safety and workability concerns associated with glass particles visually recognizable as glass shards.

QUALITY REQUIREMENTS

Use crushed glass as defined by Act 101 “Post Consumer Material” or waste industrial glass that has prior PADEP approval. Do not include automobile glass, lead crystal, TV monitors, lighting
fixtures and electronic applications. Recycled crushed glass already satisfies the coarse aggregate requirements of Pub. 408, Section 703.2 Table B, Type C.

The specification allows a maximum 5% debris content which can be visually quantified using the following procedure:

1. Place 200 grams of processed cullet that meets the required gradation in a flat pan or plate. Care should be taken not to segregate debris from processed crushed glass. The percent of debris shall conform to the debris level using American Geological Institute’s (AGI) Data Sheets 15.1 and 15.2, “Comparison Chart for Estimating Percentage Composition”.
2. It is recommended to conduct a general examination of the entire stockpile of processed crushed glass. Conduct one visual inspection estimate for debris content for every 50 cubic yards of processed recycled glass.

CONSTRUCTION REQUIREMENTS

Conventional construction equipment is suitable for compaction of crushed glass and blends of crushed glass with conventional aggregates. The compacted density of crushed glass aggregate is relatively insensitive to moisture content. This means that the material has good drainage characteristics and can be placed and effectively compacted during wet weather.

Full-scale testing shows that a nuclear densometer can be used to measure the density and moisture content of 100% glass aggregate fills without the need for correction factors. Use Direct Transmission Mode testing method.

SOURCE APPROVAL

1) Sufficient testing must be performed to ensure that aggregates provided meet the specified gradation and quality requirements. Sources, other than those listed in Bulletin 14, Aggregate Producers, must demonstrate to the District that they meet the Special Provision quality and gradation requirements, as stipulated in Pub. 408, Section 106 and as directed by the District Executive. Producer supplied test data from a certified laboratory on the source material may be accepted as documentation of any test requirement. Verification sampling and testing will be performed by the District, unless otherwise specified.

2) Until widespread experience is gained using crushed glass aggregates in pipe bedding backfill applications, this material will retain provisional status. Provisional status also requires projects to be visually inspected for settlement, by the District for five years. Districts are requested to report any problems encountered during construction, and any problems observed during the life of the project to PennDOT’s Pollution Prevention Section at 717-783-3616. If further experience gained by the Districts reveals problems with the application, the Special Provision will be withdrawn immediately.