Pulverized Glass Aggregate

by Beth Terney, Project Assistant

Pulverized recycled glass after processing ready to be used in roadway projects.

Pulverized Glass Aggregate (PGA) is an environmentally conscious method to recycle glass. This article will outline approaches for the manufacture and use of PGA.

What is PGA?

PGA is crushed post-consumer glass used in New Hampshire since the late 1980's. To create PGA, recycled glass is ground, in a homemade or a commercially available crusher. Particles are usually less than a half inch in diameter. Screening is necessary to remove contaminants, and often to sort by particle size.

Factors for Increased Use

The recycling market is flooded with unwanted glass. Recent market specifications and regulations result in glass being rejected, and then land-filled or stockpiled. Municipalities can process PGA for all rejected glass. Anything can be recycled, from broken bottles to a sink or bath tub, depending upon the strength of the crusher.

Uses for PGA

PGA is safe, easy to use, and inexpensive building material. Many applications for PGA make glass collection worthwhile. Cities and towns can use it alone or with aggregate. Place PGA at sites that will not be disturbed later. Its three main uses are:

1. As fill
2. As a base aggregate substitute, or supplment
3. In drainage projects.

Fill

The most common applications are as sand or gravel, such as fill around water and sewer pipes, electric conduits, and fiber optic lines and as utility trench bedding. It works as fill around culverts if headwalls prevent flow through the PGA.

Base Aggregate Substitute or Supplement

Many agencies use PGA as a substitute for gravel, sand, and crushed stone in a number of roadway applications. Like all aggregates, compaction is essential. In roadway applications, PGA should make up less than 10% of the mix. Used as a sub-base, such mixes effectively supports the base and road surface. PGA works well in embankments between the existing ground and the sub-grade. PGA should not be used in surface applications or as glassphalt, because increases stopping distance and has the potential for stripping.

Experience has shown that PGA in roadways retains its shape for years. In New York, PGA has been applied to public works projects for years. It is financially beneficial where gravel is expensive and glass is recycled free. It can reduce maintenance costs especially when used as fill.

Drainage Applications

PGA used for drainage often works better than sand and gravel. Examples include: drainage fill behind retaining walls, in foundation drains, draining blankets, and in French drains.

PGA is more permeable than sand making it ideal for use in drainage projects. PGA compacts more easily than sand over a wider range of moisture conditions. PGA holds a

grade and doesn't heave. It is dense, absorbs no water (unlike sand and gravel), and is relatively inert.

Other uses for PGA are as decorative gravel in landscaping and in septic systems and sewer connections.

Application in New London

Richard Lee Director of Public Works in New London has used PGA for many years. His crew built a crusher to grind glass. They use PGA straight or mixed 50/50 with gravel. Then they use it in place of gravel and sand in various projects. New London has found that PGA works well under sidewalks, as backfill, and in road reconstruction as a base material. They have found no drawbacks to PGA use, and continue to find new approaches for it.

Other Pros to PGA Use

Not only are there many uses for PGA, but there are many benefits to using glass to make PGA. PGA allows for the removal of up to 50% more material from the waste stream because it puts discarded material to new uses. This helps to decrease air and water pollution by replacing resources (e.g. sand) that require excavation and by decreasing land filling (which also extends the life of landfills). It will not biodegrade nor corrode, so will not leach contaminants into ground or surface water. It can, therefore be stored or stockpiled indefinitely.

Processing glass does drive up costs; however the economic benefit of this technique comes from avoiding disposal, landfill, and transportation costs. PGA use saves on the cost of glass shipping, storage, and road construction.

Using PGA decreases recycling costs. There is less labor required in collection because the colors don't need to be separated and collection is safer because workers handle broken glass less.

PGA provides many benefits to its users. It can be used in many applications and has often been found to work better than the material it is replacing. It also provides a significant economic, as well as environmental, benefit. It is a free method to divert waste products from ending up in a landfill to being a useful building material.

There is NHDOT specification, call the UNH T^2 Center for a copy or look on-line http://webster.state.nh.us/dot/specifications/2002/pdf/supplementals/304%20suppl.pdf

Sources

Clear Solutions for Glass Recycling. Solid Waste and Recycling, Montana Public Interest Research Group May 2002. http://www.pirg.org/montpirg/issues/waste.html.

Evaluation of Recycled Glass/Ceramic Product as an Aggregate Substitute for MDOT Project. Final Report, University of Maine, April 1994.

Processed Glass Aggregate: An Alternative Reuse for Post-Consumer Glass. NRRA Educational Bulletin, 2002.

The Andela Pulverizer, Andela Products, Ltd: www.recycle.net/andela.

Northeast Resource Recovery Association: www.recyclewithus.com.

Kirby, Bob. *Construction Aggregate from Scrap Glass.* Resource Recycling, May 1998, pp 48-49.

8th Annual Eastern Winter Road Maintenance Expo

Save the Date; September 3-4, 2003

The 8th Annual Eastern Winter Road Maintenance Expo is sponsored by the Federal Highway Administration (FHWA). This year the NHDOT is a co-sponsor and the UNH T^2 Center is involved with the training component. There will be 3 training tracks: environmental, safety and technical.

The event will be held at the Center of New Hampshire in Manchester, and features the latest in winter maintenance equipment, materials, technologies and strategies. The expo is held in a different state each year. In 2001, it was held in Worcester MA.

There is no registration fee for attendee. In late spring FHWA will mail a flyer to people on the UNH T^2 Center mailing list. It will ask participants to pre-register. See the website at www.easternsnowexpo.org and see you there!