

Sanitary Sewer, Northfield Center, Ohio

PROJECT

Northfield Center
Sanitary Sewer

LOCATION

Northfield Center, Ohio

OWNER

Summit County
Department of
Environmental Services
Cuyahoga Falls, OH

CONTRACTOR

Wingfoot Rental &
Development
Mogadore, OH

**LIGHTWEIGHT
AGGREGATE
PRODUCER**

Hydraulic Press Brick
Company – Cleveland, OH

**LIGHTWEIGHT
AGGREGATE**

Expanded Shale,
Haydite “C”
Size 3/4 x No. 4

PROJECT DETAILS

Length of Sewer Line:
6,000 feet

Sewer Pipe Size:
24”

Sewer Depth:
20 - 30 feet
with 3’ undercut

Cost Savings:
\$4.5 Million

HAYDITE PROVIDES SUBSTANTIAL COST SAVINGS AND A QUICKER SOLUTION TO SEWER PIPE INSTALLATION IN UNSTABLE SOIL



Marshy soil is removed. Haydite expanded shale lightweight aggregate, geotechnical grid and geotechnical fabric are incorporated to provide stability.

POOR SOIL PRESENTS CHALLENGE IN REPLACEMENT OF SANITARY SEWER SYSTEM

In the spring of 2000 Wingfoot Rental and Development received the contract from Summit County Ohio to dismantle an existing pump station and replace the sanitary system with a gravity-fed line. The new 24-inch sewer line was placed at a depth of 28 – 30 feet below grade with a 3 foot undercut (see diagram on page 2). The initial design utilized traditional limestone backfill.

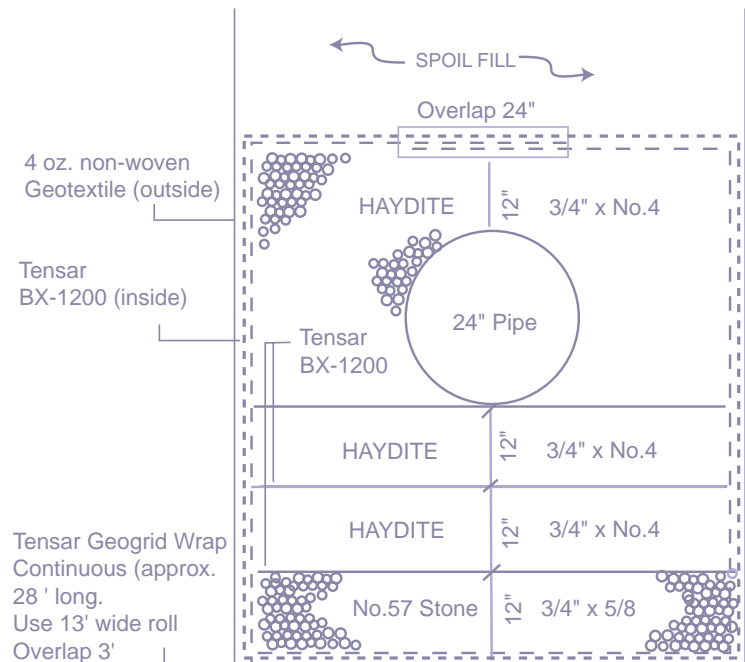
The right of way for the project passed through an area of unstable marshy soil. When the initial phases for this project were inspected, problems were spotted. The inspection revealed that there was settlement in the line when the examination camera went under water indicating a low spot. In the past when this occurred, a pile and cradle system was designed and installed. After evaluation of the site it was determined that 6,000 feet of the 10,000-foot project would need to be placed on piles. This type of construction is very costly.

1. Geosynthethics are placed in excavated trench.
2. Tensar BX-1200 is placed over #57 base.
3. Haydite expanded shale is placed in excavated trench below pipe level.
4. Haydite expanded shale aggregate is compacted with vibratory plate compactor.



USE OF HAYDITE EXPANDED SHALE AGGREGATE SAVES AN ESTIMATED \$4.5 MILLION ON SEWER PROJECT

An alternative to help keep the costs under control was considered. This solution incorporated the use of Haydite expanded shale lightweight aggregate, geotechnical grid and geotechnical fabric in place of the pile and cradle system. Because of Haydite's in-place densities of less than 60 pounds per cubic foot, the poor soil condition at the jobsite supported the new pipe and lightweight backfill. This solution eliminated the need for the costly pile and cradle system and allowed the contractor to complete the project much quicker than the more expensive alternative.



According to John Smith of Wingfoot Rental & Development the pile and cradle system would install at a rate of 40 linear feet of line per week while the lightweight backfill and geosynthetics system installed at a rate of 100 linear feet per week. This provided a significant savings on this project. John estimates that using Haydite on this project provided a savings of \$4.5 million.

General Engineering Properties of Haydite 3/4" to No. 4 Aggregate Grading

Aggregate Property	Measuring Method	Test Method	Commonly Used Specifications for ESCS	Typical Values For Haydite Aggregate	Typical Values For Ordinary Granular Fills
Soundness Loss	Magnesium Sulfate	AASHTO T 104	<30%	<2 %	<6 %
Abrasion Resistance	Los Angeles Abrasion	ASTM C 131	<40 %	26.2%	10 - 45%
Chloride Content	Chloride Content of Soils	AASHTO T 291	<100 ppm	18.5 ppm	
Grading	Sieve Analysis	ASTM C 136	3/4 x No.4	3/4 x No.4	
Compacted In-Place Unit Weight (Bulk Density)	Density Test	ASTM D 698 Modified*	<70 lb/ft ³	58.0	100 -130 lbs/ft ³
Stability (Phi Angle, ϕ)	Triaxial-Consolidated Drained	Corps of Engineers EM 1110-2-1906 Appendix X	35° - 45° +	49°	30° - 38° (fine sand - sand and gravel)
Loose Unit Weight (Bulk Density)	Loose	ASTM C 29	Dry <50 lb/ft ³ Saturated <65 lb/ft ³	46 lb/ft³	89 -105 lb/ft ³
pH	pH Meter	AASHTO T 289	5 - 10	8.8	5 - 10

* Measured by a one point proctor test conducted in accordance with a modified version of ASTM D 698 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort." Because of the cohesionless nature of coarse lightweight aggregate, the standard shall be modified as follows: The aggregate sample shall be placed in a 0.5 cubic foot bucket at the moisture content that the aggregate will be delivered to the jobsite. The sample shall be placed in three equal layers and compacted by dropping a 5.5 pound rammer from a distance of 12 inches 25 times on each layer.

For Additional Information About Geotechnical and Other Advantages of ESCS

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