

STRATA CASE STUDY

CLEMSON ROAD BRIDGE

Owner:	South Carolina Department of Transportation
General Contractor:	C. Ray Miles Construction Co. Elgin, SC
Slope Contractor:	Eckhart Construction Fort Mill, SC
Geogrid Type:	STRATAGRID SG200
Structure Geometry:	5,200 square feet, 26 foot high, IH:IV bridge abutment

Background:

The South Carolina Department of Transportation (SCDOT) needed to provide a right-of-way for an access road adjacent to a CSX Railroad line. The proposed Clemson Road Bridge overpass was a challenging project and SCDOT had three choices:

- Option 1: Construct a IH:IV Reinforced Soil Slope (RSS) at the northern bridge abutment.
- Option 2: Lengthen the northern bridge span between the bridge pier and the approach embankment at the northern bridge abutment.
- Option 3: Construct a concrete retaining wall at the northern bridge abutment.

SCDOT chose to construct the RSS at the northern bridge abutment using StrataSLOPE because it offered several benefits over the alternative options:

1. Rapid construction time.
2. Reduced costs.
3. Aesthetic symmetry with the southern bridge abutment and approach embankment.

The Clemson Road Bridge project began in August 1999 and required construction of a steepened soil slope to accommodate right-of-way needs between the northern bridge abutment and the railroad tracks. Bridge bent #4, located between the CSX tracks and the northern bridge abutment (bent #5), reduced the available clear space for the access



Fill is placed atop StrataGRID in the Reinforced Structured Slope.



Construction of the StrataSLOPE for the Clemson Road project.

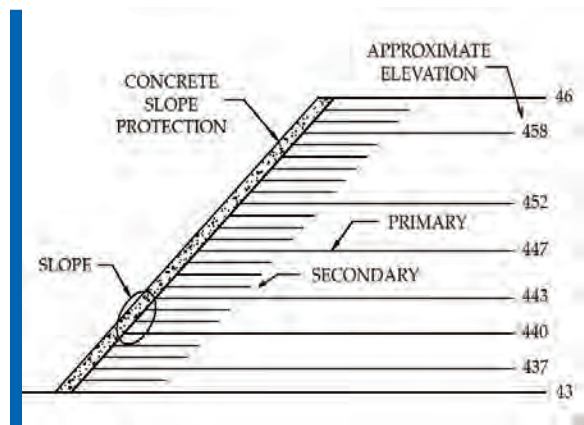


Figure 1: Typical cross-section for a reinforced StrataSLOPE.

STRATASLOPE

CLEMSON ROAD BRIDGE

With a 26 foot grade separation between road grade and the bottom of the northern bridge abutment, a IH:IV StrataSLOPE met the geometric and structural requirements of the project.

The StrataSLOPE at Clemson Road included two major elements: geogrid solid reinforcement and a slope facing system. The geogrid StrataGRID SG200 met the strength requirements for the primary geogrid reinforcement, Type P3, as specified by SCDOT. The slope facing systems was comprised of three components:

1. Prefabricated welded-wire form.
2. Geogrid facing wrap.
3. Seven oz/sy non-woven geotextile and sod with permanent erosion control blanket.

The StrataSLOPE was built on silty-sand foundation soils and utilized SCDOT embankment soils for the reinforced fill zone. The slope design required primary geogrid reinforcement (SG200) to be placed at two foot vertical spacing for the bottom third of the slope and six foot (max) vertical spacing in the upper third of the slope. The geogrid embedment lengths required to satisfy overall slope stability were 40 feet for the bottom three geogrid layers and 30 feet at the top of the StrataSLOPE.

The slope face was constructed using prefabricated welded-wire forms bent to the specified slope batter of 45° (IH:IV). The use of bent forms facilitated the construction of a 4 inch concrete slab under the bridge where vegetation cannot typically be maintained. A secondary reinforcement and a seven ounce non-woven geotextile were placed in each wire-form prior to primary geogrid placement and compacted soil.

The secondary reinforcement provided surficial slope stability and a minimum six foot top and bottom embedment specified by SCDOT. The geotextile provided temporary erosion



The completed Clemson Road bridge abutment.

protection until the concrete slope protection was placed. Outside the limits of the bridge, sod backed with a permanent erosion blanket and the secondary reinforcement were placed adjacent to the welded-wire form. This facilitated immediate vegetation of the slope during construction and provided long-term surficial slope stability and erosion protection.

Upon completion of the StrataSLOPE, piling supporting the northern bridge abutment (bent #5) was driven directly through the StrataGRID-reinforced soil mass. The pile driving operation did not affect the slope's structural integrity. Benefits of driving the piles upon completion of the slope included less potential for damaging the piles during other construction activities and a greater productivity in the slope construction since no piling would be present to restrict placement of the geogrid and structural fill.

StrataGRID SG200 satisfied the structural requirements for the steepened soil slope. The bent, welded-wire form facing system accommodated both the concrete slope protection and vegetation. The reinforced slope eliminated the costly need for lengthening the bridge span or constructing a structural wall and provided the additional right-of-way required for the access road. StrataSLOPE gave SCDOT the best solution, making the project both structurally and economically sound.



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