

Realignment of County Highway with One of the Largest Geogrid Reinforced Slope Projects Constructed in the State of Minnesota

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The presentation will review a 2018-2019 public project in Minnesota involving the turnback of a State Trunk Highway (T.H.) to a County State-Aid Highway (CSAH) and the realignment in a glacial outwash area transitioning into steep ravines created by glacial moraines. The redesign needed to conform to current State-Aid Standards.

The two mile project segment of CSAH 1 from CSAH 90 to the Mankato, MN city limits is one of the largest geosynthetic reinforced soil slope (RSS) projects in the State of Minnesota. The project was constructed over a two year period (2018 and 2019); at the time of this writing the project has been nominated for Minnesota 2019 County Project of the Year.

The original CSAH 1 roadway was constructed on the edge of a steep hillside slope and was fraught with sharp 20 mph curves, limited sight distances and narrow shoulders. Any change in alignment or widening of the road would result in significant impacts and costs. The solution included an alignment that achieved a 40 mph design speed over much of the project. The project included two 1H:1V (45 deg) RSS's and one 1H:2.75V (70 deg) RSS which supported the new road. The RSS's were staged such that they could be used to facilitate haul routes and access for residents during construction. Due to active hillside seepage, a gravel chimney and blanket drain were included at the base of the cut. Shallow limestone bedrock was located within the lower tier and within the RSS reinforced zone. This rock needed to be removed based on specific criteria to develop the required geogrid embedment lengths.

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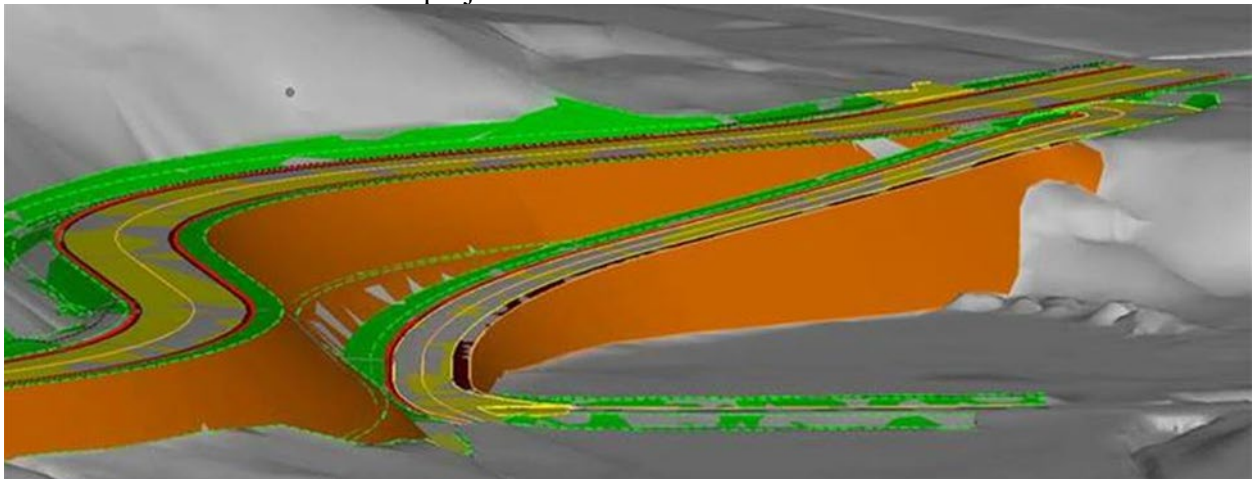


Figure No. 1 – Rendering of 1600 ft. long 1H:1V tiered RSS system with an overall height of 60 ft. The orange represented the two-tiered RSS faces.



Figure No. 2 – 30 ft tall 1H:1V upper RSS tier as shown on Figure No. 1



Figure No. 3 – 1H:2.75V RSS with stacked Geocell face
Figure No. 4 – 30 ft tall 1H:2.75V RSS with vegetated Geocell face

