



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

August 2, 2011

Karen Nelson, P.E.
VERSA-LOK Retaining Wall Systems
6348 Highway 36
Suite 1
Oakdale, MN 55128

Subject: Approval of VERSA-LOK's Reinforced Soil Wall System

Dear Ms. Nelson:

The Geotechnical Engineering Unit (GEU) has reviewed the renewal submittal dated February 23, 2011 for VERSA-LOK's Reinforced Soil Wall System in accordance with the "NCDOT Policy for Mechanically Stabilized Earth Retaining Walls" and the GEU Standard Mechanically Stabilized Earth (MSE) Retaining Walls Provision. In addition to the February 23rd submittal, several subsequent revised design calculations were received. Based on this information, VERSA-LOK's wall system is approved for use on North Carolina Department of Transportation (NCDOT) projects in accordance with the MSE wall policy and standard provision. This policy and provision may be obtained from:

<http://www.ncdot.org/doh/preconstruct/highway/geotech/msewalls/>

The VERSA-LOK system is only approved for design heights up to 30 ft. The design height is defined in the NCDOT MSE wall policy. The design calculations were submitted with secondary geogrid reinforcement in between primary reinforcement layers. The *AASHTO LRFD Bridge Design Specifications* do not specifically address secondary reinforcement. However, secondary geogrid reinforcement with a length of at least 3 ft behind SRW units in the reinforced zone is approved for NCDOT projects.

The VERSA-LOK system requires a 2.4 degree wall batter. Depending on the clearances, right-of-way and easements available, the VERSA-LOK system may not be applicable to many MSE wall projects since NCDOT prepares plans assuming all MSE walls will be vertical with no wall batter.

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LOCATION:
CENTURY CENTER COMPLEX
ENTRANCE B-2
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

For your reference, the approved geogrid reinforcements and corresponding design parameters to be used for future NCDOT MSE wall design submittals are listed in the tables below.

For Fine Aggregate in Reinforced Zone (1S, 2S, 2MS, and 4S) - $\phi=34$ deg

Geogrid Reinforcement

Reinforcement	T_{ult}^1 (kips/ft)	RF_{cr}^2	RF_d^3	RF_{kt}^2	T_{all} (kips/ft)	F^4	α^5	ρ^6 (deg)	CR_{cr}^7	T_{ac}^8 (kips/ft)
Miragrid 5XT	4.296	1.58	1.3	1.1	1.901	0.45	0.8	29.8	0.092 to 0.271	0.303 to 0.895
Miragrid 8XT	6.996	1.58	1.3	1.1	3.096	0.45	0.8	29.8	0.031 to 0.199	0.165 to 1.068
Miragrid 10XT	9.500	1.58	1.3	1.1	4.205	0.45	0.8	29.8	0.023 to 0.146	0.165 to 1.068

For Course Aggregate in Reinforced Zone (5, 57, 57M, 6m, 67 and 78M) - $\phi=38$ deg

Geogrid Reinforcement

Reinforcement	T_{ult}^1 (kips/ft)	RF_{cr}^2	RF_d^3	RF_{kt}^2	T_{all} (kips/ft)	F^4	α^5	ρ^6 (deg)	CR_{cr}^7	T_{ac}^8 (kips/ft)
Miragrid 5XT	4.296	1.58	1.3	1.25	1.673	0.52	0.8	33.6	0.092 to 0.271	0.303 to 0.895
Miragrid 8XT	6.996	1.58	1.3	1.25	2.725	0.52	0.8	33.6	0.031 to 0.199	0.165 to 1.068
Miragrid 10XT	9.500	1.58	1.3	1.25	3.700	0.52	0.8	33.6	0.023 to 0.146	0.165 to 1.068

Also, VERSA-TUFF pins are required and defined as miscellaneous components in accordance with the GEU standard MSE wall provision.

If you have any questions, I can be reached at (919) 707-6850.

Sincerely,



Njoroge W. Wainaina
State Geotechnical Engineer

cc: K. J. Kim, Ph.D., P.E., Eastern Regional Geotechnical Manager (w/ submittal)
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