



PAT McCrory
Governor

NICHOLAS J. TENNYSON
Secretary

January 19, 2016

Craig Moritz, P.E.
Keystone Retaining Wall Systems, Inc.
4444 West 78th Street
Minneapolis, MN 55435

Subject: Approval of Keystone's KeySystem II Retaining Wall System with Compac III SRW Units

Dear Mr. Moritz:

The Geotechnical Engineering Unit (GEU) has reviewed the submittal for Keystone's KeySystem II Retaining Wall System with Compac III SRW Units in accordance with the *NCDOT Policy for Mechanically Stabilized Earth Retaining Walls* and the GEU Standard *Mechanically Stabilized Earth (MSE) Retaining Walls* Provision. Based on the information submitted, Keystone's KeySystem II MSE wall system with Compac III SRW units is **approved for provisional 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: <https://connect.ncdot.gov/resources/Geological/Pages/Products.aspx>

See the standard MSE wall provision for restrictions on MSE wall systems with "approved for provisional use" status. This letter includes the approved facing elements, reinforcements with design parameter tables and miscellaneous components as well as an additional design requirement for the KeySystem II with Compac III units in accordance with the GEU standard MSE wall provision.

Facing Elements

18" x 8" x 12" deep Compac Series III Segmental Retaining Wall (SRW) Units with less than 1 degree batter

Reinforcements

Miragrid 3XT, 5XT, 7XT, 8XT and 10XT Geogrids in accordance with the design parameter tables below:

- Fine Aggregate

Reinforcement	Mirafid Geogrid Properties						Keystone Connection Properties					
	Tult (lb/ft)	RFcr 75/100 year design life	RFd pH 5-8	RFid Fine Agg	Tal		F*	α	p (deg)	CRult	CRcr 75 & 100 year design life	Tac 75 & 100 year life (lb/ft)
					75 year life (lb/ft)	100 year life (lb/ft)						
Miragrid 3XT	3,500	1.45/1.47	1.15	1.10	1,908	1,882	0.61	0.80	31.3	0.28-0.66	0.23-0.55	707 - 1,662
Miragrid 5XT	4,700	1.45/1.47	1.15	1.10	2,562	2,527	0.61	0.80	31.3	0.20-0.57	0.17-0.47	680 - 1,945
Miragrid 7XT	5,900	1.45/1.47	1.15	1.10	3,217	3,173	0.61	0.80	31.3	0.15-0.52	0.13-0.43	657 - 2,213
Miragrid 8XT	7,400	1.45/1.47	1.15	1.10	4,034	3,979	0.61	0.80	31.3	0.14-0.46	0.12-0.38	772 - 2,448
Miragrid 10XT	9,500	1.45/1.47	1.15	1.10	5,179	5,109	0.61	0.80	31.3	0.08-0.35	0.06-0.29	531 - 2,394
NCDOT	1.45/1.47	1.15	1.10	varies		0.61	0.80	31.3	varies	varies	varies	



- Coarse Aggregate

Reinforcement	Mirafi Geogrid Properties						Keystone Connection Properties					
	Tult (lb/ft)	RFcr 75/100 year design life	RFd pH 5-8	RFid Coarse Agg	Tal		F*	α	ρ (deg)	CRult	CRcr 75 & 100 year design life	Tac 75 & 100 year design life (lb/ft)
					75 year life (lb/ft)	100 year life (lb/ft)						
Miragrid 3XT	3,500	1.45/1.47	1.15	1.25	1,679	1,656	0.70	0.80	35.1	0.28-0.66	0.23-0.55	707 - 1,662
Miragrid 5XT	4,700	1.45/1.47	1.15	1.25	2,255	2,224	0.70	0.80	35.1	0.20-0.57	0.17-0.47	680 - 1,945
Miragrid 7XT	5,900	1.45/1.47	1.15	1.25	2,831	2,792	0.70	0.80	35.1	0.15-0.52	0.13-0.43	657 - 2,213
Miragrid 8XT	7,400	1.45/1.47	1.15	1.25	3,550	3,502	0.70	0.80	35.1	0.14-0.46	0.12-0.38	772 - 2,448
Miragrid 10XT	9,500	1.45/1.47	1.15	1.25	4,558	4,496	0.70	0.80	35.1	0.08-0.35	0.06-0.29	531 - 2,394
NCDOT	1.45/1.47	1.15	1.25	varies		0.70	0.80	35.1	varies	varies	varies	

Miscellaneous Components

Keystone Fiberglass Pins for SRW unit alignment as required by Keystone

Additional Design Requirement

For traffic impact cases with guardrail or barrier, use full length primary geogrid between each SRW unit layer for the top 2 ft of wall, i.e., reinforcement located at 8", 16" and 24" below top of wall.

A renewal is required if the KeySystem II with Compac III units changes or 5 years from the date of this letter for the system to stay on the NCDOT list of approved MSE wall systems. If there are any questions, I can be reached at (919) 707-6850.

Sincerely,

DocuSigned by:


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 John L. Pilipchuk, L.G., P.E.
 State Geotechnical Engineer

- cc: Mohammed Mulla, P.E., Geotechnical Contracts & Statewide Services Manager
 K. J. Kim, Ph.D., P.E., Eastern Regional Geotechnical Manager
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 Chris Peoples, P.E., State Materials Engineer
 Jessica Kuse, P.E., State Value Management Engineer
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