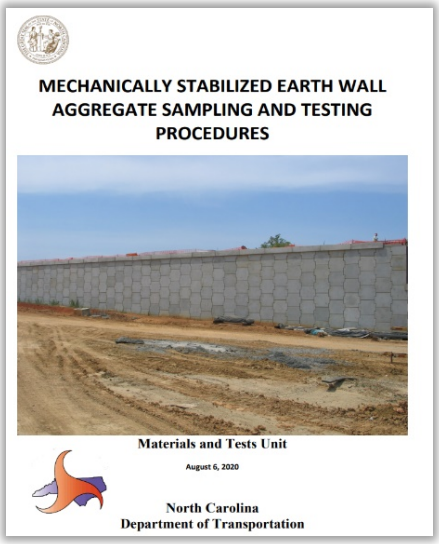
STRUCTURE BULLETIN

NCDOT Construction Unit

Website email



1. Current Issues: MSE Wall Aggregate Sampling
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Current Issues: MSE Wall Aggregate Sampling

The Materials and Tests Unit has recently updated their Aggregate Sampling and Testing Procedures Manual for MSE Walls which can be found at this Link. Section 4 of the new manual clarifies when samples are needed and who is responsible for taking them. Physical requirements (i.e. gradation) is covered under the routine QA/QC program and no project specific samples are required. Chemical/Electrochemical samples are required on all MSE walls except those utilizing Non-Coastal Plain Coarse Aggregate with Steel reinforcement. Good news for project inspectors….these samples will be taken by M&T from the quarry, prior to wall construction beginning. The catch is, they have to be notified in advance of wall construction so that the samples can be taken. The Contractor/Aggregate Producer should notify the M&T Aggregate QA/QC Engineer, but it is a good idea for the RE staff to ensure that M&T has been notified for each wall to be constructed. If there are multiple walls, each wall requires its own sample. The only time samples will be required from the project is if a wall exceeds 3000 yd^3. The project inspector would then be required to sample the aggregate according to the procedures in this manual. Additionally, there are no more verification samples required. Contact your M&T Section Materials Specialist with specific questions about the manual or sampling process.

Proper Compaction :

The MSE Wall special provision requires the contractor to properly compact the aggregate in the reinforced zone. For fine aggregates, Subarticle 235-3(C) must be followed. There is further guidance for compactive effort and equipment to be used depending on the proximity to the wall face. The Special Provision should be reviewed for these requirements. The area outside the reinforced zone must be backfilled in accordance with Article 410-8 and be backfilled as the reinforced zone is brought up in layers. Many times, the compactive effort in this zone is rushed and not coordinated well between the wall contractor and grading contractor. This can lead to settlement of approach slabs, or roadway sections. The inspector should monitor this backfill operation as close as possible and take density tests when necessary to confirm proper compaction.

Concrete Slump Increase:

A memo dated 7/18/20 from M&T addressed a recent change to the Standard Specs. To improve workability, finishing, and concrete consolidation, the allowable slump for concrete has been increased to allow up to **6 inches**. The additional slump must be achieved by adding a chemical admixture conforming to Section 1024-3. Water reducing admixtures can be used in various ways, but primarily allow increased workability without the addition of excessive water. This improves the workability without negatively affecting strength and durability. The admixture must be listed on the approved concrete mix design Form 312U to be used. If it is not, and they want to increase the slump, they will need to resubmit the mix design for approval. There will be times that a 6" slump is warranted, but just because they can pour with a 6" slump, does not mean they always should. For instance, deck pours with steep grades or superelevations could cause problems if the slump were too high. The Contractor is responsible for the final product and must decide the slump to best suit the situation, within the allowable slump range. One other point of caution is at the beginning of pumping. Often, the Contractor does not pump all the slick pack out before the initial test. High slump is usually an indication of this. With the higher slump allowance, increased attention to this is warranted. The memo addressing the slump increase can be found HERE. A copy is also attached at the end of the bulletin.

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Videos:

Inspection training videos can be found on the Construction Unit YouTube playlist.

Training:

Structure Bulletins are now archived on the Construction Unit website under Construction Resources.

If you have a topic you would like to see addressed in a future edition of the Structure Bulletin, please email us at either acochran@ncdot.gov or aearwood@ncdot.gov

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

J. ERIC BOYETTE
SECRETARY

DATE: July 18, 2020

TO: Division Engineers

FROM: Todd W. Whittington, PE
State Materials Engineer

DocuSigned by:
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SUBJECT: Modifications to Table 1000-1 – Slump Requirements for Concrete

To improve workability, finishing, and concrete consolidation in structures with congested steel designs, the allowable slump for Class AA, A, B, and lightweight concrete has been increased to allow up to 6 inches. The additional slump must be achieved by adding a chemical admixture conforming to Section 1024-3.

As prescribed in Note A of the table, in no case shall the water-cement ratio on the approved concrete mix design be exceeded. Concrete exhibiting segregation and/or excessive bleeding will be rejected. Utilizing an admixture to modify slump does not relinquish the contractor's responsibility to ensure the final product quality and overall configuration meets design specifications. Caution should be taken when placing these modified mixes on steep grades to prevent unintended changes to the set slope.

This change will take effect immediately for all contracts. The Standard Specifications and all associated manuals and references have been modified to reflect these changes. For your information, a copy of the special provision SP10 R01, Table 1000-1, is attached.

If you have any questions, please contact Brian Hunter at 919-329-4030 or bhunter@ncdot.gov.

Attachment

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PORTLAND CEMENT CONCRETE PRODUCTION AND DELIVERY:

(9-15-20) 1000, 1014, 1024 SP10 R01

Revise the *2018 Standard Specifications* as follows:

Page 10-6, Table 1000-1, REQUIREMENTS FOR CONCRETE, replace with the following:

TABLE 1000-1
REQUIREMENTS FOR CONCRETE

Class of Concrete	Min. Compressive Strength at 28 days	Maximum Water-Cement Ratio				Consistency Maximum Slump		Cement Content			
		Air-Entrained Concrete		Non-Air-Entrained Concrete		Vibrated	Non-Vibrated	Vibrated		Non-Vibrated	
		Rounded Aggregate	Angular Aggregate	Rounded Aggregate	Angular Aggregate			Min.	Max.	Min.	Max.
Units	*psi*					*inch*	*inch*	*lb/cy*	*lb/cy*	*lb/cy*	*lb/cy*
AA	4500	0.381	0.426	---	---	3.5[A]	---	639	715	---	---
AA Slip Form	4500	0.381	0.426	---	---	1.5	---	639	715	---	---
Drilled Pier	4500	---	---	0.450	0.450	---	5 – 7 dry 7 - 9 wet	---	---	640	800
A	3000	0.488	0.532	0.550	0.594	3.5 [A]	4.0	564	---	602	---
B	2500	0.488	0.567	0.559	0.630	1.5 machine placed 2.5 [A] hand placed	4.0	508	---	545	---
Sand Light-weight	4500	---	0.420	---	---	4.0 [A]	---	715	---	---	---
Latex Modified	3000 (at 7 days)	0.400	0.400	---	---	6.0	---	658	---	---	---
Flowable Fill excavatable	150 max. (at 56 days)	as needed	as needed	as needed	as needed	---	Flow-able	---	---	40	100
Flowable Fill non-excavatable	125	as needed	as needed	as needed	as needed	---	Flow-able	---	---	100	as needed
Pavement	4500 Design, field 650 flexural, design only	0.559	0.559	---	---	1.5 slip form 3.0 hand placed	---	526	---	---	---
Precast	See Table 1077-1	as needed	as needed	---	---	6.0	as needed	as needed	as needed	as needed	as needed
Prestressed	per contract	See Table 1078-1	See Table 1078-1	---	---	8.0	---	564	as needed	---	---

A. The slump may be increased to 6 inches, provided the increase in slump is achieved by adding a chemical admixture conforming to Section 1024-3. In no case shall the water-cement ratio on the

approved design be exceeded. Concrete exhibiting segregation and/or excessive bleeding will be rejected. Utilizing an Admixture to modify slump does not relinquish the contractor's responsibility to ensure the final product quality and overall configuration meets design specifications. Caution should be taken when placing these modified mixes on steep grades to prevent unintended changes to the set slope.

Updated: 8/26/2020

QUICK REFERENCE

MECHANICALLY STABILIZED EARTH (MSE) WALL AGGREGATE SAMPLING AND TESTING PROCEDURES

https://connect.ncdot.gov/resources/Materials/MaterialsResources/Mechanically%20Stabilized%20Earth%20Wall%20Aggregate%20Sampling%20and%20Testing%20Procedures.pdf

Do you have an MSE wall on your project?	If yes **and** sample required per table below, RE office and aggregate supplier shall contact the Materials and Tests Unit Aggregate QC/QA Engineer (Chris Whitley) as soon as the aggregate source is known. The initial acceptance sampling for each wall will be performed by the Materials and Tests Unit at the quarry per the sampling method described in the procedures.
Is your MSE Wall larger than 3,000 yd^3?	If yes **and** sample required per table below, project personnel, certified as NCDOT Aggregate QC/QA Sampling Technicians or as NCDOT Aggregate QC/QA Sampling and Testing Technicians, will take a project verification sample after the first 3,000 yd^3 are delivered per the sampling method described in the procedures.

Note: In the rare instance where the wall contains both geosynthetic and steel in the same wall, the scenario resulting in harsher test requirements shall be followed.

Scenarios

		Coarse Aggregate				Fine Aggregate	
Aggregate Source Location		**Coastal Plain* Source**		**Non-Coastal Plain Source**		**All Sources**	
Reinforcement / Connector Type		**Steel**	**Geosynthetic**	**Steel**	**Geosynthetic**	**Steel**	**Geosynthetic**
Electrochemical	**Sample required?**	**Yes**	No	No	No	**Yes**	No
	Tested For	Table 2	N/A	N/A	N/A	Table 1	N/A
pH	**Sample required?**	**Yes**	**Yes****	No	**Yes****	**Yes**	**Yes**
	Tested For	Table 3	Table 3	N/A	Table 3	Table 3	Table 3
Physical Testing	**Sample needed?**	No, however sources must participate in the Department's Aggregate QC/QA Program				No, however sources must participate in the Department's Aggregate QC/QA Program	
	Gradation	57***, 57M***, 67 or 78M				1S, 2S, 2MS, 4S or Class III Type 3	

* Coastal Plain as defined by Sub article 1018-2(B)(1) of the NCDOT Standard Specifications

** Not Common

***Not to be used with geosynthetic