

The attached variance VAR-2013-105 designates LATM Mix 15 as a pre-approved, exterior concrete mix that replaces LATM Mix 19 and 44 on all new projects. This change became effective on September 4, 2013.

For existing projects in progress before the effective date of September 4, 2013, mix 19 and 44 will be allowed.

This VAR supersedes VAR-2012-066 - Labwide Ext Concrete Strength and Durability per IBC 2009.

If you have any questions, please feel free to contact Doug Volkman, 667-6238.



**Conduct of Engineering
Request for Variance or Alternate Method**

Assigned by SMPO or SMPOR: Alternate Method Variance Tracking number: VAR- 2013-105

1.0 Affected Document(s)

<input type="checkbox"/> Engineering Processes (e.g., P 341) <input checked="" type="checkbox"/> Engineering Standards (e.g., P 342) <input type="checkbox"/> Engineering Training & Qualification (e.g., P 343) If against P documents themselves, revision: _____	Subordinate (Functional Series) document if applicable (ESM Chapter, Master Spec, AP, etc.): Document Title/Number: <u>03 3001</u> Revision: <u>6</u>
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1.1 SECTION 2.7 CONCRETE MIX, Paragraph H. Pre-Approved LATM Design Mixes, Subsection H.3.a. and H.3.b.

1. Specific Requirement(s) as Written in the Document(s) The pre-approved mixes are:
- a. LATM Mix No. 19 -- Exterior, 4000 psi concrete, 4" slump, 5% air (use aggregate correction factor of 0.3 for ML-3 and ML-4 concrete)⁽⁷⁾, 20% fly ash (proportions per CY):

Type I-II Cement: Gcc Rio Grande, Tijeras	656 lbs
Class F, Fly Ash: Salt River Materials, 4-Corners	164 lbs
Water	295 lbs
Washed Concrete Sand: El Guique Quarry	1079 lbs
Sz#67 Coarse Aggregate: El Guique Quarry	1630 lbs
Water Reducer: Mb poly heed 997	41 oz ⁽¹⁾
Air Entraining Agent: MB Micro Air,	8.2 oz ⁽²⁾

 - b. LATM Mix No. 44 -- Exterior, 4000 psi concrete to be pumped, 6" slump, 5% air (use aggregate correction factor of 0.3 for ML-3 and ML-4 concrete)⁽⁷⁾, 20% fly ash (proportions per CY)⁽⁸⁾:

Type I-II Cement: Gcc Rio Grande, Tijeras	656 lbs
Class F, Fly Ash: Salt River Materials, 4-Corners	164 lbs
Water	295 lbs
Washed Concrete Sand: El Guique Quarry	1079 lbs
Sz#67 Coarse Aggregate: El Guique Quarry	1630 lbs
Water Reducer, Mb poly heed 997	57.4 oz ⁽¹⁾
Air Entraining Agent: MB Micro Air,	8.2 oz ⁽²⁾

2.0 Request

Brief descriptive title: <u>LATM Concrete Mix 15 is pre-approved exterior mix</u>	
NCR required (work has occurred)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If Yes, NCR Number
TA-Bldg-(Room) and/or Project Affected <u>Site-wide</u>	System/Component Affected
Proposal ESM Master Specification 03 3001, Reinforced Concrete, Section 2.7, Paragraph H.3.a. and H.3.b. include pre-approved concrete mixes that are not compliant with severe freeze-thaw durability requirements included in ACI318-08 that at times apply to Los Alamos applications. LATM mix 15 has been designed to accommodate the increased durability requirements of ACI318-08, as well as address the cementitious limits for mass concrete as specified in ACI 301 Section 8.1.2. These mixes are intended to replace the pre-approved LATM mixes 19 and 44 for exterior concrete. Mix 15 is to be used for normal placements, as well as pump placements, of concrete.	

This proposal should apply to all projects, site-wide, that have incorporated ESM Master Specification 03 3001 into the project specifications. Note, this variance applies to ML-3 and ML-4 concrete; ML-3 (DID), ML-2, and ML-1 must following the CGI process to be used. Also, note that issuance of this variance supersedes variance VAR-2012-066 for all new projects starting on the issuance date for this variance. However, VAR-2012-066 may still be used for any project that is in progress before the issuance date of this variance.

Justification/Compensatory Measures

LATM concrete mix 15 has been developed to produce concrete with compressive strengths of 4500psi, while maintaining 6% air content, as required to meet severe freeze-thaw conditions defined in ACI318-08. This has been accomplished through the use of chemical admixtures, which allow for low w/c ratios. See the attached mix design. A cautionary note is that LATM mix 15 has been lab tested only. When batch plant production is started, the amount of admixture necessary to produce fresh concrete, with a target of 4500 psi and other material properties may vary. As a result, some initial batches may not achieve full performance expectations.

Duration of Request:	Start Date:	End Date:	<input checked="" type="checkbox"/> Lifetime	
Requestor Douglas E. Volkman	Z Number 099106	Organization ES-DE	Signature Signature on file	Date 8/8/13
USQD/USID required (Nucl. High/Mod Hazard)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		If Yes, USQD/USID Number		
Design Authority Representative N/A	Z Number	Organization	Signature	Date
LANL Owning Manager (FOD or Programmatic) N/A	Z Number	Organization	Signature	Date

3.0 Safety Management Program Owner (SMPO) Representative (SMPOR/POC)

<input type="checkbox"/> Decline <input type="checkbox"/> Accept <input checked="" type="checkbox"/> Accept Labwide <input type="checkbox"/> with Modification:			
POC Michael W. Salmon	Z Number 115793	Signature Signature on file	Date 8/28/13

4.0 Additional Approval for P341 and APs; P342, ESM, Code, and Regulation Matters; and P343

<input checked="" type="checkbox"/> Accepted <input type="checkbox"/> Accepted with comments <input type="checkbox"/> Declined			
Comments:			
Safety or Security Management Program Owner Lawrence K. Goen	Z Number 106351	Signature Signature on file	Date 9/4/13

4500 PSI Air Entrained Concrete Design

Client: Los Alamos Transit Mix
 Address: PO Box 38
Espanola, NM 87532

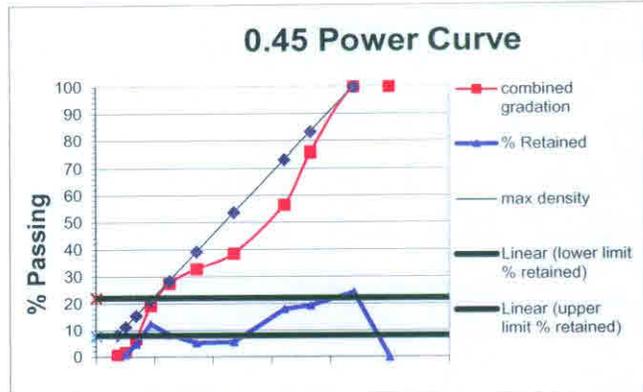
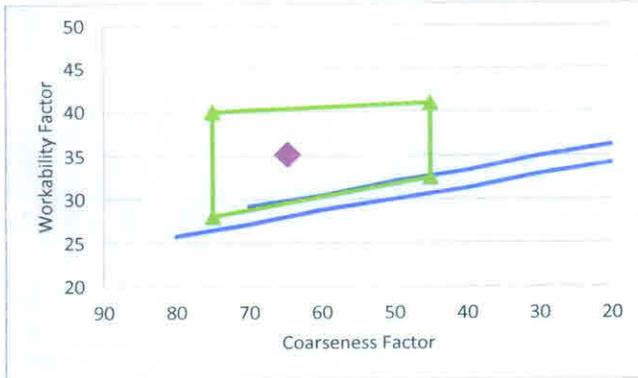
Report Date: 7/29/2013
 Lab Log: MD38-08

		MIX ID: LATM 15			
CONCRETE MIX PROPORTIONS					
Material Description	Material Source	SSD Batch Weights	Specific Gravity	Absorption	Abs Vol in Ft ³
Cement	I/II LA	GCC Tijeras	520	3.15	2.65
Fly Ash	CI. F	SRM Four Corners	130	2.01	1.04
		Total Cementitious>	650		
Fine Aggregate (lbs)		El Guique Sand	1137	2.627	1.10%
Coarse Aggregate #1 (lbs)		El Guique #67 (3/4")	1855	2.665	0.80%
Coarse Aggregate #2 (lbs)		N/A	0	1	1.00%
Coarse Aggregate #3 (lbs)		N/A	0	1	1.00%
Total design coarse aggregate at ssd:		1855			
Total design FA & CA at ssd:		2993		18.09	
Air Content % by volume		Entrained	6.0		1.62
Water @ SSD aggregates		Gals/cubic yard:	27.0		3.60
		Lbs per cubic yard:	225		
		Total Weight>	3868	Total Volume>	27.0
Range of acceptable dosages					
Air Entraining Admixture - OZ		BASF Micro Air, oz	7.2	3 -20 oz/cy	1.1 oz/cwt
HRWRA - OZ		BASF Glenium 3030, oz	78.0	70 - 100 oz/cy	12.0 oz/cwt
Hydration Stabilizer		BASF Delvo, oz	3.3	2 - 6 oz/cy	0.5 oz/cwt
<i>Temperature and slump variations may cause adjustments in admixtures dosages.</i>					
			Design	Specs	
Total Cementitious content in lbs:	650				
Cement content in lbs:	520				
Water/cementitious ratio:	0.35				
Ash wt as % of cement wt only:	25.0%				
Ash wt as % of total cementitious:	20.0%				
El Guique Sand	38.0%				
El Guique #67 (3/4")	62.0%				
	N/A	0.0%			
	N/A	0.0%			
			Target corrected air content:	4.5 - 7.5%	
			Aggregate Correction Factor:	0.3	
			Anticipated Air Content:	<input type="text" value="6.0%"/>	
			Target slump:	4 - 8"	
			Anticipated Slump:	<input type="text" value="6"/>	
			Anticipated Unit Weight:	<input type="text" value="143.2"/>	
			Max Theo. unit weight:	152.4	
			Calc'd Air:	6.0%	
Age in Days	anticipated compressive strength		Specs		
<u>7</u>	5881				
<u>14</u>	6504				
<u>28</u>	7158				
			f _c = 4500 psi		
			f _{cr} = 5700 psi		
Anticipated plastic and hardened properties are based on trial batches prepared in March 2013. The range of acceptable dosages is based on trial data and supplier experience in an effort to make the mix as versatile as possible for use in pump and non-pump operations.					

4500 PSI Air Entrained Concrete Design

Client: Los Alamos Transit Mix
 Address: PO Box 38
 Espanola, NM 87532

Report Date: 7/29/2013
 Lab Log: MD38-08



Workability Factor 32.9
 Coarseness Factor 64.7

adjusted for
 cementitious content
 35.2
 64.7

Combination	Sand	Rock 1	Rock 2	Combined	% retained Individual	% cumulative Individual
	38%	62%	0%			
1"	100	100		100		
3/4"	100	100		100	0	0
1/2"	100	61		76	24	24
3/8"	100	30		57	19	43
#4	100	1		39	18	61
#8	85	1		33	6	67
#16	71	1		28	5	72
#30	49	1		19	8	81
#50	16	1		7	13	93
#100	3	1		2	5	98
#200	1.1	0.6		0.8	1	99

