TRIAL BATCH DEMONSTRATION

Date:_____ Location:_____

Ambient Temperature & RH:_____

Batching & Mixing Equipment:_____

Mix Design Identification & Intended Use:_____

AGGREGATE PROPERTIES

Properties	Contractor Result	INDOT Result
FA Bulk Sp. Gr. (SSD)		-NA-
FA Absorption	%	-NA-
FA Moisture	%	%
FA Gradation	(attached)	(not required)
CA Bulk Sp. Gr. (SSD)		-NA-
CA Absorption	%	-NA-
CA Moisture	%	%
CA Gradation	(attached)	(not required)
Agg. Correction Factor	%	%

CONCRETE BATCHING

Materials	Design Batch Wts. (SSD Agg. Wts.) kg/m^3	Dry Aggregate Batch Weights kg/m^3	Target Batch Wts. (Moist Agg.Wts.) kg/m^3	Target Batch Size m^3	Total Batch Wts. kg	Actual Batch Wts. kg	Error ± %
Cement		-NA-					
Pozzolan		-NA-					
Silica Fume		-NA-					
FA							
CA							
Water		-NA-					
∑		-NA-		-NA-	-NA-		-NA-

Admixtures	Target Dosage ml/100kg	Total Req. Dosage ml	Actual Dosage ml	Error ±%
AEA				
Type ( )				
Type ( )				

CONCRETE TESTING

Plastic Property	Contractor Quality Control Technician	INDOT Acceptance Sampler	Tolerance Check	Third Party Results
W/(C+P)				
Unit Wt. (kg/m^3)				
Air Content (%)				
Slump (mm)				
Relative Yield			-NA-	

Use ITM 403, Attachment A, to calculate Water Cementitious Ratio.

LINEAR EQUATION

	Predicted Unit Weight kg/m^3	Measured Unit Weight kg/m^3	Tolerance Check ± %
Contractor Rep.			
INDOT Rep.			
Third Party			

COMPRESSIVE STRENGTH

Age In Days	Contractor's Lab Result MPa		INDOT District Lab Result MPa		Tolerance Check ± %
	Specimen	Average	Specimen	Average	
7					-NA-
7					-NA-
28					
28					
					-NA-
					-NA-

COMMENTS:

Contractor Rep._____
Air Meter Serial # _____

INDOT Inspector _____
Air Meter Serial # _____

Approved By PE/PS:_____

MIX DESIGN & PROPORTIONING
QC/QA SUPERSTRUCTURE CONCRETE

Mix Identification No. & Intended Use:_____

Initial Parameters (see Note 1)	
Target Cement Content, kg/m^3	
Target Pozzolan Content, kg/m^3	
Target Silica Fume Content, kg/m^3	
Target Water / Cementitious Ratio, by wt.	
Target Cement / Pozzolan Ratio, by wt.	
Target % Silica Fume	
100 FA / FA+CA, Target, % by volume	
FA Absorption, %	
FA Bulk Sp. Gr. (SSD)	
CA Absorption, %	
CA Bulk Sp. Gr. (SSD)	

Material	Size, Type or Class	Source	Design Batch Weights kg/m^3	Specific Gravity	Absolute Volume m^3
Cement				3.150	
Pozzolan					
Silica Fume					
FA					
CA (see Note 2)					
Water				1.000	
Air	entrained	see table below	0.0	-NA-	0.0650
Σ	-NA-	-NA-		-NA-	1.0000

Admixture Name	Admixture Type	Source	Range of Dosage Rate ml/100kg
	AEA		

Note 1 – Aggregate Batch Weights For Mix Design shall be saturated surface dry (SSD). Aggregate Bulk Sp. Gr. (SSD) & Absorption will be checked against source records for INDOT concurrence. Call District Geologist for assistance.

Note2 – Is Class AP coarse aggregate require? [ ] yes [ ] no

CMD Linear Equation: Unit Weight = _____ (Air Content) + _____

Linear Equation At Maximum Allowable Water/Cementitious Threshold: UW = _____(Air) + _____

(see attached worksheets)

PE/PS Approval: _____

WORKSHEET FOR CMD LINEAR EQUATION

Material	Mix Design 6.5% Target Air Content Yield = 1.000 m^3			Mix Proportions 5.0 % Air Content Yield = 0.985 m^3		
	Weight kg	**Specific Gravity**	**Volume m^3**	**Weight kg**	**Specific Gravity**	**Volume m^3**
Cement		3.150			3.150	
Pozzolan						
Silica Fume						
FA						
CA						
Water		1.000			1.000	
Air Content	0.0	-NA-	0.0650	0.0	-NA-	0.0500
∑		-NA-			-NA-	
Unit Weight, ordinate for Point	Pt. 2, y_2 =			Pt. 1, y_1 =		
W / (C + P + SF), by weight						
100 FA / (FA+CA),% by volume						

Slope of line = $m = (y_2 - y_1) / (x_2 - x_1)$ where: y_2 = Unit Weight, ordinate for Point 2

$m = (y_2 - y_1) / (6.5 - 5.0)$ y_1 = Unit Weight, ordinate for Point 1

$m = (y_2 - y_1) / (1.5)$

m = (_____ – _____) ÷ 1.5

m = (_____) ÷ 1.5

m = _____ rounded to nearest tenth (note: slope is negative value)

y-intercept = $b = y_2 - (6.5\ m)$ where: y_2 = Unit Weight, ordinate for Point 2

b = _____ – (6.5 × _____)

b = _____ – (_____) (note: subtracting a negative value results in adding a positive value)

b = _____

b = _____ rounded to whole kg/m^3

Linear Equation: UW = m (Air) + b

UW = _____ (Air) + _____

Transfer equation to sheet 1 of 3, Mix Design & Proportioning

WORKSHEET FOR LINEAR EQUATION OF UNIT WEIGHT Vs. AIR CONTENT AT MAXIMUM ALLOWABLE WATER / CEMENTITIOUS THRESHOLD

CMD Target Cementitious Content (C+P+SF): _____ kg/m^3 (pg. 1 of 3)
Maximum Allowable Water Content: _____ kg/m^3 $\times$ 0.420 = _____ kg/m^3
CMD Target Water Content: _____ kg/m^3 (pg. 1 of 3)
Additional Water: _____ kg/m^3 – _____ kg/m^3 = _____ kg/m^3

Material	**CMD Weights kg/m^3**	**Water + / – kg/m^3**	**Initial Batch Weights Prior To Normalizing**			**1st Iteration To Normalize Weights**			**2nd Iteration To Normalize Weights**		
			Weight kg	**Specific Gravity**	**Volume m^3**	**Weight kg**	**Specific Gravity**	**Volume m^3**	**Weight kg**	**Specific Gravity**	**Volume m^3**
Cement		-NA-		3.150			3.150			3.150	
Pozzolan		-NA-									
Silica Fume		-NA-									
FA		-NA-									
CA		–									
Water		+		1.000			1.000			1.000	
Air Content	0.0	-NA-	0.0	-NA-	0.0650	0.0	-NA-	0.0650	0.0	-NA-	0.0650
∑		-NA-		-NA-			-NA-			-NA-	
Unit Weight, kg/m^3		-NA-	-NA-								

Unit Weight From CMD Linear Equation @ 6.5 % Air Content: _____ kg/m^3 (Σ for CMD Weights)
Normalized Unit Weight @ 6.5 % Air Content From Iterations: _____ kg/m^3
Difference: _____ kg/m^3 (rounded to whole kg/m^3)
Subtract Difference from CMD y-intercept (pg. 2 of 3) to get y-intercept for threshold equation: _____ kg/m^3
Slope for threshold equation (same as slope for CMD linear equation, pg. 2 of 3) = _____
Linear Equation For Max. Allowable W / (C+P+SF) Threshold: **UW = _____(Air Content) + _____**
Transfer equation to Page 1 of 3, Mix Design & Proportioning

WORKSHEET FOR CALCULATING REDESIGN OF CONCRETE AS THE RESULT OF OUT-OF-TOLERANCE BATCHING AT TBD

Absorption FA: _____% Absorption CA: _____%
Moisture Content FA: _____% Moisture Content CA: _____%

Material	Actual Batch Weights kg	Target Batch Size m^3	Starting Point For Adjusting Batch Weights					1st Iteration To Normalize Weights			2nd Iteration To Normalize Weights		
			Moist Agg. Wt. kg	Dry Agg. Wt. kg	SSD Agg. Wt. kg	Sp. Gr.	Vol. m^3	SSD Agg. Wt. kg	Sp. Gr.	Vol. m^3	SSD Agg. Wt. kg	Sp. Gr.	Vol. M^3
Cement				-NA-		3.150			3.150			3.150	
Pozzolan				-NA-									
Silica Fume				-NA-									
FA													
CA													
Water				-NA-		1.000			1.000			1.000	
Air Content	0	-NA-		-NA-		-NA-	0.0650	0.0	-NA-	0.0650	0.0	-NA-	0.0650
∑	-NA-	-NA-		-NA-		-NA-			-NA-			-NA-	
Unit Weight, kg/m^3		-NA-	-NA-										

Initial Parameters		✔Spec
Target Cement Content, kg/m^3		
Target Pozzolan Content, kg/m^3		
Target Silica Fume Content, kg/m^3		
Target Water / Cementitious Ratio, by wt.		
Target Cement / Pozzolan Ratio, by wt.		
Target % Silica Fume		
100 FA / FA+CA, Target, % by volume		

If initial parameters meet requirements of Special Provision, repeat pages 1 through 3 of Mix Design & Proportioning