



1800 SUPER-ADMIX - HIGH PERFORMANCE CONCRETE

HIGH PERFORMANCE CONCRETE using 14.9% FLY ASH MIX DESIGN

MECHANICAL ANALYSIS: PCT. PASSING U.S. STANDARD SIEVES

SIEVE	2"	1.5"	1.0"	3/4"	3/8"	#4	#8	#16	#30	#50	#100	#200	F.M.	Absorb
1" X #4			100	96	49	3							6.52	1.2
SAND					100	98	81	56	33	13	4	2	3.15	1.8
COMBINED			100	98	74	50	40	28	16	6	2	1		

SACK CONTENT: 6.0 SACKS PER CU YD WATER/CEMENT RATIO: **.53**
 SPECIFIED STRENGTH: **3000 PSI** SLUMP: **3-4" MAX.**
 ENTRAINED AIR: 0.0% ADMIXTURES: **MOXIE 1800 SUPER-ADMIX**
 PORTLAND CEMENT TYPE: **CALAVERAS, I-II LA**
 WATER/VAPORPROOF CONCRETE *MIX DESIGN MI 97

MATERIAL	SPECIFIC GRAVITY	DENSITY LB./C.F.	S.S.D. WEIGHT	ABSOLUTE VOLUME CUBIC FEET
1" X #4	2.66	165.98	1548 LBS	9.327
SAND	2.69	167.86	1564 LBS	9.320
CEMENT	3.15	196.56	480 LBS	2.442
FLY ASH POZZOLANIC INT'L	2.39	149.14	84 LBS	0.563
WATER	1.00	62.40	293.67 LBS	4.715
MOXIE 1800 SUPER-ADMIX (60 oz per yard)	1.09	68.02	6.33 LBS	.093
ENTRAPPED AIR(approx. 2%)				0.540
TOTAL			3976 LBS	27.000

CHEMICAL AND PHYSICAL TEST RESULTS

TYPE:	CALAVERAS, I-II LA	FINENESS (M2/Kg)	375	Blaine
CERT	#000	TIME OF SET (MINUTES)		
SiO2 (%):	20.79	INITIAL:	96	
Al2O3 (%):	4.73	FINAL:	171	
Fe2O3 (%):	4.19	COMPRESSIVE STRENGTH (PSI)		
CaO (%):	64.88	3-DAY:	3310	
MgO (%):	1.10	7-DAY:	4262	
SO3 (%):	2.93	28-DAY:	5155	
TOTAL ALKALI AS Na2O (%):	0.28	28-DAY (PROJECTED):	5591	
LOSS-ON IGNITION (%):	1.17			
INSOLUBLE RESIDUE (%):	0.65			
C3S (%):	58.1			
C2S (%):	15.8			
C3A (%):	6.2			
C4AF (%):	12.8			

AVERAGE COMPRESSION STRENGTHS - Designed Strength **3,000 P. S. I.**

	3 DAY	7 DAY	28 DAY
P.S.I.	3310	4262	5155

AVERAGE FLEXURAL STRENGTH - ASTM C78, Three point loading - Designed minimum, **383 Modulus of Rupture**

	3 DAY	7 DAY	28 DAY
Modulus of Rupture	773	844	984

Aggregate source: **Table Mountain Quarry, Jamestown, CA**

TABLE 1. HIGH PERFORMANCE MOXIE 1800 SUPER-ADMIX



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CONCRETE MIX DESIGN WITH 17.5% TYPE F FLY ASH		
		HIGH-PERFORMANCE FLYASH CONCRETE - Kg/m ³
CEMENT (Kg/m ³)		400
FLY ASH, TYPE F 17.5%		70
SAND ((K)g/m ³)		1,800
10mm CRUSHED AGGREGATE(Kg/m ³)		230
20mm CRUSHED AGGREGATE(Kg/m ³)		85
WATER (LITERS.)		15,000
MOXIE 1800 SUPER-ADMIX (% OF CEMENT AND FLY ASH)		70.5 .015%
28 DAY CUBE STRENGTH		60 N/mm ²

TABLE 2. MIX PROPORTIONS AND PROPERTIES OF A TYPICAL STANDARD CONCRETE MIX DESIGN AND HIGH-PERFORMANCE CONCRETE		
	TYPICAL STANDARD CONCRETE	HIGH-PERFORMANCE CONCRETE
CEMENT (LB./CU. YD.)	520	760
SAND (LB./CU. YD.)	1,300	1,290
GRAVEL (LB./CU. YD.)	1,900	1,800
WATER (LB./CU. YD.)	300	230
SILICA FUME (LB./CU. YD.)		85
SUPERPLASTICIZER (% OF CEMENT AND SILICA FUME)	0	1.7%
28 DAY COMPRESSIVE STRENGTH	4,250	15,000
MODULUS OF ELASTICITY (KSI)	3,600	6,400
SERVICE LIFE (YEARS)	30 TO 40	50 TO 100

TABLE 3. COMPRESSIVE STRENGTH CONTRIBUTION OF PORTLAND CEMENT TO CONCRETE	
AGE OF TEST (DAYS)	PSI PER POUND OF CEMENT PER CUBIC YARD
1	1 TO 3
7	5 TO 8
28	8 TO 12

TABLE 4. COMPRESSIVE STRENGTH CONTRIBUTION OF WATER-REDUCING ADMIXTURES TO CONCRETE	
AGE OF TEST (DAYS)	INCREASE PSI PER POUND OF CEMENT PER CUBIC YARD
1	0.2 TO 0.5
7	0.7 TO 1.5
28	1.0 TO 2.0

TABLE 5. COMPRESSIVE STRENGTH



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CONTRIBUTION OF POZZOLANS TO CONCRETE						
AGE OF TEST (DAYS)	TYPE I CEMENT †	CLASS F FLY ASH	CLASS C FLY ASH	CLASS N FLY ASH**	SLAG ††	SILICA FUME
1	2.4	1.2	2.5	3.0	2.3	3.8
7	6.4	8.4	9.2	12.8	6.0	15.4
28	9.7	12.1	18.8	30.8	21.4	38.1

20% by weight of portland cement was replaced by an equal volume of pozzolan; in psi per pound, per cubic yard.
 **Ground expanded perlite
 †Original strength contribution per 1 pound of cement per cubic yard
 ††Granulated blast furnace slag

TABLE 6. COMPRESSIVE STRENGTH CONTRIBUTION OF FLY ASH TO CONCRETE	
AGE OF TEST (DAYS)	INCREASE PSI PER POUND OF CEMENT PER CUBIC YARD
1	0 TO 8
7	7 TO 15
28	9 TO 20

Reference: Bruce A. Suprenant, Rules of thumb for strength contribution, Concrete Journal, 1994, The Aberdeen Group, Addison, IL
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Permeability is a true indicator of durability for concrete. The following recommended tests will indicate the effectiveness of the application.

- ASTM D4263 - Standard Test for Moisture and Vapor Migration - Plastic Sheet Method
- ASTM D5084 - Standard Test for Permeability Of Concrete, Method A
- AASHTO 227, Chloride-ion Permeability Test, should not exceed 500C.

The above mix design examples are based on the most comprehensive data available at this time. They are for reference purposes only and are not absolute. These mix design have resulted in the ability to duplicate high performance concrete, at a standard mix design cost, with consistent, quality results.

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