

DOCUMENTATION OF CONCRETE MIX PERFORMANCE

AMT Engineers

Project

PROJECT: Memorial Civic Center, Lima, Ohio

ARCHITECT: Tech 5 Architects and Engineers

ENGINEER: Young & Associates

CONTRACTOR: Howard W. Kaspar and Sons

CONCRETE
SUPPLIER: National Services, Columbus, Ohio

REMARKS: All concrete supplied by National Services out of
Plant Number 4

Mix Properties

MIX No.: 3.55A

SPECIFIED STRENGTH: 3000

DESIGN AGE: 28

SPECIFIED SLUMP: 3 to 7 in

TOTAL AIR CONTENT: 4 to 8 %

UNIT WEIGHT: 142 to 145

WATER/CEMENT RATIO: 0.53

Cement Type I 417 lbs/cy

Slag cement 96 lbs/yd

Coarse agg 1 in 1825 lbs/cy

Fine agg 1192 lbs/cy

Hybrid MRWRA 6 oz/100 lbs cem

Air entraining 1 oz/100 lbs cem

Water 223 lbs/cy

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Report Number	DATE OF TEST	CYLINDER STRENGTHS, psi			Slump in.	Air Content %	Conc Temp	Ave Test Value	Cumul Ave	Cumul S D	Cumul C V	Move 3 C V	Move 3 C V	Move 3 Ave	Cumul Ave Range	Cumul Ave Range	Mov Ave Range	W/in Test C V
		28	28	28														
14	7/22/2008	4420	4310	4350	4.00	2.3	65	4360	4360	---	---	---	---	---	110	110	---	1.49
16	7/22/2008	4790	4490	4580	4.00	---	57	4620	4490	184	4.1	---	---	---	300	205	---	2.70
18	7/22/2008	4700	4790	4610	4.00	---	58	4700	4560	178	3.9	178	3.9	4560	180	197	197	2.55
23	7/22/2008	4240	4070	4170	---	---	59	4160	4460	247	5.5	291	6.5	4493	170	190	217	2.52
25	7/22/2008	4090	4600	4490	3.50	---	58	4393	4447	216	4.9	271	6.1	4418	510	254	287	3.37
29	7/22/2008	4770	4950	4670	2.50	---	59	4797	4505	240	5.3	322	7.2	4450	280	258	320	3.39
33	7/22/2008	4170	4770	4600	3.50	1.8	54	4513	4506	219	4.9	207	4.5	4568	600	307	463	4.03
36	7/22/2008	5160	5040	5130	3.50	2.7	71	5110	4582	295	6.4	298	6.2	4807	120	284	333	3.66
40	7/22/2008	3910	3930	3930	3.00	1.9	81	3923	4509	352	7.8	593	13.1	4516	20	254	247	3.33
47	7/22/2008	4320	4210	4170	4.00	2.0	79	4233	4481	343	7.7	615	13.9	4422	150	244	97	3.22
54	7/22/2008	4170	4240	4240	4.00	1.5	61	4217	4457	335	7.5	174	4.2	4124	70	228	80	3.02
62	7/22/2008	4280	4240	4420	3.50	2.0	---	4313	4445	322	7.3	52	1.2	4254	180	224	133	2.98
72	7/22/2008	3040	----	----	3.50	2.0	78	3040	4337	497	11.5	709	18.4	3857	---	---	---	---

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Analysis Criteria

Report Name: Demo3
 Report Description: Legal Portrait 13 specimens
 Report File: Demo3.SRC

Project(s): Memorial Civic Center, Lima, Ohio
 Mix(es): 3.55A
 Supplier: use all
 Technician: use all
 Slump filter: No lower limit to no upper limit
 Air Content filter: No lower limit to no upper limit
 Temperature filter: No lower limit to no upper limit
 Test dates: 1/1/1980 to : 11/20/2013
 Specimen age: 28 days

Analysis Results (28 days)

Number of tests -----	13	
Additional Strength Required (ACI 301-05) -----	1200 psi	per Table 4.2.3.3.c
Average strength -----	4337 psi	
Standard deviation -----	497 psi	
Adjusted standard deviation -----	n/a	
Design strength (28 days) -----	3000 psi	
Minimum required average strength (ACI 301-05) -----	4200 psi	per Table 4.2.3.3.a
3000 + 1200 = 4200 psi		
Margin of extra performance -----	137 psi	
(Average strength - minimum required average strength)		
Probability of a test below 3000 based on normal distribution is 0.36%		
Probability of a test below 2500 based on normal distribution is 0.01%		
Concrete performance (ACI 214R-02) -----	Very good	per Table 3.2
Based on standard deviation of 497 psi		
Using general construction testing rating system		
Laboratory testing proficiency (ACI 214R-02) -----	Excellent	per Table 3.2
Based on within test coefficient of variation of -----	2.98	
Using general construction testing rating system		
Average range -----	224 psi	
Maximum 2 specimen range permitted to attain a rating of good: ---	237 psi	
Maximum 3 specimen range permitted to attain a rating of good: ---	356 psi	

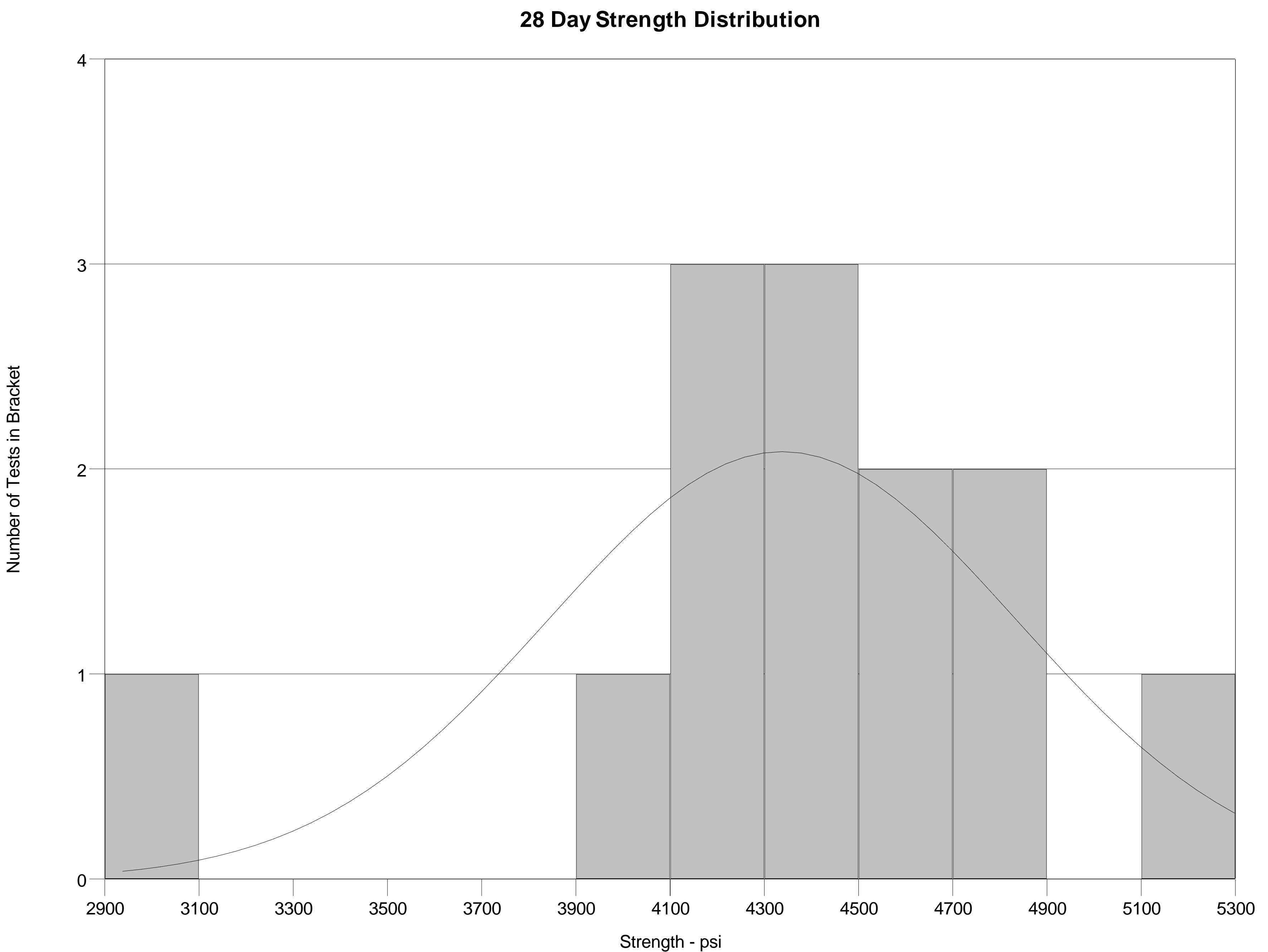
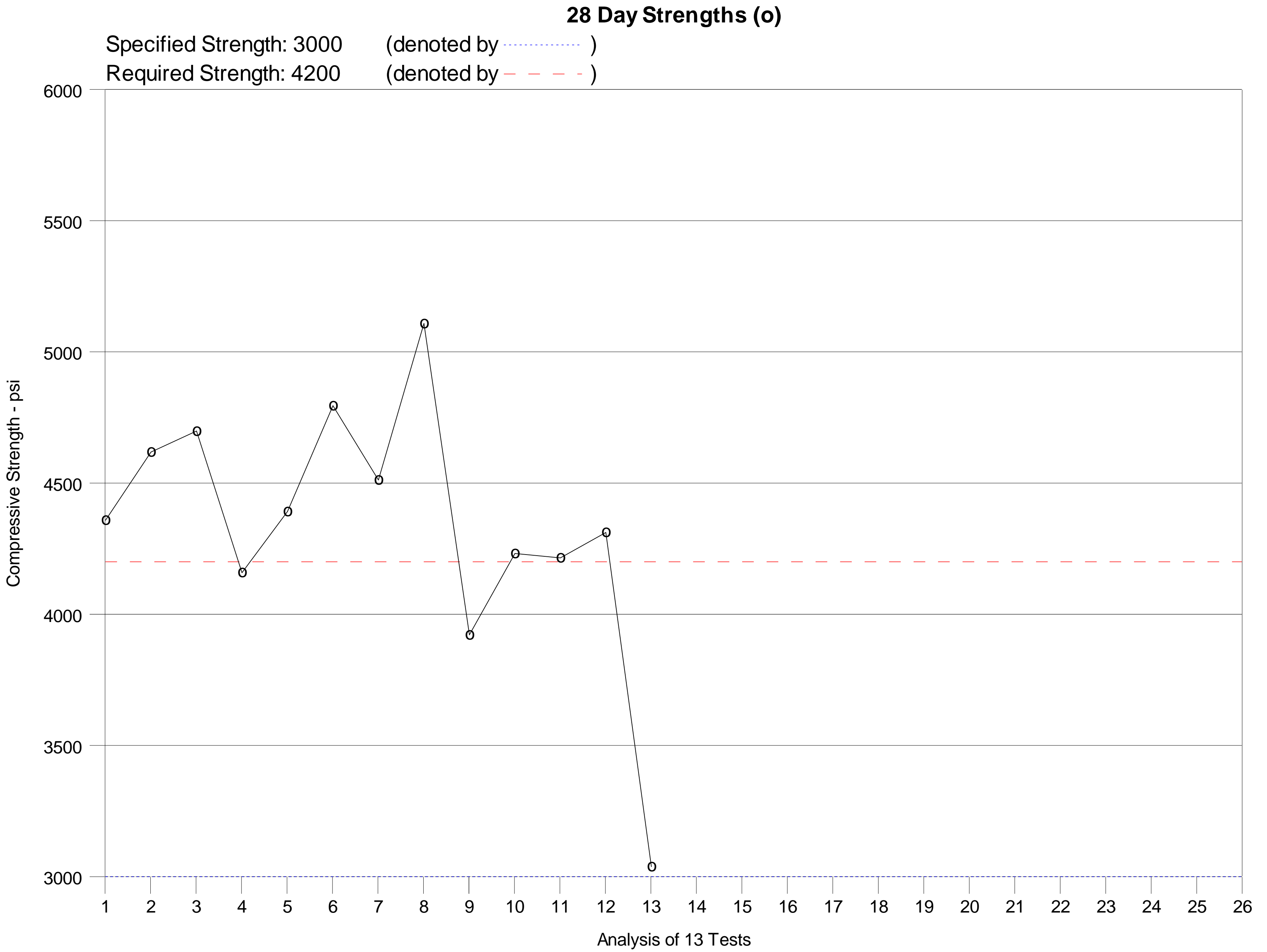
The above statistical analysis as per ACI 301 Sec. 4.2.3.2.a and ACI 318 Sec. 4.3.1.1 will also qualify mixes

Mix ID: <u> M2 </u>	<u> M3 </u>	<u> M4 </u>	<u> M5 </u>
Strength: <u> 2000 </u>	<u> 3000 </u>	<u> 4000 </u>	<u> 5000 </u>

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99% Confidence value = 3181 psi

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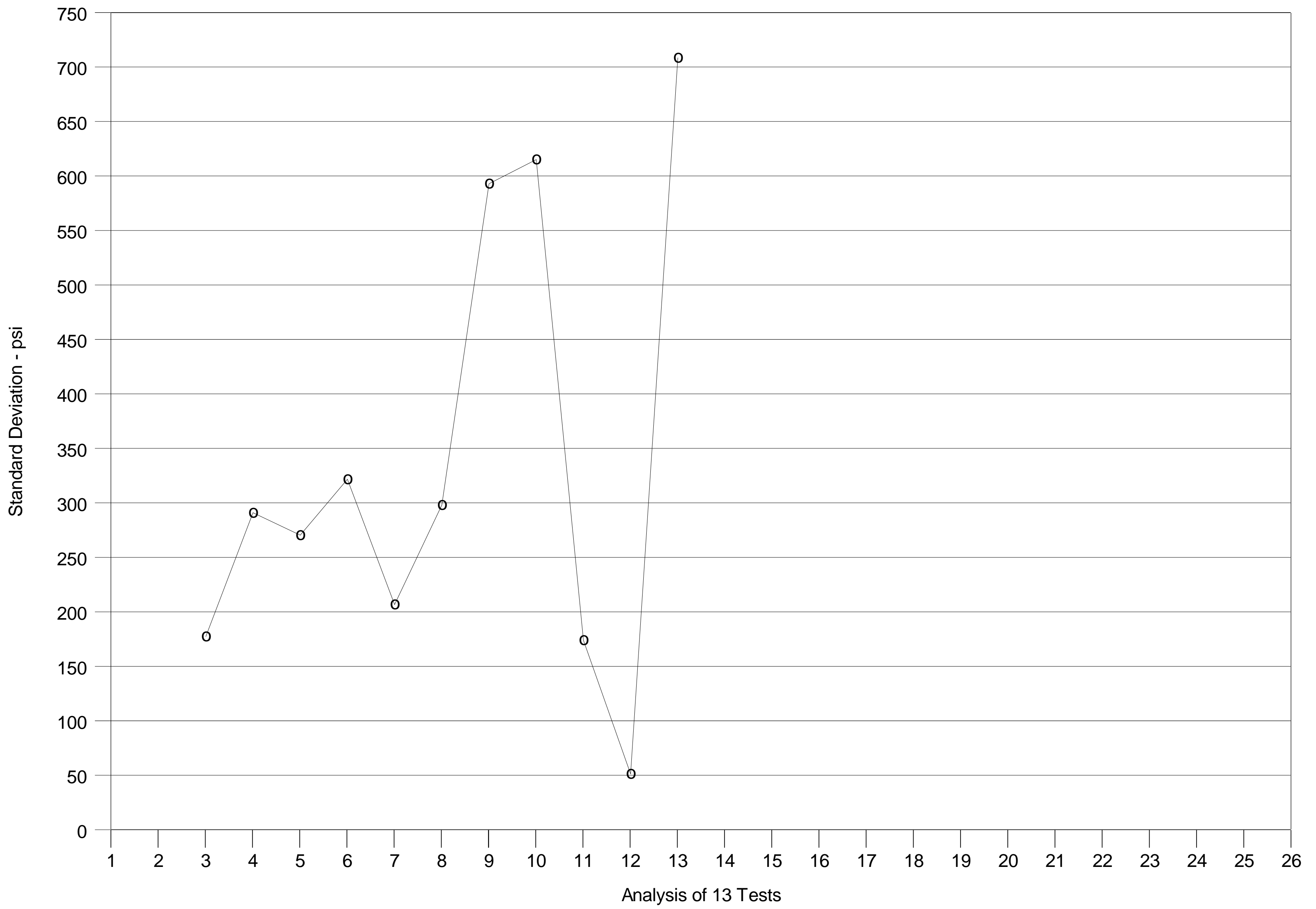
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3 Test Moving Standard Deviation - 28 Day Test Strength



Estimated 28 Day Within Batch Coefficient of Variation (+) Average Range of 28 Day Tests (o)

