AGENCY OF TRANSPORTATION VERMONT DEPARTMENT OF HIGHWAYS MATERIALS DIVISION

CLASS B CONCRETE
USING CALEDONIA INC. AGGREGATES
WATERFORD, VERMONT

REPORT 77-6 MAY 1977

REPORTING ON WORK PLAN NO. 77-C-27

R.E.W. Crisman, Acting Commissioner E.H. Stickney, Chief Engineer R.F. Nicholson, P.E., Materials Engineer

Prepared by

J.L. Talbot, Structural Concrete Engineer Structural Concrete Subdivision

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Materials Division Highway Department Agency of Transportation March 27, 1978 Reviewed By:

R.F. Nicholson, P.E., Materials Engineer

Date: March 30, 1978

Prepared by: J. Talbot Date: 5/2/77

VERMONT DEPARTMENT OF HIGHWAYS MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION

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ABSTRACT

Difficulties in obtaining a compressive strength of 3500 P.S.I. consistantly during the summer construction season has been experienced.

In order to achieve the desired strength the mix design must be capable of obtaining the specified strengths under conditions similar to those experienced in the field.

This evaluation is an attempt to obtain a Class B structural concrete mix design that will achieve a compressive strength of 3500 P.S.I. under field conditions and during temperatures experienced during summer placement.

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VERMONT DEPARTMENT OF HIGHWAYS
MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION

INTRODUCTION

A history of poor structural concrete strength has been experienced dur-

ing periods of warm weather.

The principal supplier of the aggregates used during this time has been

Caledonia, Incorporated, Waterford, Vermont.

The purpose of this evaluation is to obtain a mix design that will pro-

duce concrete meeting the requirements of Item 501.25 Concrete Class B during

the warm summer months. Based on the data obtained during the 1976 construc-

tion season an average 28 day compressive strength of 4271 P.S.I. is required

in order for Item 501.25 Class B concrete to meet the minimum strength require-

ment of 3500 P.S.I. ninty percent of the time. Determination of the 4271 P.S.I.

average 28 day compressive strength was obtained through the use of the Vermont

Department of Highways Concrete Compressive Tests Evaluation and Plot Program

No. P609.

Date: 4/19/77

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PRODUCT EVALUATION WORK PLAN

Number 77-C-27

ProductC	lass B Concre	te using Caledo	onia Aggregates	
Manufacturer	Lawrence Sa	ndgravco, Inc.	Distributor or _	Lawrence Sandgravco, Inc.
	St. Johnsbu	ry,	Representative _	St. Johnsbury,
	Vermont 05	819	_	Vermont 05819
Evaluation Re	quested By	In House	Dat	e April 19, 1977
Date Informat	ion Required	N/A		
Date Product	Data & Applic	ation Instruct	ions Received	N/A
Date Samples	Received	February 2	2, 1977	
Sample Quanti	tyN	/A	_ Were sufficient	samples received yes
Purpose of Ev				
To develop	a mix design	that will meet	strength require	ments, 3500 psi @ 28 days
	er temperatur			
		tra sheet if ne	cessary)	
			28 days using 6"	x 12" cylinders
		ace & Pressure		
	rolled Temper			
	: Weight & Yie			
	ermine Water (
1		ollowing Sub-di		None
Projected Man	power Require	ements 35	man days includin	g report
Evaluation to	be Conducted	i by <u>Structur</u>	al Concrete Subdi	vision
				ion Date July, 1977
Approval/Disa	approval by Ma	aterials Engine	er AIV	chem 5/3/7;
Comments by I	faterials Engi	ineer		

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Report of Product Evaluation Work Plan No. 77-C-27 April 1977

Materials:

Product: Item 501.25 Concrete Class B - using Caledonia, Inc. Aggregates

Manufacturer of Concrete Aggregate: Caledonia, Inc. - Waterford, Vermont

Manufacturer of Air Entraining Admixture used:

Product - Darex AEA - manufactured by W. R. Grace & Co. Cambridge, Massachusetts

Dosage - 5-12 oz. per yard, as necessary to obtain desired air content.

Manufacturers of Water Reducing Admixtures used:

Product - WRDA - manufactured by W. R. Grace & Co. Cambridge, Massachusetts

Dosage - rate used 7 oz./100 wt.

Product - Pozzolith 122N - manufactured by Master Builders, Cleveland, Ohio

Dosage - rate used 5 oz./100 wt.

Product - Daratard HC - manufactured by W. R. Grace & Co. Cambridge, Massachusetts

Dosage - rate used 3 oz./100 wt.

Manufacturer of Portland Cement:

Product - Glens Falls Type II - manufactured by the Glens Falls Portland Cement Co. Glens Falls, New York

Product - Northeast Cement Type II - manufactured by Canada Cement Lafarge LTD Montreal, P.Q.

Producer of Concrete: Lawrence Sangravco, Inc. - St. Johnsbury, Vermont

Description of Product: A Portland Cement concrete containing a minimum of 610 lbs. of cement per cubic yard, having a maximum of 36.5 gallons of water per cubic yard, a slump range of 2 to 4 inches, an air content of 6.0+1 percent, containing a coarse aggregate and fine aggregate and possessing the ability to obtain a minimum 28 day compressive strength of 3500 P.S.I.

Vermont Department of Highways Specification: Item 501.25 Concrete, Class B

Prepared by: J. Talbot Date: 5/2/77

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Report of Product Evaluation Work Plan No. 77-C-27 April 1977

Procedure:

All aggregates were tested for compliance to Vermont Department of Highways Specifications (Appendix A). Mix designs were proportioned to ACI procedures (Appendix B). Several water reducing admixtures and a retarder were incorporated in our mix designs. A reference mix was also prepared for comparison. After preparing the mixes in the laboratory, 6 x 12 inch cylinders were cast.

Two methods of curing and two concrete mix temperatures were studied. Mix designs number 1 thru 48 were prepared and cured as follows: The concrete mix temperatures were raised to 80° by use of warm water. The purpose of this was to simulate warm weather concrete temperatures in the laboratory. The curing procedures for the cylinders made from these mixes were as follows: These cylinders were placed in a dry curing box for 24 hours prior to removal of their molds. The temperature in the curing box was allowed to rise to 90°F. The heat produced by hydration was sufficient to create the 90°F temperatures. This procedure was used because it was the best way to simulate the worst conditions that should occur in the field during the summer months. At the end of 24 hours, the cylinders were removed from the curing box, stripped of their molds and placed in the moist curing room to receive a standard cure until removal for capping and breaking at 7, 14 and 28 days.

Mix designs No. 49 thru 52 were selected after the results of mix designs No. 1 thru 48 were obtained. These mixes were proportioned using the water reducing admixture Pozzolith 122N. Mix designs No. 49, 49NE, 51, 53 and 55 were cast and cured using the same procedures that were followed for the mixes designs No. 1 thru 48.

Mix designs No. 50, 52, 54 and 56 were prepared using the same water reducing admixture, Pozzolith 122N, but were mixed having a concrete mix temperature of 70°F and were cured for the first 24 hours in a room at 72°F. The molds were then stripped and the cylinders placed in the moist curing room to receive a standard cure until removal for capping and breaking at 7, 14 and 28 days.

Three cement contents were used in our mix designs 610, 634 and 660 pounds per cubic yard. For each cement content three different blends of 1-1/2 and 3/4 inch coarse aggregate were proportioned for mix designs. These were, by percent of total coarse aggregate, 66-2/3%-1-1/2 inch stone to 33-1/3%-3/4 inch stone 50% 1-1/2 inch stone to 50% 3/4 inch stone, 33-1/3% 1-1/2 inch stone to 66-2/3% 3/4 inch stone. In addition to the mix designs with various blends of coarse aggregate a mix for each cement content was prepared using only 3/4 inch stone as the coarse aggregate.

Each of the above coarse aggregate gradations were then used in a mix design in combination with the following admixtures. Darex AEA and WRDA, Darex AEA and Pozzolith 122N, Darex AEA and Daratard HC and a reference mix with only Darex AEA.

All but one mix was proportioned using Glens Falls Type II cement. Mix No. 49NE was proportioned using Northeast Cement Type II.

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Report of Product Evaluation Work Plan No. 77-C-27 April 1977

Results:

Trial mixes No. 1 thru No. 48 were designed in an effort to narrow the choice of designs and obtain a revised design that would produce satisfactory results. See Tables No. 1, No. 2 and No. 3.

These results show that none of the reference mixes obtained a 3500 P.S.I. compressive strength. Trial mixes containing Pozzolith 122N surpassed all other mix designs except for trial mix No. 43. As the cement content increased, most trial mixes showed an increase in compressive strength. The use of Daratard HC produced results with limited success and in some trial mixes resulted in a compressive strength lower than the reference mix.

In all mixes tested, the yield was higher than desired. The percent of air, when on the low side of our target aim, gave compressive strength results slightly higher than would be expected had the 6.0+1 percent air been obtained.

Based on the results shown on Tables No. 1, No. 2 and No. 3, mix designs were revised. For results of the revised mix designs see Table No.4. Because of the better performance obtained using Pozzolith 122N, the mix designs No. 49 thru No. 56 contained this water reducing admixture. Cement contents were held to 610 and 634 lbs. per cubic yard. The use of 66-2/3% 1-1/2 inch stone and 33-1/3% 3/4 inch stone as a blend was discontinued due to the coarse mixes this blend produced in trial mixes No. 1 thru 4, 17 thru 20 and 33 thru 36.

The revised trial mix designs No. 49 thru 56 corrected the high yield previously obtained in our trial mixes. Except for trial mix design No. 53, the 3500 P.S.I. compressive strength was obtained. However, only one mix design, No. 56, obtained our desired compressive strength of 4271 P.S.I.

Trial mix design No. 49 and No. 49 NE showed very little difference when different cements were used with the same design.

Except for trial mixes No. 51 and No. 52, the trial mixes proportioned at a 70°F temperature and standard cured at 72°F obtained higher compressive strengths than did the trial mixes proportioned at 80°F and cured at 90°F for the first 24 hours.

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Conclusions and Recommendations:

The purpose of this investigation was to obtain a Class B concrete mix design that would produce a minimum compressive strength of 3500 P.S.I. during the temperatures experienced in the summer. A maximum concrete temperature of 80°F and a maximum ambient temperature of 85°F is permitted for this class of concrete. It is therefore possible to achieve temperatures of 90°F adjacent to cylinder during the first 24 hours of curing during summer months. It was for this reason the above temperatures were created in the laboratory as a condition in our testing.

It was determined by analysis of cylinder strengths obtained during the summer of 1976, that it would be necessary to develop a mix design that would yield a minimum compressive strength of 4271 P.S.I. in the laboratory under temperatures simulating summer conditions in order to obtain a minimum compressive strength of 3500 P.S.I. in nine out of ten tests on concrete class B produced in the field.

Based on the results obtained in our laboratory tests, the mix design used for trial mix Nos. 55 and 56 produced compressive strengths that exceeded the 4271 P.S.I. desired compressive strength when tested under normal laboratory controlled temperatures of 73.3+3°F. This same mix design came within 27 P.S.I. of meeting our desired compressive strength of 4271 P.S.I. when tested in our laboratory under the maximum summer temperatures expected in the field (80°F concrete temperature and a 90°F curing temperature during the first 24 hours).

The results obtained by this mix design, under simulated summer temperatures, came within six-tenths of one percent of obtaining the desired compressive strenth of 4271 P.S.I. These results are considered to be within an acceptable tolerance of our desired aim. However, the design proposed herein shall be considered a minimum design for the ingredients proposed and is subject to revision based upon the results actually obtained in the field.

Based on the results of the tests performed, and subject to revisions based upon results obtained in the field, the following minimum mix design is hereby recommended.

Caledonia, Inc. - Aggregate

Item 704.02 - Coarse Aggregate - 1-1/2" Stone	660 lbs. (dry weight)
Item 704.02 - Coarse Aggregate - 3/4" Stone	1320 lbs. (dry weight)
Item 704.01 - Fine Aggregate - Sand	1083 lbs. (dry weight)
Glens Falls Type II minimum Cement Content	634 lbs./cubic yard
Pozzolith 122N Water Reducing Admixture	5 oz./100 cwt
A maximum water cement ratio of	0.42
Darex AEA 12 oz./cy. or as required to obtain	6 + 1 percent air

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TABLE NO. I

Results of Trail Mixes using Caledonia, Inc. Aggregate

610 lbs. Cement/Cubic Yard 80°F Concrete Mix Temperature 90°F Cure for first 24 hours, Standard Cured in moist curing room thereafter until broken.

Trial	Admixtures used in Addition to Darex	Percentage of Coarse Aggre- gate blend	of Two Cy the follo	linders b		Perc of A P		Slump in Inches	Unit Weight	Yield	Water Cement Ratio
1	None(Reference Mix)	1-1/2" to 3/4" 66-2/3-33-1/3	7 days 2317	14 days 2724	28 days 2824	4.5	7.0	3	149.36	27.25	.467
								2-1/2	150.24		
2	WRDA	66-2/3-33-1/3	2600	3086	3426	4.2	6.0			27.3/	110
3	Pozzolith 122N	66-2/3-33-1/3	2989	3537	3599	3.4	4.5	2-3/4	152.53	27.14	448
4	Daratard HC	66-2/3-33-1/3	2449	2856	2900	5.2	6.0	2-1/2	149.31	27.68	.448
5	None(Reference Mix)	50 - 50	2299	2609	2909	4.2	5.2	3	149.64	27.81	.489
6	WRDA	50 - 50	2444	2825	3099	4.8	6.0	3-1/4	148.95	27.81	.456
7	Pozzolith 122N	50 - 50	2851	3285	3488	4.4	5.0	2-3/4	150.08	27.65	.457
8	Daratard HC	50 - 50	2564	2962	3135	4.8	5.8	2-3/4	148.23	27.96	.459
9	None(Reference Mix)	33-1/3-66-2/3	2494	2821	3117	4.8	5.3	2-3/4	148.99	27.82	.464
10	WRDA	33-1/3-66-2/3	2374	2626	3157	5.3	7.0	2-3/4	147.03	28.23	472
11	Pozzolith 122N	33-1/3-66-2/3	2750	3334	3205	5.1	6.0	4-1/2	148.03	27.99	.461
12	Daratard HC	33-1/3-66-2/3	2480	2781	3183	5.2	5.3	2-3/4	147.55	28.00	.441
13	None(Reference Mix)	0 - 100	2608	2932	3258	5.6	4.3	3-1/4	146.74	27.75	.472
14	WRDA	0 - 100	2418	2901	3329	6.0	6.0	3-1/4	144.90	28.07	.466
15	Pozzolith 122N	0 - 100	3015	3550	3652	5.3	5.0	2-3/4	146.26	27.83	.470
16	Daratard HC	0 - 100	2308	2980	2896	5.8	5.8	3	144.98	28.08	.470

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TABLE NO. 2

Results of Trial Mixes using Caledonia. Inc. Aggregate

634 lbs. Cement/Cubic Yard 80°F Concrete Mix Temperature 90°F Cure for first 24 hours, Standard Cured in moist curing room thereafter until broken.

Trial	Admixtures used in Addition to Darex	Percentage of Coarse Aggre- gate blend 1-1/2"to 3/4"	-	linders l	ve Strength proken at s 28 days	Perc of A P		Slump in Inches	Unit Weight	Y i eld	Water Cement Ratio
17	None(Reference Mix)	66-2/3-33-1/3	2577	2918	3422	5.3	5.8	2-1/2	150.89	27.42	.435
18	WRDA	66-2/3-33-1/3	2578	2936	3241	5.8	7.8	3	149.68	27.61	.427
19	Pozzolith 122N	66-2/3-33-1/3	3016	3307	4036	4.4	5.3	3	152.18	27.15	.426
20	Daratard HC	66-2/3-33-1/3	2524	2679	3369	5.6	5.5	3-1/4	149.28	27.76	.445
21	None(Reference Mix)	50 - 50	2600	2957	3183	5.3	6.0	3	150.49	27.53	.435
22	WRDA	50 - 50	2388	2789	3312	6.2	6.0	3	148.39	27.95	.443
23	Pozzolith 122N	50 - 50	3104	3471	3837	4.3	4.0	3	152.70	27.16	.443
24	Daratard HC	50 - 50	2410	2838	3435	5.7	5.5	2-3/4	149.28	27.76	.437
25	None(Reference Mix)	33-1/3-66-2/3	2595	2993	3276	4.8	5.0	2-3/4	149.24	27.77	.443
26	WRDA	33-1/3-66-2/3	2604	2856	3546	6.0	5.5	3	148.03	27.95	.432
27	Pozzolith 122N	33-1/3-66-2/3	2896	3311	3908	5.6	4.5	2-1/2	149.08	27.80	.442
28	Daratard HC	33-1/3-66-2/3	2440	2851	3488	6.2	6.8	3	147.71	28.03	.435
29	None(Reference Mix)	0 - 100	2626	3135	3369	5.7	5.3	3	147.67	27.58	.451
30	WRDA	0 - 100	2427	2909	3290	7.4	6.3	3	144.32	28.25	.457
31	Pozzolith 122N	0 - 100	2794	3060	3798	6.1	5.0	3-3/4	146.10	27.97	.472
32	Daratard HC	0 - 100	2454	2755	3307	7.2	6.0	3	144.52	28.22	.459

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TABLE NO. 3

Results of Trial Mixes using Caledonia, Inc. Aggregate

660 lbs. Cement/Cubic Yard 80°F Concrete Mix Temperature 90°F Cure for first 24 hours, Standard Cured in moist curing room thereafter until broken.

Trial Mix No.	Admixtures used in Addition to Darex	Percentage of Coarse Aggre- gate blend 1-1/2" to 3/4"	Average C of Two Cy the follo 7 days	linders l	3	Percof A		Slump in Inches	Unit Weight	Yield	Water Cement Ratio
33	None(Reference Mix)	66-2/3-33-1/3	2560	2790	3059	5.5	5.3	2-1/2	148.43	27.93	.426
34	WRDA	66-2/3-33-1/3	2608	3064	3554	6.0	6.0	3	146.30	28.31	.420
35	Pozzolith 122N	66-2/3-33-1/3	3241	3546	4068	5.4	6.0	2-1/2	149.08	27.77	.417
36	Daratard HC	66-2/3-33-1/3	2485	2980	3373	5.2	6.5	3-1/4	149.40	27.76	.427
37	None(Reference Mix)	50 - 50	2573	2940	3219	5.3	5.0	2-3/4	149.28	27.81	.426
38	WRDA	50 - 50	2646	3348	3608	5.0	5.0	2-1/2	149.80	27.70	.424
39	Pozzolith 122N	50 - 50	2979	3325	4098	5.0	5.0	2-3/4	150.08	27.67	.429
40	Daratard HC	50 - 50	2454	3121	3595	5.0	5.8	2-3/4	149.92	27.67	.421
41	None(Reference Mix)	33-1/3-66-2/3	2542	3030	3488	6.0	5.3	3	147.63	28.10	.427
42	WRDA	33-1/3-66-2/3	2895	3170	3895	5.3	5.0	2-1/2	148.27	27.98	.426
43	Pozzolith 122N	33-1/3-66-2/3	3024	3320	3568	5.4	6.3	3	148.07	28.14	.453
44	Daratard HC	33-1/3-66-2/3	2418	3051	3090	5.6	5.0	3-1/4	148.23	28,02	.435
45	None(Reference Mix)	0 - 100	2573	3020	3320	6.1	4.8	3	145.57	28.07	.450
46	WRDA	0 - 100	2847	3205	3661	6.0	5.0	2-3/4	146.94	27.75	.436
47	Pozzolith 122N	0 - 100	2755	3395	3935	6.2	5.0	3	145.05	28.18	.453
48	Daratard HC	0 - 100	2494	2918	3268	7.0	5.3	3-1/4	143.80	28.39	.444

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VERMONT DEPARTMENT OF HIGHWAYS MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION

TABLE NO. 4

Results of Trial Mixes using Caledonia, Inc. Aggregate

Lbs. of Cement/Cubic Yard - Trial Mixes No. 49 thru No. 52 contain 610 Lbs./C.Y.
Trial Mixes No. 53 thru No. 56 contain 634 Lbs./C.Y.

Concrete Mix Temperature - Check Code (a) or (b) to note concrete mix temperature and conditions of cure.

(a) 70°F Concrete Mix Temperature

(a) 72°F Cure for first 24 hours, Standard Cured in moist curing room thereafter until broken.

(b) 80°F Concrete Mix Temperature

(b) 90°F Cure for first 24 hours, Standard Cured in moist curing room thereafter until broken.

Trial Mix No.	Admixtures used in Addition to Darex	Percentage of Coarse Aggre- gate blend 1-1/2"to 3/4"	of Two Cy:	linders l		Perc of A P		Slump in Inches	Unit Weight	Yield	Water Cement Ratio
, .	CEMENT CONTENT 610 Lbs./C.Y.										
(b) 49 (b) 49NE (a) 50 (b) 51 (a) 52	Pozzolith 122N Pozzolith 122N Pozzolith 122N Pozzolith 122N Pozzolith 122N CEMENT CONTENT 634 Lbs./C.Y.	50 - 50 50 - 50 50 - 50 33-1/3-66-2/3 33-1/3-66-2/3	2922 3144 2918 2887 2967	3444 3590 3639 3528 3458	3754 3780 4161 3908 3873	5.0 6.0 4.6 5.2 5.2	5.5 5.5 5.2 5.6 5.2	3 3 3 3 3–1/4	146.87 147.95 147.47 146.30 145.02	27.02 26.95 26.81 26.88 27.05	.425 .456 .400 .407 .392
(b) 53 (a) 54 (b) 55 (a) 56	Pozzolith 122N Pozzolith 122N Pozzolith 122N Pozzolith 122N	50 - 50 50 - 50 33-1/3-66-2/3 33-1/3-66-2/3	3332 2985 3263 2949	3528 3559 3665 3568	3475 4165 4244 4368	4.4 4.7 5.5	5.9 5.2 5.2 5.9	2-3/4 2-3/4 2-3/4 2-3/4	148.11 148.27 147.63 144.54	27.18 27.32 26.88 27.66	.385 .424 .369 .416

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MATERIALS DIVISION Montpelier, Vermont 05602

REPORT ON SAMPLE OF AGGREGATE

	Report	April 28, 1977_
Laboratory No. G77 00	79 Tested	By W. Meyer
Name Item 704.02	1-1/2" Stone	
Identification MarksL	ab Evaluation	
Submitted byJ. Talbot	Title CLP Ac	idress
Sampled 12/23 , 19 76 Rece	ived 2/18, 19 77	
Sample from Stockpile a	t Lawrence Sandaravco	St. Johnsbury, VT
Quantity Represented N/	Ά	
Source of MaterialCaled	lonia, Inc. Waterford, VI	1
Location used or to be used	Laboratory Trial Mixes	
Examined for Item 704.02	and the second s	
	TEST RESULTS	
Total Sample	Fineness Modulus	
Sieve Size % Passing	% Coarser Than	Percent of Wear
4 1/2"	No. 100	AASHO T3
4"	No. 50	AASHO T4
3 1/2"	No. 30	AASHO T96 23.4
3"	No. 16	
2 1/2"	No. 8	Fractured Faces, % 83
2"	No. 4	
1 3/4"		Thin & Elongated
1 1/2" 99 1" 52	Fineness Modulus =	Pieces, % 6
3/4"		Soundness, % Loss 2.35
5/8"	Comments:	
1/2"	· ·	
3/8"	Y 5 0	
No. 4		arse Aggregate for Concrete -
	Item 704.02.	
No. 8		
No. 10		,
	Sand	·
	ortion E. H. Stickney, Ch	ief Engineer
No. 50	2,, 2, 2, 2, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3,	
No. 100	P.J. Mies	Phan 1007
No. 200 Dry 0.3	R. 20.1/30	1014
1jg	By: F. Nicholson, M	eterials Engineer

MATERIALS DIVISION Montpelier, Vermont 05602

REPORT ON SAMPLE OF AGGREGATE

		keport Apr	11 20 , 1977
Laboratory No	G77 0080	Tested By	W. Meyer
Name Item	704.02 3/4" Stone		
Identificatio	n Marks Lab Evaluation		
Submitted by	J. Talbot Title CL	P Address	
Sampled 12/2	3, 1976 Received 2/18, 19 77	-	
Sample from _	Stockpile at Lawrence Sandgra	vco St. J	ohnsbury, VT
Quantity Repr	esented N/A		
Source of Mat	erial <u>Caledonia, Inc.</u>	Waterford, VT	
Location used	or to be usedLaboratory Tri	al liixes	
Examined for	Item 704.02		
	TEST RESULTS		
Total S Sieve Size			Percent of Wear
4 1/2"	No. 100		AASHO T3
4"	No. 50	-	AASHO T4
3 1/2" 3"	No. 30 No. 16		AASHO T96 27.3
2 1/2"	No. 16 No. 8		Fractured Faces, % 88
2"	No. 4		214ctured 14ccs, 75 00
1 3/4"			Thin & Elongated
1 1/2"	Fineness Modul	us *	Pieces, % 8
1"	100		
3/4"	98		Soundness, % Loss 2.35
5/8"	Comments:		
1/2" 3/8"	22	and the second	
No. 4	33 Meets requireme	ents for Coarse Ag	ggregate for Concrete -
No. 8	3 Teem 704.02.		
No. 10	the state of the s		
No. 16	Sand		
No. 30	Portion		
No. 50	E. H. S	tickney, Chief Eng	gineer
No. 100			
No. 200 Dry ljg	0.7 By:	Jr. Mickeles	-Be7
	R. F. N	icholson, Materia	la Engineer

APPENDIX A SHEET 2 of 3

MATERIALS DIVISION Montpelier, Vermont 05602

REPORT ON SAMPLE OF AGGREGATE

		Report Ap	ril 28 19 77
Laboratory No.	G77 0031	Tested By	W. Meyer
Name Item 704.01	Fine Aggregate for Conc		
Identification Marks	Lab Evaluation		
	Talbot Title CLP		•
	6 Received 2/18 , 19 77		
	pile Lawrence Sandgrayco		
Quantity Represented			
	Caledonia, Inc. W		•
	be used Laboratory Tria		
	cem 704.01		
Andmined 101	TEST RESULTS		
Total Sample Sieve Size % Pass	Fineness Modulus		Percent of Wear
4 1/2"	No. 100	95	AASHO T3
4"	No. 50	. 87	AASHO T4
3 1/2"	No. 30	61	AASHO T96
2 1/2"	No. 8	<u>25</u> 8	Fractured Faces, %
2"	No. 4		
1 3/4"			Thin & Elongated
1 1/2"	Fineness Modulus	2.76	Pieces, %
1"	Color - 1		
3/4" 5/8"	Comments:		Soundness, % Loss 3.01
1/2"	- Comments.		
3/8" 100	lieets requiremen	nts for Fine Ag	gregate for Concrete -
No. 4 100	Item 704.01.	-	
No. 8 92			· · ·
No. 10			
No. 16 78	Sand		,
No. 30 39	Portion F H G	Halman Ohio O	
No. 50 13 No. 100 5	ш. п. э	tickney, Chief E	ngineer
No. 200 Dry 2	p	J. Mickel	10-
ljg	By:	مارا حديث	or Illet
		cholson, Materi	als Engineer

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date 5/2/77

MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS B Page 15 of 26

Ready Mix Supplier: Lawrence Sangravco Inc. - St. Johnsbury, Vermont

		Dry Rodded Unit Weight	Absorption
1-1/2"Stone Caledonia, Inc.	2.91	102.64	0.6
3 <u>/4</u> " Stone	2.91	106.15	0.9
Blend: 1-1/2" & 3/4" 2/3 - 1/3	2.91	106.06	N/A
Sand Caledonia, Inc.		F.M. 2.70	1.9

Cement 610 Lbs./Cu.Yd.
Water 32 Gals./Cu.Yd.
Air 6 Percent

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size	Sand F.M.						
Aggregate	2,60	2.70	2.80	2.90	3.00	3.10	
3/4"	0.64	0.63	0.62	0.61	0.60	0.59	
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68	

106.06 X 0.72 = 76.36 X 27 = 2062 Lbs./CY Coarse Aggregate
Unit Weight) Volume)

1.	Volume of Water (Gals/CY) 32	4.278	Cu. Ft.
	7.48		
2.	Solid Volume of Cement (Lbs./CY) 610	3.103	Cu. Ft.
	196.56	V 3	
3.	Volume of Entrained Air X 27 =	1.620	Cu. Ft.
4.	Solid Volume of Coarse Aggregate (Lbs./GY 2062 (SpGr) 2.91 X 62.4	11.356	Cu. Ft.
5.	Total Solid Volume of Ingredients Except Sand	20.357	Cu. Ft.
6.	Solid Volume of Sand Required 27.00 -20.357 Cu.Ft. (Line 5)	6.643	Cu. Ft.
7.	Required Weight of Sand: (Solid Volume) 6.643 X (SpGr) 2.78 X 62.4 =	37	Lbs./Cu.Yd.
8.	Ratio of Sand to Total Agg. Line 6 + (Line 6 + Line 4) = SUMMARY OF QUANTITIES/CU. YD. (DRY WEIGHTS)	Na-	% by Vol.
	Trial #1 Trial #2 Tria	1 #3	
,			

1-1/2 " Stone	Trial #1	Trial #2	Trial #3
3/4" Stone	687		Lbs.
Sand	1152	· · · · · · · · · · · · · · · · · · ·	Lbs.
Cement	610	1.1	Lbs.
Water	32		Gals.

(See Reverse Side for Results)

Air Admixture used:						
Manufactured by:	contain de dans de consequencia de la Regional de l					
Other Admixtures used: _					·	
Manufactured by:						
economic desirements and a seconomic desirements and a sec	indelikaan kitoon kitaa kaliga kaliga kaliga kaliga kitoo kitoo kitoo kan agaa kalaan kitoo kitoo ka ababa, madaa		;		en e	
	TRIAL #	L	TR	IAL #2		TRIAL #3
Air Admixture Dosage	es distribute de la companya del companya de la companya del companya de la companya del la companya de la comp				and sometimed	
Other Admixture Dosage						
% Air			•			
Slump						
-	Charles on the state of the sta		de la		ments quantuments	
Unit Weight					name enciclosumb	
Yield		·				
W/C Ratio						
Average Compressive Strengths -	Standard Cured	6" x 12"	Cylinder	8		
7 Days			CONTRACTOR CONTRACTOR AND		· ·	
14 Days		**************************************	01.00 October 100		thrá atmatika	
28 Days						
Days						
						ossonika elijini ilijapereseni i politiksi iristale iliku iliku elipantipuna juma
	of Trial No. 1, s		No. 1 Tri	al Mix No	.'s 1-4.	Trial mixes
were to coarse	to warrant its u	se.				
Trial Mix Numbers		#1	#2	#3	#4	
Admixtures	Dosage	· · · · · · · · · · · · · · · · · · ·			•	
Darex AEA	oz./C.Y.	6	5	6	11	
WRDA	oz./100 wt.	gas cos	7.		. co est	Parilli dan dan Makas dan di Salah Pilippa magama dan Hasar apambipa menanga
Pozzolith 122N	oz./100 wt.	4000 800+	600 600	5		
Daratard HC	oz./100 wt.	#20 (22¢	EC17 6179	. Step both	3	

Prepared J. Talbot

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date

Page 16 of 26 MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS _

Ready Mix Supplier: __Lawrence Sangravco Inc. - St. Johnsbury, Vermont

Aggregate Supplier:		Dry Rodded Unit Weight	
3/4" Stone Caledonia, Inc.	2.91	102.64	0.6
1-1/2" Stone Caledonia, Inc.	2.91	106.15	0.9
Blend: 1-1/2" & 3/4"50-50	2.91.	110.17	N/A
Sand Caledonia, Inc.	2.78	F.M. 2.70	1.9

Lbs./Cu.Yd. 610 Cement Gals./Cu.Yd. Water Air Percent

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size	Sand F.M.						
Aggregate	2,60	2.70	2.80	2.90	3,00	3.10	
3/4"	0.64	0.63	0.62	0.61	0.60	0.59	
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68	

Lbs./CY Coarse Aggregate 110.17 (Unit (Dry Rodded Unit Weight) Volume)

1.	Volume of Water	(Gels/CY) 32	4.278	Cu. Ft.
		7.48		
2.	Solid Volume of Cement	(Lbs./CY) 610	3.103	Cu. Ft.
		196.56		Singer Co.
3.	Volume of Entrained Air	$\frac{6}{1000}$ X 27 =	1.620	Cu. Ft.
4.	Solid Volume of Coarse Aggregate	(Lbs./GY 2142 (SpGr) 2.91 X 62.4	11.796	Cu. Ft.
5.	Total Solid Volume of Ingredients Exc	ept Sand	20.797	Cu. Ft.
6.	Solid Volume of Sand Required 27.00	- 20.797 Cu.Ft. (Line 5)	6.203	Cu. Ft.
7.	Required Weight of Sand: (Solid Volume) 6.203 X (Sp	Gr) 2.78 X 62.4 =	1076	Lbs./Cu.Yd.
8.	Ratio of Sand to Total Agg. Line 6	+ (Line 6 + Line 4)	35	% by Vol.
	SUMMARY OF QUANTIT	TIES/CU. YD. (DRY WEIGHTS)	A 202	

	Trial #1	Trial #2	Trial #3	
1-1/2 " Stone	1071	1.020		Lbs.
3/4 " Stone	1071	1020		Lbs.
Sand	1076	10251/4		Lbs.
Cement	610	610		Lbs.
Water	32	32		Gals.

(See Reverse Side for Results)

minutes of the same of the							
ther Admixtures	used:						
Manufactured by:							
Andrac darea by.		aga panda pangan di Barangan di Salangan di Salangan di Salangan di Salangan di Salangan di Salangan di Salang	·	; = Ts - 1			
		TRIAL #1	_	TRIAL #	2	TRIAL	#3
ir Admixture Dos	age		and the particular of the part		information of the second	A STATE OF THE PARTY OF THE PAR	
ther Admixture D	osage				***		-
% Air			ngg manipulan dalah				
Slump							
	. 181	- 1					
Jnit Weight				3			
<i>l</i> ield							
//C Ratio							
Compressive Stren	6						
7 Days 14 Days 28 Days	V V			:			
7 Days	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			1			
7 Days 14 Days 28 Days Days Remarks: For	results of	Trial No. 1 s	ee Table No	. 1. Trial	mixes Nos.		or
7 Days 14 Days 28 Days Days Remarks: For result	results of	Trial No. 1 s	ee Table No	. 1. Trial	mixes Nos. 49 thru 50		or #49NE
7 Days 14 Days 28 Days Days Remarks: For result	results of s of Trial N	Trial No. 1 s	ee Table No	. 1. Trial	mixes Nos. 49 thru 50) .	
7 Days 14 Days 28 Days Days Remarks: For result	results of s of Trial N x Numbers	Trial No. 1 s	ee Table No e No. 4, Tr	. 1. Trial	mixes Nos. 49 thru 50 #8) .	
7 Days 14 Days 28 Days Days Remarks: For result Admixture	results of s of Trial N x Numbers es D	Trial No. 1 s No. 2 see Tabl	ee Table No e No. 4, Tr	. 1. Trial ial Mix Nos.	mixes Nos. 49 thru 50 #8	#49	#49NE
7 Days 14 Days 28 Days Days Remarks: For result Trial Minary Admixture Darex AEA	results of s of Trial N x Numbers es D A o	Trial No. 1 s No. 2 see Tabl osage z./C.Y.	ee Table No e No. 4, Tr #5	. 1. Trial ial Mix Nos. #6 #7	mixes Nos. 49 thru 50 #8	#49	#49NE

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date

MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS B Page 17 of 26

Ready Mix Supplier: Lawrence Sangravco Inc. - St. Johnsbury, Vermont

		Dry Rodded Unit Weight	Absorption	
1-1/2' Stone Caledonia, Inc.	2.91	102.64	0.6	
3/4" Stone Caledonia, Inc.	2.91	106.15	0.9	
Blend: 1-1/2" & 3/4" 1/3 - 2/3	2:91	106.18	N/A	
Sand Caledonia, Inc.	2.78	F.M. 2.70	1.9	

Cement 610 Lbs./Cu.Yd.
Water 32 Gals./Cu.Yd.
Air 6 Percent

Lbs.

Lbs.

Lbs.

Gals.

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size	-					
Aggregate	2,60	2.70	2.80	2,90	3,00	3.10
3/4"	0.64	0.63	0.62	0.61	0.60	0.59
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68

106.18 X .72 = 76.45 X 27 = 2064 Lbs./CY Coarse Aggregate
Unit Weight) Volume)

1.	Volume of Water	(Gals/CY) 32		4.278	_ Cu. Ft.
			.48		4 7 7
2.	Solid Volume of Cement	(Lbs./CY) 610		3.103	Cu. Ft.
		196	.56		- 1
3.	Volume of Entrained Air	. 6	- X 27 = -	1.620	_ Cu. Ft.
4.	Solid Volume of Coarse Aggregate	(Lbs./CY 2064		11.367	_ Cu. Ft.
		(SpGr) 2.91	X 62.4		
5.	Total Solid Volume of Ingredients E	xcept Sand	_	20.368	_ Cu. Ft.
6.	Solid Volume of Sand Required 27.00	-20.368 Cu.Ft. (L	lne 5)	6.632	_ Cu. Ft.
7.	Required Weight of Sand: (Solid Volume) 6.632 X	SpGr) 2.78 x	62.4 = -	1150	_ Lbs./Cu.Yd.
8.	Ratio of Sand to Total Agg. Line	6 + (Line 6 + Line 4)		37	% by Vol.
	SUMMARY OF QUANT	TIES/CU. YD. (DRY W	EIGHTS)		
	Trial #1	Trial #2	Trial	#3	
1-1/2	" Stone 688	650	1.5		Lbs.
		11 12 mg			

(See Reverse Side for Results)

1300

1087

610

32

3/4" Stone

Sand

Cement

Water

1376

1150

610

32

Air Admi:	xture used:							
Manufact	ured by:		eranerae en de participa de comunica de participa en de					
Other Adr	mixtures used:							
						. 21. 17		
Manuracu	ured by:						7 7 7	
		TRIAL #1		TRL	AL #2		TRIAL	#3
Air Admi	xture Dosage		kintyysoraks yvejsintii illiyokkindii			-		
Other Ada	mixture Dosage	described and the Second Association of the				*		iki dagan kata Sopi ili pandi setsi
% Air			Concentrate Market Market	Control of the Contro		•		
Slump						M		himmer party and the control of the
Unit Weig	ght			(S) Providence (S) Pr			· .	
Yield			AN AMERICAN STREET, SAN THE ST					
W/C Ratio))		-			u +4644.a		
	ys	tandard Cured	6" x 12" (Cylinders				
Remarks:	For results of	Trial No. 1, se	ee Table 1	No. 1 - T	rial Mix	Nos. 9 -	12.	
	For results of Tr	ial No. 2, see	Table No.	4 - Tria	l Mix Nos	. 51 and	No. 52.	
	Trial Mix Numbers		#9	#10	#11	#12	#51	#52
	Admixtures	Dosage						
	Darex AEA	oz./C.Y.	7	6 .	10	11	11	11
	WRDA	oz./100 Wt.		7		and box	hery \$100	40 64
	Pozzolith 122N	oz./100 wt.	fox for	gen sylv	5	40% pm	5	5
	Daratard HC	oz./100 wt.	and the second	grama dell'All	top ma	3	pier euro	100 000

Frebared by J. Talbot

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date 5/2/77

Page 18 of 26 MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM #501.25 CONCRETE CLASS B

Ready Mix Supplier: __Lawrence Sangravco Inc. - St. Johnsbury, Vermont

Aggregate Supplier:		Dry Rodded Unit Weight	
" Stone	N/A	N/A	N/A
3/4" Stone Caledonia, Inc.	2.91	106.15	0.9
Blend: 1-1/2" & 3/4" 0 - 100	N/A	N/A	N/A
Sand Caledonia, Inc.	2.78	F.M. 2.70	1.9

Cement 610 Lbs./Cu.Yd. 35 Gals./Cu.Yd. Percent Air

Gals.

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size			Sand	F.M.	-	
Aggregate	2,60	2.70	2.80	2.90	3.00	3.10
3/4"	0.64	0.63	0.62	0.61	0.60	0.59
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68

1806 _ Lbs./CY Coarse Aggregate 0.63 106.15 (Unit (Dry Rodded Unit Weight)

1.	Volume of Water	er V	(Gals/CY) 3	35 4.6	79 Cu. Ft.
				7.48	
2.	Solid Volume of	Cement	(Lbs./CY) 61	.0 3.1	03 Cu. Ft.
		***		06.56	
3.	Volume of Entra	ined Air	6	$- x 27 = \frac{1.6}{}$	20 Cu. Ft.
4.	Solid Volume of	Coarse Aggregate	(Lbs./GY 1806 (SpGr) 2.78	_ X 62.4 = 9.9	046 Cu. Ft.
5.	Total Solid Vol	ume of Ingredients	Except Sand	19.3	348 Cu. Ft.
6.	Solid Volume of	Sand Required 27.	00 - 19.348 Cu.Ft. (Line 5) _ 7.6	552 Cu. Ft.
7.	Required Weight (Solid Vol		(<u>SpGr</u>) 2.78	62.4 = 132	Lbs./Cu.Yd.
8.	Ratio of Sand t	o Total Agg. Line	6 + (Line 6 + Line	4)43.	5 % by Vol.
		SUMMARY OF QUAN	TITIES/CU. YD. (DRY	WEIGHTS)	
	ì	Trial #1	Trial #2	Trial #3	2
N/A	_" Stone	N/A	· part Configuration		_ Lbs.
3/4	_" Stone	1806		1-	Lbs.
San	d :	1327			Lbs.
Cem	ent	610			Lbs.

(See Reverse Side for Results)

35

Water

Other Admixtor Manufactured Air Admixture Other Admixtor % Air Slump Unit Weight Yield W/C Ratio	-		#1					TR	IAL #3
Manufactured Air Admixture Other Admixture % Air Slump Unit Weight Yield W/C Ratio	by:	TRIAL	#1					TR	IAL #3
Air Admixture Other Admixture % Air Slump Unit Weight Yield W/C Ratio	e Dosage	TRIAL	#1		TRL	AL #2		TR	IAL #3
Air Admixture Other Admixte % Air Slump Unit Weight Yield W/C Ratio	-				TRL	AL #2		TR	IAL #3
Other Admixton % Air Slump Unit Weight Yield W/C Ratio Avera	-						 		
% Air Slump Unit Weight Yield W/C Ratio	ure Dosage								
Slump Unit Weight Yield W/C Ratio Avera		Specification of the control of the							
Unit Weight Yield W/C Ratio Avera		Omegas and a regardly or good of the control of the	agalan digirindi din engapa Sapah dina Resiled						
Yield W/C Ratio Avera					Control of the Contro				
W/C Ratio Avera							ė. Secondo		
Avera		CONTRACTOR OF THE PROPERTY OF							
Avera									
7 Days	ge Strengths - S	tandard Cured	l 6" x	12" Cj	linders				
14 Days 28 Days				•			,		
Days				•			rigansia em		
Remarks:	For results	of Trial No.	1, See	Table	No. 1 -	Trial M	ix Nos.	13 - 1	16.
Tri	al Mix Numbers		#1	3	#14	#15	#16		
Adm	ixtures	Dosage							
Dar	ex AEA	oz./C.Y.		7	6	10	10		
WRD	A	oz./100 wt.			7	pella puer	g# t=		
Poz	zolith 122N	oz./100 wt.	-			5			
Dar	atard HC	oz./100 wt.		sa	604 e-a	pris con	3		

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date 5/2/77

MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS B Page 19 of 26

Ready Mix Supplier: Lawrence Sangravco Inc. - St. Johnsbury, Vermont

Aggregate Supplier:		Dry Rodded Unit Weight	Absorption
1-1/2" Stone Caledonia, Inc.	2.91	102.64	0.6
3/4" Stone Caledonia, Inc.	2.91	106.15	0.9
Blend: 1-1/2" & 3/4" 2/3 - 1/3	2.91	106.06	N/A
Sand Caledonia, Inc.	2.78	F.M. 2.70	1.9

Cement 634 Lbs./Cu.Yd.
Water 32 Gals./Cu.Yd.
Air 6 Percent

Lbs.

Gals.

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size		(a) 14 3	Sand	F.M.		
Aggregate	2,60	2.70	2.80	2.90	3.00	3.10
3/4"	0.64	0.63	0.62	0.61	0.60	0.59
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68

106.06 X 72 = 76.36 X 27 = 2062 Lbs./CY Coarse Aggregate
Unit Weight) Volume)

1.	Volume of Water	•	(Gals/CY)	32	4.278	Cu. Ft.
			.,, ., ., ., ., ., ., ., ., ., ., ., ., 	7.48		74.2
2.	Solid Volume of	Cement	(Lbs./CY)	634	3.225	Cu. Ft.
				196.56		
3.	Volume of Entrai	ned Air		6 X 27	1.620	Cu. Ft.
4.	Solid Volume of	Coarse Aggregate	1,2001/02	2.91 X 62.4	11.356	Cu. Ft.
5.	Total Solid Volu	me of Ingredients	Except Sand		20.479	Cu. Ft.
6.	Solid Volume of	Sand Required 27.	00 - 20,479 Cu.F	<u>t</u> . (Line 5)	6.521	Cu. Ft.
7.	Required Weight (Solid Volu		(SpCr) 2.78	—x 62.4	1131	Lbs./Cu.Yd.
8.	Ratio of Sand to	Total Agg. Line SUMMARY OF QUAN	6 + (Line 6 + L TITIES/CU. YD. (ine 4)	36.5	% by Vol.
		Trial #1	Trial #2		Trial #3	
1-1/2	2" Stone	1375	1.9-6	-1		Lbs.
3/1	4" Stone	687				Lbs.
San		11.31				·· Lbs .

(See Reverse Side for Results)

634

32

Cement

Water

Air Admix	ture used:		as per district specific states and sections are				
Manufactu	ared by:						
Other Adm	nixtures used:						
Manufactu	ared by:						
		TRIAL #1	,	TRIA	AL #2		TRIAL #3
Air Admix	ture Dosage						
Other Adm	nixture Dosage					***************************************	
% Air			on Control to the Con			gile approximation of the second	
Slump							
Unit Weig	tht.		,	1 -			
	,110					all the second	
Yield		Commence of the commence of th				-	
W/C Ratio			. '			((1.0),000,000,000	
	verage ive Strengths -	Standard Cured	6" x 12" (ylinders	· · · · · · · · · · · · · · · · · · ·		
7 Day	rs						<u>, , , , , , , , , , , , , , , , , , , </u>
14 Day	78						
28 Day	7 S						
Day	rs		· .				
Damaslag	For results	s of Trial Mix No	o. 1. see '	Table No.	2 - Tria	1 Mix Nos	. 17 - 20.
Remarks:		too coarse to v			And the state of t		
	Trial Mix Numbers	:	#17	#18	#19	#20	
	Admixtures	Dosage					
	Darex AEA	oz./C.Y.	11	8.	11	14	
	WRDA	oz./100 wt.		7		19 es	
	Pozzolith 122N	oz./100 wt.			5	E4 100	
	Daratard HC	oz./100 wt.	en to			3	

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date 5/2/77

Page 20 of 26 MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS B

Ready Mix Supp	olier: Lawren	ce Sangravco	Inc St.	Johnsbury,	Vermont

Aggregate Supplier:		Dry Rodded Unit Weight		
1-1/2' Stone Caledonia, Inc.	2.91	102.64	0.6	Cement 634 Lbs./Cu.Yd.
3/4" Stone Caledonia, Inc.	2.91	106.15	0.9	Water 32 Gals./Cu.Yd.
Blend: 1-1/2" & 3/4" 50 - 50	2.91	110.17	N/A	Air 6 Percent
Sand Caledonia, Inc.	2.78	F.M. 2.70	1.9	

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size			Sand	F.M.		
Aggregate	2,60	2.70	2,80	2.90	3.00	3.10
3/4"	0.64	0.63	0.62	0.61	0.60	0.59
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68

110.17 2142 Lbs./CY Coarse Aggregate (Dry Rodded (Unit Unit Weight) Volume)

					a least a second	
1.	Volume of Water	(Gals/CY)	. 32		4.278	Cu. Ft.
	V = = 257 + = 1		7.48			
2.	Solid Volume of Cement	(Lbs./CY)	634		3.225	Cu. Ft.
			196.56			-
3.	Volume of Entrained Air	-	x	27 = -	1.620	Cu. Ft.
4.	Solid Volume of Coarse Aggregate	(Lbs./CY (SpGr)	2142	2.4 = -	1 1.7 96	Cu. Ft.
5.	Total Solid Volume of Ingredients Exc	ept Sand	110	_	20.919	Cu. Ft.
6.	Solid Volume of Sand Required 27.00	_ 20.919 Cu	.Ft. (Line	5)	6.081	Cu. Ft.
7.	Required Weight of Sand: (Solid Volume) 6.081 X (Sp.	Gr) 2.78	x 62.	4 = -	1055	Lbs./Cu.Yd.
8.	Ratio of Sand to Total Agg. Line 6	+ (Line 6 +	Line 4)		34	% by Vol.
	SUMMARY OF QUANTIT	IES/CU. YD.	(DRY WEIGH	TS)	- Anna	
	Trial #1	Trial #2		Trial	#3	
1-1/	2" Stone 1071	1042				Lbs.
211	1007	10/2				

3/4 " Stone 1071 1042 Lbs. 1028 1055 Sand Lbs. 634 634 Cement Lbs. 32 32 Water Gals.

(See Reverse Side for Results)

Air Admix	ture used:						sezanii ette kontektrika	
Manufactu	red by:							
Other Adm	ixtures used:		· · · · · · · · · · · · · · · · · · ·					-co-co-co-co-co-co-co-co-co-co-co-co-co-
Manufactu	red by:			·				
		TRIAL #1		TRIAI	#2	,	TRIAL #3	3
Air Admix	ture Dosage							
Other Adm	ixture Dosage		-			-		
% Air			***					
Slump	e v							
Unit Weig	ht	:		,				
Yield			•					
W/C Ratio						-		
Av Compressi	erage ve Strengths - Ste	andard Cured 6	" x 12" Cy	linders				
7 Day	rs		-	`:				
14 Day	'S				an der spromer lever der vik			
28 Day	rs		-					
Day								
Remarks:	For results	of Trial No. 1	see Table	- No 2 -	. Trial Mi	x Nos 2	1 - 24	
Remarks:	For results of Tr							
•	Trial Mix Numbers		#21	#22	#23	#24	#53	#54
	Admixtures	Dosage						
	Darex AEA	oz./C.Y.	11	8	12	14	12	12
	WRDA	oz./100 wt.	Fig. was	7	en en	en to	~ ~	era 44
	Pozzolith 122N	oz./100 wt.		ç	5	mild bone	5	. 5
	Daratard HC	oz./100 wt.	65 (4)		## c=	3	## C-4	

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date 5/2/77

MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS B Page 21 of 26

Ready Mix Supplier: Lawrence Sangravco Inc. - St. Johnsbury, Vermont

Aggregate Supplier:		Dry Rodded Unit Weight	Absorption
11/2" Stone Caledonia, Inc.	2.91	= 102.64	0.6
3/4" Stone Caledonia, Inc.	2.91	. 106.15	0.9
Blend: 1-1/2" & 3/4" 1/3 - 2/3	2.91	106,18	N/A
Sand Caledonia, Inc.	2.78	F.M. 2.70	1.9

Cement 634 Lbs./Cu.Yd.
Water 32 Gals./Cu.Yd.
Air 6 Percent

Lbs.

Gals.

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size			Sand	F.M.		
Aggregate	2.60	2.70	2.80	2.90	3.00	3.10
3/4"	0.64	0.63	0.62	0.61	0.60	0.59
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68

106.18 X .72 = 76.45 X 27 = 2064 Lbs./CY Coarse Aggregate
Unit Weight) Volume)

1.	Volume of Water		(Gals/CY)	32	4.278	Cu. Ft.
				7.48		-
2.	Solid Volume of	Cement	(Lbs./CY)	634	3.225	_ Cu. Ft.
				196.56	3 (00	
3.	Volume of Entrai	ned Air		6 x 27 =	1.620	_ Cu. Ft.
4.	Solid Volume of	Coarse Aggregate		2064 2.91 X 62.4	11.367	_ Cu. Ft.
5.	Total Solid Volu	me of Ingredien	ts Except Sand		20.490	_ Cu. Ft.
6.	Solid Volume of	Sand Required 2	27.00 - 20.490 Cu.F	t. (Line 5)	6.510	Cu. Ft.
7.	Required Weight (Solid Volu		x (SpGr) 2.78		1129	_ Lbs./Cu.Yd.
8.	Ratio of Sand to		ine 6 + (Line 6 + I JANTITIES/CU. YD. (36	_ % by Vol.
		Trial #1	Trial #2		ial #3	
1-1/	2" Stone	688	660			Lbs.
3/4	" Stone	1376	1320			Lbs.
San	đ	1129	1083	_		Lbs.
					* 4	

(See Reverse Side for Results)

634

32

634

32

Cement

Water

Air Admiz	xture used:								
Manufacti	ured by:		and and the figure is a surface of the surface of t					Principles Tournis (por relient respectively) (con Surface)	
Other Adm	mixtures used:					ng day na stagan diguna kang malika sa kang kang kang kang kang kang kang kan			
Manufacti	red by:								manusial (Institution)
		TF	RIAL #1		TRIA	L #2		TRIAL #3	
Air Admia	xture Dosage	**************************************		Contractor Contractor			#GENTERNITATION (PROCESSOR)		
Other Adm	nixture Dosage	Benefit and the second and the second					***********		
% Air							-		
Slump				Management of the Control of the Con					
Unit Weig	ght	Carrières anno Carrette		Openskomkronystop	,		***************************************		
Yield		,							
W/C Ratio									
		- Standard (Cured 6	y x 12" C	ylinders				
28 Day	ys	Charles de la constante de la			Charles Company of the Company of th		-		
Day	y s		- Law State of the Law	· .		-	-		
Remarks:	For a	esults of Tr	ial No.	l, see Ta	ble No. 2	! - Trial l	Mix Nos.	25 - 28.	
	For results of	of Trial Mix	No. 2,	see Table	No. 4 - 1	rial Mix I	No. 55 an	d No. 56	
	Trial Mix Numb	pers:		#25	#26	#27	#28	#55	#56
	Admixtures	Dosage							
	Darex AEA	oz./c.y		11	8.	13	14	12	12
	WRDA	oz./100	wt.	F22 950	7	With Dark	tion pers	an es	***
,	Pozzolith 122N	v oz./100	wt.			5		5	5
	Daratard HC	oz./100	wt.			Hote Cont	3	poil age:	proj. 1000

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MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date

5/2/77

MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS

Page 22 of 26

Ready Mix Supplier: Lawrence	Sangrave	o Inc St.	Johnsbury, V	Vermont
Aggregate Supplier:	Specific Gravity	Dry Rodded Unit Weight	Absorption	
" Stone	· N/A	N/A	N/A	Cem
3/4" Stone Caledonia, Inc.	2.91	106.15	0.9	Wat
Blend: 1-1/2" & 3/4" 0 - 100	N/A	N/A	N/A	Air

2.78

634 Lbs./Cu.Yd. 35 Gals./Cu.Yd. Air Percent

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

F.M. 2.70

1.9

Maximum size			Sand	F.M.		
Aggregate	2,60	2.70	2.80	2.90	3.00	3.10
3/4"	0.64	0.63	0.62	0.61	0.60	0.59
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68

106.15 0.63 1086 Lbs./CY Coarse Aggregate (Dry Rodded (Unit Unit Weight) Volume)

1.	Volume of Water	(Gals/CY) 35	4.679	Cu. Ft.
		7.48		
2.	Solid Volume of Cement	(Lbs./CY) 634	3.225	Cu. Ft.
3.	Volume of Entrained Air	196.56 = X 27 =	1.620	_ Cu. Ft.
4.	Solid Volume of Coarse Aggregate	(Lbs./CY 1806 (SpGr) 2.91 X 62.4	9.946	_ Cu. Ft.
5.	Total Solid Volume of Ingredients E	xcept Sand	19.470	_ Cu. Ft.
6.	Solid Volume of Sand Required 27.00	0 = 19.470 Cu.Ft. (Line 5)	7.530	Cu. Ft.
7.	Required Weight of Sand: (Solid Volume) 2.530 X	SpGr) 2.78 X 62.4 =	1306	Lbs./Cu.Yd.
8.		6 + (Line 6 + Line 4) ITIES/CU. YD. (DRY WEIGHTS)	43	% by Vol.

N/A " Stone	Trial #1 N/A	Trial #2	Trial #3	Lbs.
3/4 " Stone	1806			Lbs.
Sand	1306	2.2 % (A.C.)		Lbs.
Cement	634	- 5		Lbs.
Water	35			Gals.

(See Reverse Side for Results)

Sand

Caledonia, Inc.

Air Admi	xture used:						
Manufact	ured by:						
Other Ad	mixtures used:						
Manufact	ured by:			GANGER - GRANDER - HER SHEET - HER SHEET - HE SHEET - H			
		TRIAL #	1	TRIA	L #2	7	TRIAL #3
Air Admi	xture Dosage						
Other Ad	mixture Dosage	BARRANDO COMO CONTRACTOR CONTRACT					
% Air						***************************************	
Slump							
Unit Wei	ght			<u> </u>			
Yield		,		١.			
W/C Rati	o					at the same of the	
A Compress 7 Da	verage ive Strengths -	Standard Cured	6" x 12" 0	lylinders			
14 Da	vs						
28 Da							
20 Du	<i>J</i>	**************************************	диосического поми				
Da	ys						
		ts of Trial No.	l, see Tabl	e No. 2 -	Trial Mi	x Nos. 29	- 32.
	For result						- 32.
	For result	3	1, see Tabl #29	e No. 2 -	Trial Mi	x Nos. 29 #32	- 32.
	For result						- 32.
	For result Trial Mix Numbers Admixtures	Dosage	#29	#30	#31	#32	- 32.
Da	For result Trial Mix Numbers Admixtures Darex AEA	Dosage	#29 11	#30 7	#31	#32	- 32.

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date 5/2/77

MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM #501.25 CONCRETE CLASS B Page 23 of 26

Ready Mix Supplier: Lawrence Sangravco Inc. - St. Johnsbury, Vermont

Aggregate Supplier:	Specific Gravity	Dry Rodded Unit Weight	Absorption
1/2" Stone Caledonia, Inc.	2.91	102.64	0.6
3/4" Stone Caledonia, Inc.	2.91	106.15	0.9
Blend: 1-1/2" & 3/4" 2/3 - 1/3	2.91	106.06	N/A
Sand Caledonia, Inc.	2.78	F.M. 2.70	1.9

Cement 660 Lbs./Cu.Yd.
Water 32 Gals./Cu.Yd.
Air 6 Percent

Gals.

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size	Sand F.M.					
Aggregate	2.60	2.70	2.80	2.90	3.00	3.10
3/4"	0.64	0.63	0.62	0.61	0.60	0.59
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68

106.06 X .72 = 76.36 X 27 = 2062 Lbs./CY Coarse Aggregate
Unit Weight) Volume)

1.	Volume of Water		(Gals/CY)	32	4.278	_ Cu. Ft.
	0.8			7.48		
2.	Solid Volume of	Cement	(Lbs./CY)	660	3.358	Cu. Ft.
			978/2004 - 100	196.56		
3.	Volume of Entra	ined Air	· ·	6 X 27	1.620	_ Cu. Ft.
4.	Solid Volume of	Coarse Aggregate	(Lbs./CY (SpGr)	2062 2.91 x 62.4	11.356	Cu. Ft.
5.	Total Solid Vol	ume of Ingredients I	Except Sand		20.612	Cu. Ft.
6.	Solid Volume of	Sand Required 27.0	00 -20.612 Cu.	Ft. (Line 5)	6.388	Cu. Ft.
7.	Required Weight (Solid Vol	of Sand: ume) 6.388 x	(SpGr) 2.78	—X 62.4	1108	Lbs./Cu.Yd.
8.	Ratio of Sand to	o Total Agg. Line	6 + (Line 6 +		36	% by Vol.
		SUMMARY OF QUANT	TITIES/CU. YD.	(DRY WEIGHTS)		
		Trial #1	Trial #2	Tr	ial #3	
1-1/	2" Stone	1375				Lbs.
3/	4" Stone	687				Lbs.
San	nd .	1108	4.2			Lbs.
Cen	nent	660	*			Lbs.

(See Reverse Side for Results)

32

Water

Air Admi:	xture used:						
Manufact	ured by:						
Other Adı	mixtures used:						understand stage of the stage of
Manufact	ured by:						
		TRIAL #	1	TRIA	L #2		TRIAL #3
Air Admi:	xture Dosage		-				
Other Adı	mixture Dosage	managering a visit device only on such homes and				***************************************	
% Air							
Slump						Bangus States	
Unit Weig	ght				1.		
Yield				i .			
W/C Ratio	o	475			,	2	
A. Compress	verage ive Strengths -	Standard Cured	6" x 12"	Cylinders			
7 Dag	ys			C	,		
14 Da	ys	· · · · · · · · · · · · · · · · · · ·					
28 Da	ys						
Dag	ys	March State Bull Transport Anna Albert Anna Anna Anna Anna Anna Anna Anna Ann	rys (Chana De Chana and Chana De Chana			- 1/115 - 111-11	
Remarks:	For resu	alts of Trial No	. 1, see Ta	able No. 3	- Trial M	ix Nos. 3	3 - 36.
	Trial Mix Numbers	:	#33	#34	#35	#36	
	Admixtures	Dosage					
	Daratard AEA	oz./C.Y.	12	9	13	13	
	WRDA	oz/100 wt.	ene koa	7.	gain print.	g=5 65A	
	Pozzolith 122N	oz./100 wt.	will ech		5	NICE CHIE	-
	Daratard HC	oz./100 wt.		end end		3	

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date 5/2/77

Date <u>5/2/77</u>
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MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS B

Ready Mix Supplier: Lawrence Sangravco Inc. - St. Johnsbury, Vermont

Aggregate Supplier:	Specific Gravity	Dry Rodded Unit Weight	Absorption
1-12" Stone Caledonia, Inc.	2.91	102.64	0.6
3/4" Stone Caledonia, Inc.	2.91	106.15	0.9
Blend: 1-1/2" & 3/4" 50 - 50	2.91	110.17	N/A
Sand Caledonia, Inc.		F.M. 2.70	1.9

Cement 660 Lbs./Cu.Yd.

Water 32 Gals./Cu.Yd.

Air 6 Percent

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size			Sand	F.M.	: : :	
Aggregate	2.60	2.70	2.80	2.90	3.00	3.10
3/4"	0.64	0.63	-0.62	0.61	0.60	0.59
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68

110.17 X 0.72 = 79.37 X 27 = 2142 Lbs./CY Coarse Aggregate
Unit Weight) Volume)

1.	Volume of Water		(Gals/CY) 32	4.278	_ Cu. Ft.
		1.	7.48	3	
2.	Solid Volume of	Cement	(Lbs./CY) 660	3.358	Cu. Ft.
	, <u>, , , , , , , , , , , , , , , , , , </u>		196.56	3 -	
3.	Volume of Entra	ined Air	- 6	27 = 1.626	Cu. Ft.
4.	Solid Volume of	Coarse Aggregate	(Lbs./GY 2142 (SpGr) 2.91 X	62.4 = 11.796	_ Cu. Ft.
5.	Total Solid Volu	ume of Ingredients		21.052	_ Cu. Ft.
6.	Solid Volume of	Sand Required 27	.00 -21.052 Cu.Ft. (Line	5.948	_ Cu. Ft.
7.	Required Weight (Solid Volu	of Sand: ime) 5.948 X	(SpGr) 2.78 X 62	2.4 = 1032	_ Lbs./Cu.Yd.
8.	Ratio of Sand to	Total Agg. Line	6 + (Line 6 + Line 4)	33.5	% by Vol.
	· ·	SUMMARY OF QUAN	NTITIES/CU. YD. (DRY WEIC	HTS)	
		Trial #1	Trial #2	Trial #3	
1-1/	2' Stone	1071	- V.		Lbs.
3/4	_" Stone	1071			Lbs.
San	đ	1032			Lbs.
Cem	ent	660			Lbs.
Wat	er	32			Gals.

(See Reverse Side for Results)

	xture used:						
Manufactu	ired by:						
	nixtures used:						
	·	· A · -			(:		
Manufactu	ared by:						
		TRIAL #1		TRIAI	#2	1	TRIAL #3
Air Admix	kture Dosage		and the second second			process of the second	
Other Adm	nixture Dosage		ani interconnecti interconnect				
% Air							
Slump							
Unit Weig	zht			/	<u> </u>		¥ .
Yield	5						
	_	Apparatus sount or in grant more state of their investment and apparatus sound	·	gio more esperatores de mesos estados estados en contratores en co	<u>regiment de ministración de la companya de la comp</u>		Againtal Little on Cymreid y thai Chaby, a chilair Impiese migyr ad The Construction of Health
W/C Ratio)		PARAMETER .				
A ₁ Compress	verage ive Strengths - 6	Standard Cured	6" x 12" C	ylinders			
				1			
7 Day	ys				,		
7 Day		ententes de constituir de la constituir					
14 Day	ys						
14 Day 28 Day	ys ys						
14 Day	ys ys						
14 Day 28 Day Day	ys ys	s of Trial No. 1	, see Table	No. 3 -	Trial Mix N	os. 37	- 40.
14 Day 28 Day Day	ys ys For results					,	- 40.
14 Day 28 Day Day	ys ys For results Trial Mix Numbers	S:	, see Table #37	No. 3 -	Trial Mix N	os. 37 - #40	- 40.
14 Day 28 Day Day	ys ys For results Trial Mix Numbers Admixtures	s: Dosage	#37	#38	#39	#40	- 40.
14 Day 28 Day Day	ys ys For results Trial Mix Numbers Admixtures Darex AEA	s: Dosage oz./C.U.		#38 9	#39	,	- 40.
14 Day 28 Day Day	ys ys For results Trial Mix Numbers Admixtures Darex AEA WRDA	Dosage oz./C.U. oz./100 wt.	#37	#38	#39 13 Y	#40	- 40.
14 Day 28 Day	ys ys For results Trial Mix Numbers Admixtures Darex AEA	s: Dosage oz./C.U.	#37 12	#38 9	#39	#40	- 40.

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date 5/2/77

MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS B Page 25 of 26

Ready Mix Supplier: Lawrence Sangravco Inc . - St. Johnsbury, Vermont

Aggregate Supplier:	Specific Gravity	Dry Rodded Unit Weight	Absorption
1-1/2' Stone Caledonia, Inc.	2.91	102,64	0.6
3/4" Stone Caledonia, Inc.	2.91	106,15	0.9
Blend: 1-1/2" & 3/4" 1/3 - 2/3	2.91	106.18	N/A
Sand Caledonia, Inc.	2.78	F.M. 2.70	1.9

Cement 660 Lbs./Cu.Yd.
Water 32 Cals./Cu.Yd.
Air 6 Percent

Lbs.

Gals.

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size	Sand F.M.						
Aggregate	2,60	2.70	2.80	2.90	3,00	3.10	
3/4"	0.64	0.63 -	0.62	0.61	0.60	0.59	
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68	

106.18 X .72 = 26.45 X 27 = 2064 Lbs./CY Coarse Aggregate
Unit Weight) Volume)

1.	Volume of Water	1	(Gals/CY)	30	4.278	_ Cu. Ft.
				7.48	4 3 / 1 1	
2.	Solid Volume of	Cement	(Lbs./CY)	660 196.56	3.358	Cu. Ft.
3.	Volume of Entrai	ined Air	6	X 27	1.620	Cu. Ft.
4.	Solid Volume of	Coarse Aggregate	(Lbs./CY 206 (SpGr) 2.9		11.367	_ Cu. Ft.
5.	Total Solid Volu	ume of Ingredients	Except Sand		20.623	_ Cu. Ft.
6.	Solid Volume of	Sand Required 27	.00 - 20.623 Cu.Ft	(Line 5)	6.377	_ Cu. Ft.
7.	Required Weight (Solid Volu	of Sand: nme) 6.372	(SpGr) 2.78	—x 62.4	1106	_ Lbs./Cu.Yd.
8.	Ratio of Sand to		e 6 + (Line 6 + Li		36	_ % by Vol.
		Trial #1	Trial #2	Tr	ial #3	
1-1/2	" Stone	688	· · ·			Lbs.
3/4	_" Stone	1367		1		Lbs.
San	đ	1106				Lbs.

(See Reverse Side for Results)

660

32

Cement

Water

Air Admia	kture used:	,					
Manufacti	red by:						
Other Adm	nixtures used:						
Manufactu	ired by:						
		TRIAL #	1	TRIA	L #2	ŧ .	TRIAL #3
Air Admix	cture Dosage	gambara, arguning entoning entoning entoning					
Other Adm	nixture Dosage						
% Air							
Slump							
Unit Weig	tht.		,		100 N		
Yield	544.0						
	S 3	CARTILLE CONTRACTOR CO	entition on Constituted				
W/C Ratio		State of the state				************	
	verage Live Strengths - S	Standard Cured	6" x 12" Cy	linders			
7 Day	78				1		
14 Day	7 8	17	. ^				
28 Day							
Day		All the reconstruction of the reconstruction	eritarin utara puntuta terratuan di seria di se				
Day		photograph description of province special providence describes a view	Arrando Arrand		and the state of t		
Remarks:	For results of	of Trial No. 1,	see Table N	o. 3 - Ti	rial Mix No	os. 41 -	44.
	Trial Mix Numbers	•	#41	#42	#43	#44	
	Admixtures	Dosage	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
	Darex AEA	oz./C.Y.	12	9	13	13	
	WRDA	oz./100 wt.	C NOT SEE	7.	E	. 68 69	
	Pozzolith 122N	oz./100 wt.			5	guit said	
	Daratard HC	oz./100 wt.	Auto port	1000 E000	End 528	3	

MATERIALS DIVISION - STRUCTURAL CONCRETE SUBDIVISION Date 5/2/77

MIX DESIGN SHEET - STRUCTURAL CONCRETE ITEM # 501.25 CONCRETE CLASS B Page 26 of 26

Ready Mix Supplier: Lawrence Sangravco Inc. - St. Johnsbury, Vermont

Aggregate Supplier:		Dry Rodded Unit Weight	Absorption	
N/A" Stone	N/A	n/A	N/A	
3/4" Stone Caledonia, Inc.	2.91	106.15	.0.9	
Blend: 1-1/2" & 3/4" 0 - 100	N/A	N/A	N/A	
Sand Caledonia, Inc.	2.78	F.M. 2.70	1.9	

Cement 660 Lbs./Cu.Yd.
Water 35 Gals./Cu.Yd.
Air 6 Percent

VOLUME OF DRY RODDED COARSE AGGREGATE PER UNIT VOLUME OF CONCRETE

Maximum size	Sand F.M.						
Aggregate	2,60	2.70	2.80	2.90	3.00	3.10	
3/4"	0.64	0.63	0.62	0.61	0.60	0.59	
1-1/2"	0.73	0.72	0.71	0.70	0.69	0.68	

106.15 X .63 = 66.875 X 27 = 1806 Lbs./CY Coarse Aggregate
Unit Weight) Volume)

1.	Volume of Water	(Gals/CY)	35		4.679	Cu. Ft.
		20 A100	7.48		de la .	
2.	Solid Volume of Cement	(Lbs./CY)	660 196.56		3.358	Cu. Ft.
3.	Volume of Entrained Air	Par .	6 x 2	7 = -	1.620	Cu. Ft.
4.	Solid Volume of Coarse Aggregate	120011	.806 2.91 X 62	.4 = -	9.946	Cu. Ft.
5.	Total Solid Volume of Ingredients Exc	cept Sand	i	_	19.603	Cu. Ft.
6.	Solid Volume of Sand Required 27.00	- 19.603 Cu.	Ft. (Line 5)	7.397	Cu. Ft.
7.	Required Weight of Sand: (Solid Volume) 7.397 X (Si	OGr) 2.78	x 62.4		1283	Lbs./Cu.Yd.
8.	Ratio of Sand to Total Agg. Line 6 SUMMARY OF QUANTIT	+ (Line 6 + TIES/CU, YD.		= -	42.7	% by Vol.
N/A	Trial #1	Trial #2		Trial	#3	The

		Trial #1	Trial #2	Trial #3	
N/A " Stone		N/A			Lbs.
3/4 " Stone		1806	V-103	· 10	Lbs.
Sand		1283	a p		Lbs.
Cement	1	660			Lbs.
Water	9	35			Gals.

(See Reverse Side for Results)

Air Admixtu	re used:			and the second second second second			
Manufacture	ed by:						
Other Admix	ctures used:	The state of the s					
Manufacture	ed by:	nderstandstated field freige Affects while Annach species (1976 cm Annach seine			urstuurmu room heks era kapanilija, min kirk hekkya kuntaa kunta kirkiili kilk n		
		TRIAL #	L ,	TR	[AL #2		TRIAL #3
ir Admixtu	ire Dosage						
ther Admix	cture Dosage					****	
% Air						en cent	
Slump							
Jnit Weight	į			- M. 15	£)`		en,ace
<i>[ield]</i>				1			
W/C Ratio							
Compressive 7 Days	e Strengths -	Standard Cured	6" x 12"	Cylinder	3 , , , , , , , , , , , , , , , , , , ,		
•		To the second			· :	· · · · · · · · · · · · · · · · · · ·	
14 Days 28 Days					,		
		A CERTAIN CONTINUES CONTIN		:		χ÷.	
Days	23.55		(• •		100 C	-	
lemarks:	For resu	lts of Trial No.	1, see T	able No.	3 - Trial N	lix Nos.	45 - 48.
•	6 01						
T1	rial Mix Numbers	J:			e jak		
-		Dosage	#45	#46	#47	#48	
Ac	rial Mix Numbers		#45 11	#46 9		#48 12	
Ac Da	rial Mix Numbers dmixtures	Dosage			#47		
Ac Da WI	rial Mix Numbers dmixtures arex AEA	Dosage	11	9	#47 12	12	
Ac Da WI Pc	rial Mix Numbers dmixtures arex AEA RDA	Dosage oz./C.Y. oz./100 wt.	11	9	#47 12	12	