EVALUATION OF PIKE/WATERFORD FINE AGGREGATE FOR USE IN STRUCTURAL CONCRETE

REPORT 82-2 FEBRUARY 1982

REPORTING ON WORK PLAN 81-C-6

STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS & RESEARCH DIVISION

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Date: Feb. 22, 1982

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ABSTRACT

As aggregate sources are developed, tests must be conducted to assure that the materials meet specifications and perform satisfactorily when used in concrete mixtures.

This report documents results of tests performed on a proposed source of fine aggregate for structural concrete. The material is a washed natural sand produced by Pike Industries, Incorporated at their facility in Waterford, Vermont.

Results indicate the material performed satisfactorily in all classes of concrete when used in combination with coarse aggregate from Calkins Redimix in Coventry, Vermont. The material also performed satisfactorily in Class B and Class C concrete containing coarse aggregate from Pike Industries in Waterford, Vermont, but <u>did not</u> perform satisfactorily in Class A concrete using the Waterford coarse aggregate.

INTRODUCTION

A request from Pike Industries, Incorporated of Tilton, New Hampshire to approve washed natural concrete sand from their Waterford, Vermont guarry was processed by the Materials and Research Division in the same manner as the evaluation of Pike's coarse aggregate reported on in Report No. 81-9. The evaluation procedure used was "Procedure For The Evaluation Of New Structural Concrete Aggregate Sources To Determine Compliance With A.O.T. Specifications" (PENCAS). This procedure was developed early in 1981 by the Materials and Research (see Appendix A for PENCAS). The material was sampled by Division Materials and Research Division representatives and tested for compliance with Section 704.01 of the standard specifications. Then, according to the PENCAS procedure, compressive strengths of concrete mixtures containing this aggregate were compared to strengths of mixtures containing a reference aggregate. Concrete for the evaluation program was produced at Calkins ready mix concrete plant in Coventry, Vermont, at the request of Pike Industries, Incorporated.

TESTING PROGRAM

PHASE I - SECTION 704.01 TESTS:

Pike/Waterford washed sand was sampled from a stockpile at Pike's quarry in Waterford, Vermont on May 13, 1981 by representatives of the Materials and Research Division. This material was found to comply with the specification requirements for Grading, Organic impurities, Compressive strength of mortar and Soundness. Pike Industries was so informed on June 10, 1981. The reports on Laboratory No. C8100332 and A81-0328, which document these tests, are in Appendix B.

PHASE II - PERFORMANCE-IN-CONCRETE TESTS:

As required by PENCAS, after the aggregate had been tested to determine conformance with Section 700 requirements, it was tested in concrete under field conditions. (Concrete was not produced in the laboratory, because it was felt that information gained from testing the ready mix concrete would be sufficient.) Mixtures were designed by Structural Concrete personnel for Class A, Class B, and Class C concrete using the following materials:

Coarse Aggregate:

A. Reference Aggregate

3/4 inch crushed gravel Calkins, Coventry, VT

B. Reference Aggregate

3/4 inch crushed stone Pike Industries, Inc., Waterford, VT

Fine Aggregate:

A. Proposed New Aggregate

Washed Sand Pike Industries, Inc., Waterford, VT

B. Reference Aggregate

Washed Sand Calkins, Coventry, VT Cement:

Type II Independent Cement Corporation Joliette, Quebec

Air Entraining Admixture:

Darex AEA W. R. Grace & Co. Cambridge, MA

Water Reducing Admixture:

WRDA with Hycol W. R. Grace & Company Cambridge, MA

Aggregate properties used for preparing mix designs are shown in

Table 1 and Table 2.

	Bulk Specific Gravity		Dry Rodded Unit Weight, 1bs/ft ³
Reference Aggregate - Calkins/Coventry	2.70	1.3	103.68
Reference Aggregate - Pike/Waterford	2.94	0.5	107.13

 TABLE 1

 COARSE AGGREGATE PROPERTIES

	TABLE	2
FINE	AGGREGATE	PROPERTIES

	Bulk	Absorption,	Fineness
	Specific Gravity	Percent	Modulus
Reference Aggregate - Calkins/Coventry	2.61	1.6	3.07
New Aggregate - Pike/Waterford	2.68	1.3	2.69

Initial testing for this evaluation took place during the day of August 4, 1981. On that date, batches were prepared for Class A, Class B and Class C concretes using Calkins/Coventry sand and stone in the Reference Aggregate mixes and Pike/Waterford sand and stone in the New Aggregate mixes.

When compressive strengths of both the Reference and the New Aggregate mixes were below anticipated strengths, at 7 days, a second round of testing was planned.

On August 18, 1981, batches were prepared for Class A, Class B and Class C concretes using Calkins/Coventry sand and stone in the Reference Aggregate mixes and Pike/Waterford sand with Calkins/Coventry stone in the New Aggregate mixes.

All concrete used in this evaluation was produced and tested at Calkins Redimix in Coventry, Vermont. Concrete was mixed in a standard truck mixer with batch size being one cubic yard. Moisture content of the aggregates was determined prior to the start of mixing, and aggregate weights were adjusted.

The mix proportions used are shown in Tables 3 and 4 for the August 4, 1981 tests and Tables 5 and 6 for the August 18, 1981 tests.

TABLE 3REFERENCE AGGREGATE MIX DESIGNAUGUST 4, 1981 - BATCH QUANTITIES PER CY

	Class A	Class B	Class C
*Calkins Coarse Aggregate, lbs.	1671	1671	1671
*Calkins Fine Aggregate, lbs.	1253	1396	1507
Cement, lbs.	660	611	564
Air Entraining Admixture, oz.	7	6	3
Water Reducing Admixture, oz.	19.8	18.3	17.0
Net Water, gal.	40.1	40.3	41.1

*Weights converted to saturated surface-dry condition.

TABLE 4 NEW AGGREGATE MIX DESIGN AUGUST 4, 1981 - BATCH QUANTITIES PER CY

	Class A	Class B	Class C
*Pike Coarse Aggregate, 1bs.	1831	1831	1831
*Pike Fine Aggregate, 1bs.	1260	1407	1521
Cement, 1bs.	660	611	564
Air Entraining Admixture, oz.	5	³¹ 2	2
Water Reducing Admixture, oz.	19.8	18.3	17.0
Net Water, gal.	42.0	42.5	38.0

*Weights converted to saturated surface-dry condition.

		TABLE 5				
REFERENCE	AG	GREGATE	MIX	DESIGN		
AUGUST 18, 198] _	BATCH	QUANT	ITIES	PER	СҮ

	Class A	Class B	Class C
*Calkins Coarse Aggregate, lbs.	1671	1671	1671
*Calkins Fine Aggregate, lbs.	1253	1396	1507
Cement, lbs.	660	611	564
Air Entraining Admixture, oz.	6	4 ¹ 2	3
Water Reducing Admixture, oz.	19.8	18.3	17.0
Net Water, gal.	31.1	31.3	34.1

*Weights converted to saturated surface-dry condition.

TABLE 6NEW AGGREGATE MIX DESIGNAUGUST 18, 1981 - BATCH QUANTITIES PER CY

	Class A	Class B	Class C
*Calkins Coarse Aggregate, lbs.	1785	1785	1785
*Pike Fine Aggregate, lbs.	1168	1316	1429
Cement, lbs.	660	611	564
Air Entraining Admixture, oz.	5	4	2 ¹ / ₂
Water Reducing Admixture, oz.	19.8	18.3	17.0
Net Water, gal.	33.1	33.1	33.7

*Weights converted to saturated surface-dry condition.

Tests were performed on the fresh concrete to determine; Slump, Air Content, and Unit Weight/Yield. Six standard 6" p x 12" cylinders were prepared from each batch. The cylinders were tested for compressive strength, two each at ages 7, 14, and 28 days. Tests for freeze-thaw durability were not conducted.

RESULTS

The results of tests on the fresh and hardened concrete are shown in Tables 7, 8, 9, and 10.

	Class A	Class B	Class C
Slump, inches Air Content, percent Unit Weight, lbs/ft ³ Relative Yield, percent Concrete Temperature, degrees F Compressive Strength, psi	2 ¹ 2 6.3 145.62 99.7 80	3 ¹ 4 6.6 143.54 103.6 76	2 ¹ 4 5.0 146.00 103.6 78
7 days 14 days 28 days	3417 3997 4492	3409 4041 4435	3360 4081 4297

TABLE 7 REFERENCE AGGREGATES AUGUST 4, 1981 - TEST RESULTS

(Design Compressive strength, psi) (4000) (3500) (3000)

TABLE 8
NEW AGGREGATE
4, 1981 - TEST RESULTS

	Class A	Class B	Class C
Slump, inches	3 3/4	4 1/2	3 3/4
Air Content, percent	6.4	4.1	4.2
Unit Weight, 1bs/ft ³	149.59	151.22	153.76
Relative Yield, percent	101.5	103.0	102.0
Concrete Temperature, degrees F	82	83	81
Compressive Strength, psi			
7 days	2998	2891	2883
14 days	3475	3484	3665
28 days	3926	3904	4103

(Design	compressive	strength,	psi)	(4000)) (3500)) (3000))
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TABLE 9 REFERENCE AGGREGATES AUGUST 18, 1981 - TEST RESULTS

	Class A	Class B	Class (
Slump, inches	2 1/4	2 1/2	3 1/2
Air Content, percent	6.2	6.0	6.6
Unit Weight, 1bs/ft ³	145.66	145.61	143.80
Relative Yield, percent	97.8	100.2	103.6
Concrete Temperature, degrees F	76	74	75
Compressive Strength, psi			
7 days	4116	3935	3427
14 days	4474	4532	4045
28 days	4797	4970	4333

(Design compressive strength, psi) (4000) (3500) (3000)

		TABL	Ē.	10	
	NE	W AG	GRI	EGATE	
AUGUST	18.	1981	63	TEST	RESULTS

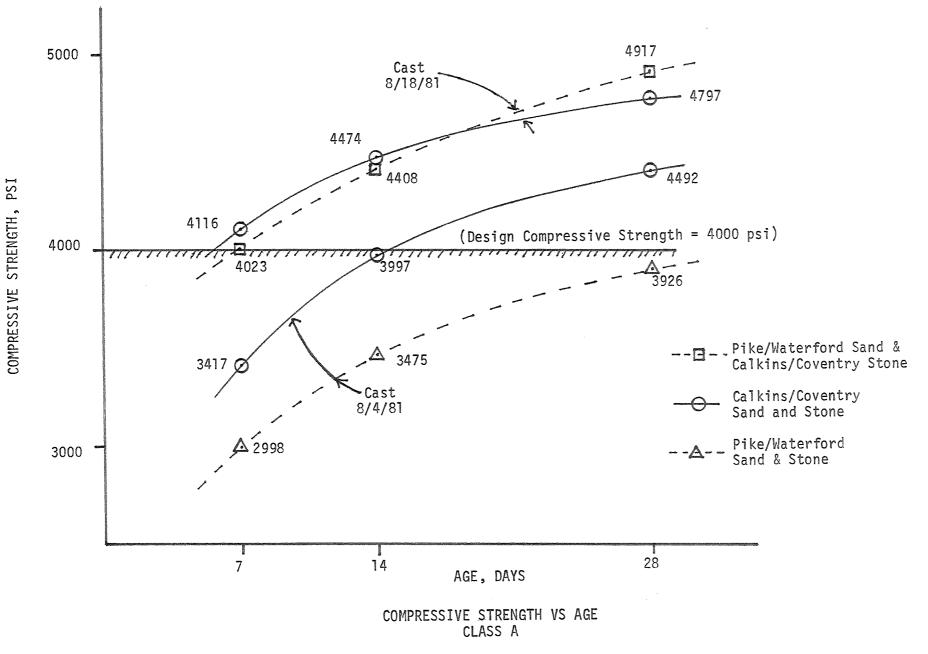
	Class A	Class B	Class C
Slump, inches Air Content, percent Unit Weight, lbs/ft ³ Relative Yield, percent Concrete Temperature, degrees F Compressive Strength, psi	3 6.3 145.42 99.0 70	3 1/4 5.5 146.66 100.7 70	2 3/4 5.0 147.29 102.0 70
7 days 14 days 28 days	4023 4408 4917	3992 4505 4912	3555 4218 4528

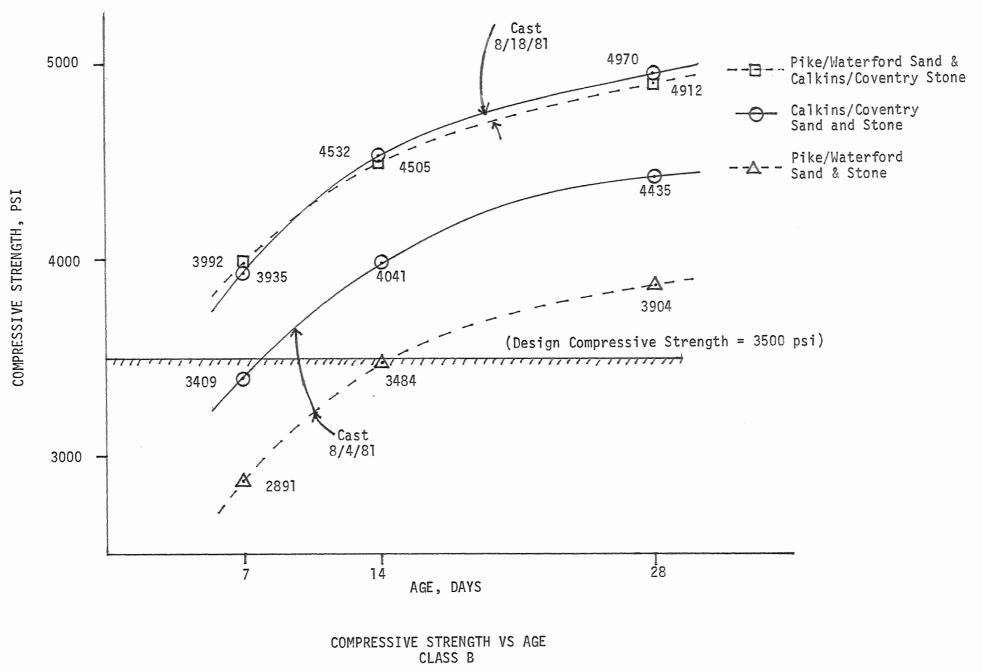
(Design compressive strength, psi) (4000) (3500) (3000)

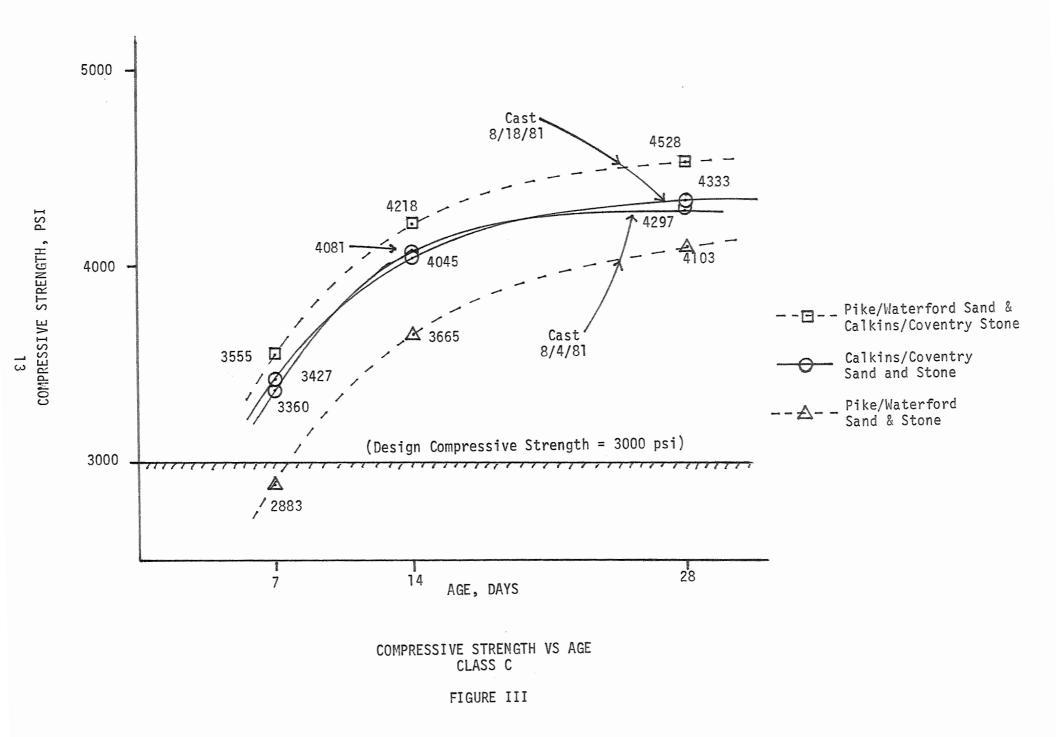
In Appendix C the results of compressive strength tests are shown as follows:

- Laboratory Report Nos. C8100920 to C8100925 show results of August 4, 1981 tests.
- Laboratory Report Nos. C8101000 to C8101005 show results of August 18, 1981 tests.

Strength age plots for both test dates are shown in Figures I, II, and III.







SUMMARY AND CONCLUSIONS

- For the three classes of concrete examined on August 4, 1981, the mixtures which contained Pike/Waterford sand and stone generally showed between 400 psi and 550 psi less compressive strength at all ages than the control mixtures which contained Calkins/Coventry sand and stone.
- The Class A mixture containing Pike/Waterford sand and stone did not achieve a satisfactory compressive strength at any age.
- 3. For the three classes of concrete examined on August 18, 1981, the mixtures which contained Pike/Waterford sand and Calkins/ Coventry stone showed strengths comparable to the control mixtures which contained Calkins/Coventry sand and stone.
- 4. While results indicated that strengths were below anticipated levels for the August 4, 1981 tests, the strengths for the August 18, 1981 tests were at expected levels. Although no apparent reasons exist for the wide fluctuations in strength, the higher temperatures of the freshly mixed concrete, experienced on August 4, 1981 may have been a contributing factor.

RECOMMENDATIONS

It is recommended that fine aggregate from the Pike/Waterford facilities be approved for use in Class A, Class B, and Class C mixtures containing an approved coarse aggregate from sources other than the Pike/Waterford facility.

It is also recommended that fine aggregate from the Pike/Waterford facilities be approved for use in Class B and Class C mixtures containing coarse aggregate from the Pike/Waterford facility. Compressive strength test results of these Class B and Class C mixtures shall be closely monitored.

Prepared By: P.A. Cover Date: May 5, 1981 Page: 1 of 2

APPENDIX A

STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS & RESEARCH DIVISION - STRUCTURAL CONCRETE SUBDIVISION

PROCEDURE FOR THE EVALUATION OF NEW STRUCTURAL CONCRETE AGGREGATE SOURCES TO DETERMINE COMPLIANCE WITH AOT SPECIFICATIONS

The evaluation of a new structural concrete aggregate source (i.e. one on which the Materials & Research Division has no service-in-concrete data) shall be divided into two sections called:

Phase I Section 700 and related tests; and

Phase II Performance-in-Concrete tests.

The Materials and Research Division shall perform all Phase I and Phase II tests.

Phase I

- 1. A written request shall be made to the Materials & Research Engineer by the person requesting the evaluation, describing the type of material, quantity available for sampling, and the location of the stockpiles.
- 2. The Structural Concrete Engineer shall determine from a site visit,
 - a) Does a stockpile of at least a day's production of processed material exist?
 - b) Can samples be obtained in the standard manner from the stockpiles?
- 3. If 2(a) and 2(b) are yes, the Structural Concrete Engineer shall make the necessary arrangements and obtain samples from the stockpiles designated by the producer.
- 4. The material shall be tested at the Materials & Research Division using the Structural Concrete Subdivision Annual Aggregate Testing Program procedure.
- 5. Report the results (as a Preliminary Sample) on the standard Materials and Research Division forms, and send a copy of the test results to the aggregate producer.

Phase II

1. Aggregates which meet the requirements of the Phase I evaluation will then be tested in concrete. The Structural Concrete Engineer will inform the person requesting the evaluation of the Phase II requirements. The performance-in-concrete tests shall be carried out on Ready Mixed concrete containing the aggregate being evaluated. At the same time concrete with a control aggregate (selected by the Structural Concrete Engineer) will also be processed. Costs for processing the aggregate thru the Ready-Mix plant will be borne by the requesting party. The Phase II tests shall Vermont Agency of Transportation Procedure for the Evaluation of New Structural Concrete Aggregate Sources to Determine Compliance with AOT Specifications

APPENDIX A

May 5, 1981 Page 2 of 2

conform to the Materials & Research Division <u>Performance-in-Concrete</u> Procedure for Evaluating a New Aggregate Source.

- 2. The Materials and Research Division shall carry out the work necessary for both the Phase I and Phase II sections of this evaluation process in a period of not more than 45 calendar days from the date the aggregate is available for testing. Any delays beyond the control of the Materials & Research Division shall be documented and the person requesting the evaluation shall be notified of the consequent extension of time required to complete the testing. Failure of the aggregate to pass the requirements of the Phase I section would terminate the evaluation.
- 3. Test results shall be the basis upon which the Structural Concrete Engineer shall recommend acceptance, further testing, or rejection to the Materials and Research Engineer.
- 4. The Materials and Research Engineer shall inform the person making the request of the acceptability or non-acceptability of the aggregate, when the Phase II tests have been completed.

APPENDIX A

STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS & RESEARCH DIVISION - STRUCTURAL CONCRETE SUBDIVISION

PERFORMANCE-IN-CONCRETE

PROCEDURE FOR EVALUATING A NEW AGGREGATE SOURCE

- Mix proportions shall be submitted for each class of concrete required; or designed by, the Materials and Research Division and shall conform to Table 501.03A.
- 2. Test shall be run on both Field and Laboratory Concrete.
- 3. Field Concrete shall be produced at an approved Ready-Mixed Concrete Plant. Cement, sand, water, and admixtures shall all be the same as in current use at the plant, and as approved by the Agency of Transportation.
- 4. Laboratory Concrete shall be prepared at the Central Laboratory with the same materials used in the Ready Mixed Concrete.
- 5. An approved aggregate in normal use at the Ready-Mixed Concrete plant shall be used as a control in a separate batch for both Field and Laboratory Concrete.
- 6. At least one cubic yard of Ready Mixed concrete shall be produced for each class of concrete containing each new and control aggregate being evaluated.
- Test cylinders shall be fabricated and cured in accordance with AASHTO T23-76.
- 8. Tests of Slump, Air Content, and Unit Weight and Yield shall be in accordance with AASHTO T119-74, AASHTO T152-80I, and AASHTO T121-79I, respectively.
- 9. Batching, mixing, field testing, and specimen fabrication using Field Concrete shall be witnessed by a representative of the Materials and Research Division.
- 10. Cylinder specimens shall be tested at the Materials and Research Laboratory for compressive strength at ages 7, 14, and 28 days in accordance with AASHTO T22-74.
- 11. The Materials and Research Division's involvement in the evaluation shall be documented in a Materials & Research Division report. The procedure in current use by the Research Subdivision shall be followed (including the drafting and approval of a Work Plan before work has begun).

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STATE OF VERMONT AGENCY OF TRANSPORTATION

MATERIALS AND RESEARCH DIVISION Montpelier, Vermont 05602

REPORT ON MISCELLANEOUS SAMPLE

		Repo	rt	June o	<u>, 19 <u>81</u></u>
Laboratory No.	C8100332	Test	ed by	Eaton	
Name	Fine Ag	gregate for Concret	e 501		
Identification Marks	sPrelimi	nary Sample			and a state of the
Submitted by			Address	and a second	an filing som an generalise and an
Sampled <u>5/13</u> , 19	81 Receiv	red <u>5/25</u> , 19 <u>81</u>		ยังกรุงกรุงกรุงกรุงกรุงกรุงกรุงกรุงกรุงกรุ	and a star of the
Sample from		Stockpile - Pike, W	aterford		ang ar al more and the second state of the second state of the second states
Quantity Represented	1		₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩	and the stand of the	n bille management som at s
Source of Material		Pike - Waterford	۲۰۰۰و۲۰۰۰و۲۰۰۰و۲۰۰۰و۲۰۰۹۲۲۲۲۲۲۲۲۲۲۲۲۲۲		
Location used or to			1944-1944-1945-1945-1945-1945-1945-1945-	1919-2-20-20-1920-2010-2010-2010-2010-20	
Examined for		704.01			ana panalaka mangan sebaharan dari kang dari kang sebaharan sebaharan sebaharan sebaharan sebaharan sebaharan s

TEST RESULTS

<u>Ottawa Sa</u>	ind	3 day	Mortar Sand
Cube #1 #2 #3	2400 2400 2375		3550 3388 3388
Avg.	2390		3400
Cube #1 #2 #3	2913 2875 2725	7 day	4438 4675 4625
Avg.	2840		4580

This material was examined for mortar strengths. the results are as indicated.

S. J. Gage, P.E., Chief Engineer

P.A. Nichobor RAZ

c 0]

By: ________ R. F. Nicholson, P.E., Materials & Research Engineer

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STATE OF VERMONT AGENCY OF TRANSPORTATION

MATERIALS & RESEARCH DIVISION APPENDIX B Montpelier, Vermont 05602

REPORT ON SAMPLE OF ACGREGATE

			Report	June 8 , 19 81
Laboratory No.	A81-0328	and the state of the	Tested By	M. Lavin
Name	Fine /	Aggregate for Conci	rete 501	
Identification	Marks Preli	ninary Sample	Second and the second	
Submitted by _	M. Morissette	Title PFP	Address	
Sampled 5/13	, 19 <u>81</u> Received	5/14 , 19 81	San Juga un protesta da la constanta da	
Sample from		Stockpile @ Pike	Waterford	
Source of Mate	rial	Pike Waterford		
Location used	or to be used	Possible Future U	Jse	
Examined for		Item 704.01		
		TEST RESULTS		
Total Sa	-	Fineness Modulus		
Sieve Size	% Passing	% Coarser Than		Percent of Wear
4 1/2"		No. 100	90	AASHTO T3
4"		No. 50		AASHTO T4
3 1/2" 3"		No. 30	57	AASHTO T96
2 1/2"		No. 16	Contraction of the Contraction o	
		No. 16 No. 8	32 13	Fractured Faces, %
2"			Contraction of the Contraction o	
2" 1 3/4" 1 1/2"		No. 8	32 13	Fractured Faces, % Thin & Elongated Pieces, %
2" 1 3/4" 1 1/2" 1"		No. 8 No. 4	32 13	Thin & Elongated Pieces, %
2" 1 3/4" 1 1/2" 1" 3/4" 5/8"		No. 8 No. 4 Fineness Modulus	32 13	Thin & Elongated
2" 1 3/4" 1 1/2" 1" 3/4" 5/8" 1/2"		No. 8 No. 4 Fineness Modulus Color = 1 Comments:	32 13 2.69	Thin & Elongated Pieces, % Soundness, % Loss5.68
2" 1 3/4" 1 1/2" 1" 3/4" 5/8" 1/2" 3/8"	 100	No. 8 No. 4 Fineness Modulus Color = 1 Comments: This material was	32 13 2.69	Thin & Elongated Pieces, % Soundness, % Loss5.68 adation, color and
2" 1 3/4" 1 1/2" 1" 3/4" 5/8" 1/2" 3/8" No. 4 No. 8	<u> </u>	No. 8 No. 4 Fineness Modulus Color = 1 Comments: This material was	32 13 2.69 examined for gr	Thin & Elongated Pieces, % Soundness, % Loss5.68 adation, color and
2" 1 3/4" 1 1/2" 1" 3/4" 5/8" 1/2" 3/8" No. 4 No. 8 No. 10	<u> 100 </u> 87	<pre>No. 8 No. 4 Fineness Modulus Color = 1 Comments: This material was soundness. The re</pre>	32 13 2.69 examined for gr esults are as in	Thin & Elongated Pieces, % Soundness, % Loss5.68 adation, color and dicated.
2" 1 3/4" 1 1/2" 1" 3/4" 5/8" 1/2" 3/8" No. 4 No. 4 No. 8 No. 10 No. 16	<u>100</u> 87 <u>68</u> Sand	No. 8 No. 4 Fineness Modulus Color = 1 Comments: This material was soundness. The re	<u>32</u> <u>13</u> <u>2.69</u> examined for gr esults are as in ze. P.E., Chief En	Thin & Elongated Pieces, % Soundness, % Loss5.68 adation, color and dicated.
2" 1 3/4" 1 1/2" 1" 3/4" 5/8" 1/2" 3/8" No. 4 No. 8 No. 10	<u> 100 </u> 87	No. 8 No. 4 Fineness Modulus Color = 1 Comments: This material was soundness. The re	<u>32</u> <u>13</u> <u>2.69</u> examined for gr esults are as in ze. P.E., Chief En	Thin & Elongated Pieces, % Soundness, % Loss5.68 adation, color and dicated.
2" 1 3/4" 1 1/2" 1" 3/4" 5/8" 1/2" 3/8" No. 4 No. 4 No. 8 No. 10 No. 16 No. 30	<u>100</u> 87 <u>68</u> Sand 43 Portic	No. 8 No. 4 Fineness Modulus Color = 1 Comments: This material was soundness. The re	32 13 2.69 examined for gr esults are as in	Thin & Elongated Pieces, Z Soundness, Z Loss5.68 adation, color and dicated.

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

Project NameSTATE OF VERMONTW.P. No. 81-C-6AGENCY OF TRANSPORTATION						2 Cover						
Project Nu		r MATERIALS AND RESEARCH DIVISION Montpelier, Vermont 05602							Central Files APPENDIX C			
			Report o	on Concret	e Test B	eam or	Cylinders					
Laboratory	No.	C81009	920 (28)	Report	7,1	4,28	Day Break	s Date	typed_Se	eptember	~ 2, 81	
Pay Item												
Submitted												
Source of				entry	naa ayoo yoo ahaa ahaa kaa ka yaadadaa ah	Ouanti	ty Repres	ented	1 cy	y		
Coarse Agg												
Cement Bra	nd	Indep	pendent	algen ann an a	r xnc	'me	II	Lbe		564	-	
											cwt	
Air Entrai												
Maximum al												
Field Test	ed by	М. Мо	orissette	2		Lab. Te	sted by	Eato	on			
Sampled fr	om	truck	k mixer N	lo.34 @ p1	ant		Date Sam	pled: A	ugust 4,	1981		
Location U								erezetetetetetetetetetetetetetetetetetet				
Examined f	or Mod.	of Rupt	ure			Com	pressive	Strength_				
				TES	T RESULI	S						
Unit Weigh	t Fresh	Concret	·e 146	5	Air: Pr	essure	5.0%	Chace				
Total Wate							ure, Conc		B ^O F An	mbient	76 ⁰ F	
	Cyl.											
Specimen No.	Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Type* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break 1	Type 2	
CC 1-2	149 150	8/6	8/11	7	7	S	3350	3360	3360°			
3-4	149 149	8/6	8/18	14	14	S	4173	3988	4081			
5-6	150 150	8/6	9/1	28	28	S	4306	4288	4297			
ABOTTALISTI ALL ALL ALL ALL ALL ALL ALL ALL ALL AL												
*S = Stand	ard Cure	d; F =	Field C	ured	1		1	<u> </u>			<u> </u>	
Types of Bi	reaks:				s	. J. Gag	e, P.E., Ch X. Mice P.E., Materia	ief Engine	er 			
Comments: TA 183H Re 2M 4/81	2V.	т 4		, , ,	Ву: R. F.	Nicholson,	P.E., Materia	ls & Researc	h Engineer			

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Project Na W.P. No.				STATE AGENCY OF	2 Cover	^					
Project Nu			• • • •	IALS AND				Centi	ral Files	5	
Contractor of the second se		and an	<u></u>	-			Cylinders	APPE	NDIX C		
Laboratory	No			,					typed	tember 2	2, 1981
Pay Item		Perfor	mance in	concrete	ype of S	ample	Field	ten en e	Marine Sar - Segre - Sara -		
Submitted	ъу_М. Мо	orissett	e.	Title_PF	Р	Address					1988 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -
Source of	Material	. Calki	ns, Cove	ntry	arran any a the gas of the second	_Quanti	ty Repres	ented	1 (су	
Coarse Agg	regate	Calkir	is, Coven	try	Fine	. Aggreg	ate(Calkins, (Coventry		an a
Cement Bra	nd	Indep	endent		7	vpe	II	Lba	3.	660	
Air Entrai	ning Adm	ixture_	Darex AE	A Dosa	.ge7oz/	су _А	dmixture_	IRDA Hyco	l Dosage_	3 oz,	/cwt
Maximum al	lowable	water c	ontent,	Gal/Cy		Total	Aggregate	, Dry Wgt	•	2884	
Field Test											
Sampled fr					ant		Date Sam	pled: A	ugust 4,	1981	
Location U											
Examined f	or Mod.	of Rupt	ure			Com	pressive	Strength_			manum skilologi vi skala skol Vikala
				TES	T RESULT	S.					
Unit Weigh	t Fresh	Concret	e145	5.62	Air: Pr	essure_	6.3%	Chace			
Total Wate				Slump	2 ¹ 2"]	emperat	ure, Conc	rete80	Ar	mbient_	76
Specimen No.	Cyl. Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Type* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break	Type 2
CA 1-2	148 148	8/6	8/11	7	7	S	3342	3492	3417		
3-4	148 148	8/6	8/18	14	14	S	3961	4032	3997		
5-6	149 149	8/6	9/1	28	28	S	4501	4483	4492		1
<u></u>					-						
		1						-			
*S = Stand	ard Cure	d; F =	Field C	ured	1		1	<u>I</u>		[<u> </u>
Types of Br	reaks:					s. j. (Gage, P.E., Ži. N č	Chief Eng choSu	gineer	817	

Comments: TA 183H Rev. 2M 4/81

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Project Na				STATE AGENCY OF	OF VERM TRANSPO			2 Cover			
W.P. No. Project Nu	. 81-0-0 mber		MATER	IALS AND ontpelier	RESEARCH , Vermon	DIVISI t 0560	0N 2		al Files		
			Report o	n Concret	e Test B	eam or	Cylinders	APPE	ENDIX C		
Laboratory	No	C8100922	2 (28)	Report	7,14 of	,28	Day Break	s Date	typed	ptember	2,81
Pay Item	Per	formance	e in conc	rete T	ype of S	ample		Field			
Submitted				DE	D		er				
Source of	Material	Call	kins, Cov	ventry		Quanti	ty Repres	ented	1	су	
Coarse Agg	regate	Pike	e - Water	ford	Fine	Aggreg	ate	Pike - Wa	terford		
Cement Bra	nd	'Inde	ependent	22 mar (da	Ţ	T	I	Lba	660		
Air Entrai	ning Adm	ixture_	Darex A	A Dosa	ge5 oz	/cyA	dmixture	WRDA Hyco] Dosage	3 oz/	cwt
Maximum al	lowable	water c	ontent,	Gal/Cy	- covers to exactly up and one region	Total	Aggregate	, Dry Wgt	•	3066	
Field Test	ed by	M. I	Morisset	te		Lab. Te	sted by		Ea	ton	
Sampled fr	om	tru	ck mixer	No.38 @ p	lant		Date Sam	pled:	Aug	ust 4,	1981
Location U									- 		
Examined f	or Mod.	of Rupt	ure			Com	pressive	Strength_			
				TES	T RESULI	S					
Unit Weigh	t Fresh	Concret	e 14	49.59	Air: Pr	essure_	6.4%	Chace			
Total Wate	er, Gal/C	Cy Used_		Slump_3	3/4" 7	Cemperat	ure, Conc	rete8	2Ar	mbient_	80
	Cyl.	Data	Data	Deedword			Brock 1	Prost 2	A	Prost	
Specimen No.	Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Type* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break 1	2 -
PPA 1-2	153 153	8/6	8/11	7	7	S	3077	2918	2998		
3-4	153 153	8/6	8/18	14	14	S	3501	3448	3475		
5-6	152 153	8/6	9/1	28	28	S	3961	3890	3926		
*S = Stand		ed; F =	Field C	ured	<u> </u>	!	1			l 	<u> </u>
Types of B:	reaks:	\square	17/	111-		S. J. Ga	ige, P.E., C	hief Engir	neer		
Comments:		1 2	2 3	4 5 6	_	Re	F. Nic	hoso	- IRa	7	
ТА 183Н Re 2м 4/81	ev.				By: R. F.	Nicholson	лде, Р.Е., С <i>А.</i> Місс , Р.Е., Маісгі	ais & Resear	ch Enginee	r	

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Project Nam W.P. No		6	STATE OF VERMONT AGENCY OF TRANSPORTATION						er		
W.P. W Project Nu		0		IALS AND I			_	Cen	tral Fil	es	
]		n Concrete				<u>A</u>	PPENDI X	<u>C</u>	
Laboratory	No.	C810092	23 (28)) Report	of 7,14	,28	Day Break	s Date	typed Se	ptember	2,81
Pay Item											
Submitted											
Source of 1										су	and a state of the second s
Coarse Agg											
Cement Bra											and a state of the
Air Entrai										3 oz	/cwt
Maximum al										0011	and an an interaction of the design of the
Field Test						Lab. Te	sted by	E	aton		
Sampled fr						_	Date Sam	pled:A	ugust 4,	1981	
Location U	sed or t	o be Us	ed	Anadar ala ga ang a na ana ang							201
Examined f	or Mod.	of Rupt	ure	alay sala - ay ya garan ay an		Com	pressive	Strength	-		
				TES	T RESULT	S					
Unit Weigh	t Fresh	Concret	e15	1.22	_Air: Pr	essure_	4.1%	_ Chace_			
Total Wate	r, Gal/0	Cy Used_		Slump	4½"_1	Cemperat	ure, Conc	83 ⁰	⁰ FAr	mbient	80 ⁰ F
Specimen	Cyl. Unit	Date	Date	Desired	Age at	Type*	Break 1	Break 2	Ave.	Break	Туре
No.	Wgt. P.C.F.	Rec'd	Broken	age at break	Break	S - F	P.S.I.	P.S.I.	P.S.I.	1	2
PPB 1-2	156	8-6	8-11	7	7	S	2900	2882	2891		
3-4	156 155	8-6	8-18	14	14	S	3501	3466	3484		
5-6	155	8-6 .	9-1	28	28	S	3890	3917	3904		
••••••••••••••••••••••••••••••••••••••	100										
		-									
••••••••••••••••••••••••••••••••••••••											
*S = Stand		ed; F =	Field (ured	1	f	<u>.</u>				
Types of B	reaks:		120	700-		S. J.	Gage, P.E. Z. M. C son, P.E., Ma	, Chief En	gineer	0.0	
Comments:			2 3	4 5 6	J	V:	2.11		-//	<u>Ra</u> 7	
TA 183H Re	ev.				R	F. Nichol	son, P.E., Ma	eriais & Res	search Engir	heer	

TA 183H Rev. 2M 4/81

Project Nat W.P. No.			STATE OF VERMONT AGENCY OF TRANSPORTATION						r		
W.P. NO. Project Nu	mber		MATER M	IALS AND	RESEARCH , Vermon	DIVISI(t 0560	0N 2		ral File	S	
			Report o	n Concret	e Test B	eam or	Cylinders	API	PENDIX C		
Laboratory	No	C810092	4 (28)	Report	of 7,14,	28	Day Break	s Date	typed ^{Sep}	tember	2, 1981
Pay Item											
Submitted	ъу_М.М	orisset	te	TitlePF	:р	Address					
Source of 3	Material	Calk	ins, Cov	entry		_Quanti	ty Repres	ented	1 cy		
Coarse AggregatePike - WaterfordFine AggregatePilCement BrandIndependentType								Lba	564		مىلى <u>مىرى بىرىمى مىلىرى مەرىمىرىمى</u>
Air Entrai											:/cwt
Maximum al											
Field Test							sted by				
Sampled fr						-	Date Sam	pled:	Augus	t 4, 19	981
Location U											
Examined f						Com	pressive	Strength	<u></u>		
					T RESULI						
Unit Weigh	t Fresh	Concret	e 153.				4.2%	Chace			
Total Wate							ure, Conc		31 ⁰ FAn	nbient_	78 ⁰ F
	Cyl.										
Specimen No.	Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Type* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break 1	Type 2
PPC 1-2	156 157	8/6	8/11	7	7	S	2830	2936	2883		
3-4	156 157	8/6	8/18	14	14	S	3643	3687	3665		
5-6	156 157	8/6 ·	9/1	28	28	S	4103	4103	4103		
An and an											
*S = Stand Types of Br		d; F =	Field (ured	7				rinoor		
Types of bi	leaks.	MK		ШĿ		S. J.	Gage, P.E 7 Æ. N	., Chief Er		R07	
Comments: TA 183H Re 2M 4/81	2V.	1 2	2 3 4	456	E	3y: R. F. Nicho	Gage, P.E Z.A.M Ison, P.E., M	aleriais & Re	search Engi	neer	

Project Nat		STATE OF VERMO AGENCY OF TRANSPOR					(2 Cover Central F			
W.P. No. Project Nu	81-C-6 mber		MATER	IALS AND	RESEARCH , Vermon	DIVISI(t 0560	NC		PPENDIX	С	
-		1	Report o	n Concret	e Test B	eam or (Cylinders	-	an den e forme de la contra de la		
Laboratory	No(8100925	5 (28)	Report	of7,14	,28	Day Break	s Date	typed Se	ptember	2, 91
Pay Item		Perform	nance in	concreter	ype of S	ample	Field		94		
Submitted	byM.	Morisse	ette	TitlePF	:p	Address	alan da ang ang ang ang ang ang ang ang ang an		<u></u>	an ngara dar 1860 a Angeladin	washing com the film of the second
Source of	Material	Calk:	ins, Cove	entry	er de sen auffan dat fan de faktigen en	_Quanti	ty Repres	ented	1 cy		
Coarse Agg	regate	Calk [.]	ins, Cove	entry	Fine	Aggreg	ateC	alkins, C	oventry	General and a strategy states	
Cement Bra											
Air Entrai	ning Adm	ixture	Darex AE	A Dosa	ge 6 oz/	'cy A	dmixture	WRDA Hyco] 	3 oz	/cwt
Maximum al											
Field Test	od by	M. M	orissett	e		Lab. Te	sted by	, , , , , ,	Eaton		
Sampled fr	om	truc	k mixer	No. 26 @ p	olant		Date Sam	pled:	Augu	st 4, 1	981
Location U	sed or t	o be Us	ed								
Examined f	or Mod.	of Rupt	ure			Com	pressive	Strength_			
				TES	T RESULT	S					
Unit Weigh	t Fresh	Concret	e 143.5	4	Air: Pr	essure	6.6%	Chace			
Total Wate										bient_	70 ⁰
Specimen No.	Cyl. Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Type* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break 1	Type 2
CB 1-2	147 147	8/6	8/11	7	7	S	3466	3351	3409		
3-4	147 147	8/6	8/18	14	14	S	4050	4032	4041		
5-6	147 147	8/6	9/1	28	28	S	4483	4386	4435		
5=0	147	0/0									
										-	
*S = Stand	ard Cure	 d; F =	 Field C	ured			1				l
Types of Br Comments:	reaks:] E		Gage, P.E Z.A.M			, <u>R</u> a7	

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

Project Na				STATE AGENCY OF	OF VERM TRANSPO			2 Cover			
<u>W.P. No.</u> Project Nu	<u>81-6-0</u> mber		MATER	IALS AND			511	Central	Files		
			Report o	n Concret	e Test B	eam or	Cylinders		APPENDI	XC	
Laboratory	No.	C81010	<u>00 (</u> 28)	Report	of 7,14,	28	Day Break	s Date	typed Se	pt. 16,	1981
Pay Item											
Submitted											
Source of	Material	Calki	ns, Cove	entry		_Quanti	ty Repres	ented	1 cy		
Coarse Agg				•							, anano, man-11, and the transmission of the party
Cement Bra											
Air Entrai											cwt
Maximum al											
Field Test	ed by	M. Mc	orissette	5		Lab. Te	sted by	Eaton			
Sampled fr							Date Sam	pled:	Aug 18,	1981	
Location U											
Examined f											
					T RESULI					. •	
Unit Weigh	t Fresh	Concret	e1	47.29	_Air: Pr	essure_	5.0	Chace			
Total Wate					2 3/4" т	emperat	ure, Conc	rete70) ⁰ FAr	mbient	68ºF
Specimen No.	Cyl. Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Type* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break 1	Type 2
PCC 1-2	151 151	8/24	8/ 25	7	7	S	3546	3563	3555	-	
3-4	150 151	8/24	9/1	14	14	S	4253 .	4182	4218		
5-6	151 151	8/24	9/15	28	28	S	4501	4554	4528		
*S = Stand Types of Br Comments: TA 183H Re	reaks:	d; $F = $	Field (Cured		By:	J. Gage, P R.A. Y	licho	3000	- Ra7	2
2M 4/81						R. F. Nicl	ielson, P.E.,	Materials &	Research Er	ngineer	

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Project Nam		STATE OF VERMONT AGENCY OF TRANSPORTATION					2 c	over	1		
W.P. No. Project Num	81- <u>L-6</u> nber	9	MATER	IALS AND			ON	entral Fi	Tes		
			Report o	n Concret	e Test E	leam or	Cylinders		APPENDI	<u>X C</u>	
Laboratory	No. <u> </u>	8101001	(28)	Report	o <u>f 7,14,</u>	28	Day Break	s Date	typedSer	ot. 16,	1981
Pay Item	Perfor	mance i	n Concre	<u>te</u> T	ype of S	ample	Fièl	d			gammara tari-ingananginjagang
Submitted h	ру <u>М</u> ,	Morisse	tte	Title P	FP	Address					an a
Source of N	laterial	Cal	<u>kins, Co</u>	ventry		_Quanti	ty Repres	ented1	су		
Coarse Agg	regate	Cal	<u>kins, Co</u>	ventry	Fine	Aggreg	ate Calk	cins, Cove	entry		
Cement Bran	nd	Ind	ependent		<u> </u>	уре	I I	Lba	3 . <u> </u>	564	
Air Entrair	ning Adm	ixture_	Darex A	EA Dosa	ge <u>30</u>	<u>z/cy_</u> A	dmixture_	WRDA HYC	Dosage_	3 oz	/cwt
Maximum all	lowable	water c	ontent,	Gal/Cy	10 ma 11 mái 12 mar - gar d'ata 20 mar - ga	Total	Aggregate	, Dry Wgt	•		
Field Teste	ed by	Μ.	Morisset	te		Lab. Te	sted by			Eaton	
Sampled fro							Date Sam				
Location Us	sed or t	o be Us	ed								e and a grade to draw down a sec
Examined fo	or Mod.	of Rupt	ure	- 		Com	pressive	Strength_			
				TES	T RESULI	S					
Unit Weight											
Total Water	r, Gal/C	y Used_		Slump	3½]	Cemperat	ure, Conc	rete75	⁰ F _An	nbient_	74 ⁰ F
Specimen No.	Cyl. Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Type* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break	Type 2
<u>CCC 1 - 2</u>	145 146	8/24	8/25	7	7	S	3431	3422	3427		
3 - 4	145 144	8/24	9/1	14	14	S	4032	4058	4045		
5 - 6	144 145	8/24	9/15	28	28	S	4465	4200	4333		
*S = Standa Types of Br		d; $F = $	Field C			S. J.	Gage, P.I	E., Chief E	ngineer		

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

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Project Na	<u>. 81-C-6</u>	14		STATE AGENCY OF		2 Cover Centr	al Files	i			
Project Nu	mber			IALS AND							
			<u></u>	on Concret	-			:	APPENDIX	<u>_C</u>	
Laboratory	r No.		•				-		typed Se	ept. 16	, 1981
Pay Item											
Submitted											
Source of										су	
Coarse Agg	regate	Cal	<u>kins, Co</u>	ventry	Fine	e Aggreg	ate <u>Pi</u>	ke, Water	rford		94.494.50
Cement Bra	nd	Ind	ependent	-	7	ype	II	Lbs	6	511	
Air Entrai	ning Adm	ixture_	Darex	AEA Dosa	ge4_ 0Z,	/cy_A	.dmixture_	WRDA Hyça	Dosage_	3 oz/	cwt
Maximum al	lowable	water c	ontent,	Gal/Cy	2	_ Total	Aggregate	, Dry Wgt			چىرىي. چىرىي غري تەراتىلىسىسىسىسىسىسى مىلەر تىلى
Field Test	ed by	Μ.	Morisset	te		Lab. Te	sted by	Eator	1		ىرىمى مىرىمى مىرىمى مىرىمى مىرىمى
Sampled fr	.om	tru	ck #26 @	Plant			Date Sam	pled:/	August 18	3, 1981	
Location U	lsed or t	o be Us	ed								
Examined f	or Mod.	of Rupt	ure	2		Com	pressive	Strength_		n	11
				TES	T RESULI	S					
Unit Weigh	t Fresh	Concret	e 146	.66	Air: Pr	essure	5.5%	Chace			
Total Wate				Slump	3 ¹ 4]	Cemperat	ure, Conc	rete70	^D F An	nbient_	70 ⁰ F
Specimen No.	Cyl. Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Type* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break	Туре2
PCB 1-2	149 147	8/24	8/25	7	7	S	4058	3926	3992		
3-4	147 147	8/24	9/1	14	14	S	4465	4545	4505		
5-6	147 147	8/24	9/15	28	28	S	4890	4934	4912		
			. •								
											1
*S = Stand		d; F =	Field C	ured	l		<u> </u>	<u> </u>	1	·	<u> </u>
Types of B:	reaks:						Gage, P.E. Z.M.			201	

Comments: TA 183H Rev. 2M 4/81

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Project Na		c		STATE AGENCY OF	OF VERM TRANSPO			2 Cove	r		
W.P. N Project Nu	<u>lo. 81-C-</u> mber	- 0	MATER	IALS AND				Cent	ral Files	S	
			Report o	n Concret	e Test B	eam or	Cylinders	<u> </u>	PPENDIX	<u>C</u>	
Laboratory	No	C81010	03 (28]Report	o <u>f</u> 7,14,	28	Day Break	s Date	typed Se	ot. 16,	1981
Pay Item	Perform	nance ir	Concre	ete T	ype of S	ample	Fiel	d			
Submitted	ъу <u>М.</u>	Morisse	ette	Title P	FP	Address					and a start of the
Source of	Material	. Calki	ns, Cove	entry	enteri julike wyraithi antifysan a myga	Quanti	ty Repres	ented		1 cy	
Coarse Aggregate Calkins, Coventry Fine Aggregate Calkins, Coventry											
Cement Brand Independent Type II Lbs. 611											
Air Entrai	ning Adm	ixture_	Darex AE	A Dosa	ge 4 ¹ / ₂ 0	z/cy_A	dmixture 4	NRDA Hyco	Dosage_	3 oź	/cwt
Maximum al											
Field Tested by M. Morissette Lab. Tested by Eaton											
Sampled fr							Date Sam				•
Location U	lsed or t	o be Us	ed								
Examined f	or Mod.	of Rupt	ure			Com	pressive	Strength_			
				TES	T RESULI	rs					
Unit Weigh	t Fresh	Concret	e 145	5.61	Air: Pr	essure	5.0%	Chace			
Total Wate											74 ⁰ F
Specimen	Cyl. Unit	Date	Date	Desired	Age at	Type*	Break 1	Break 2	Ave.	Break	Timo
No.	Wgt. P.C.F.	Rec'd	Broken	age at break	Break	S - F	P.S.I.	P.S.I.	P.S.I.	1	2
_CCB 1-2	147 147	8/24	8/25	7	7	S	3970	3899	3935		
3-4	147 147	8/24	9/1	14	14	S	4527	4536	4532	•	
5-6	147 147	8/24	9/15	28	28	S	4943	4996	4970		
4											
*S = Stand Types of Br Comments: TA 183H Re	reaks:	$\left[\begin{array}{c} \mathbf{F} \\ \mathbf{F} \\$	Field C	4 5 6		By:	. Gage, P.I	icho	200 A	<u>Ra</u> 7	
$2 \times 4/81$					1	N. F. MICHO	lson, P.E., M	aleriais & Ro	esearch Eng	ineer	

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Project Na				STATE AGENCY OF	OF VERM TRANSPO		2				
W.P. No. Project Nu	<u>81-C-6</u> mber		MATER	IALS AND			-		er tral Fil	es	
				-			Cylinders	. 1	APPENDIX	C	
Laboratory	No. <u>C</u> 8	3101004	<u>.</u>	28) _{Report}	of 7,14	,28	Day Break	s Date	typed_Se	pt. 16,	1981
Pay Item	Performa	ance in	Concrete	<u>e</u> T	ype of S	ample		Fi	eld		ant
Submitted	by <u>M.</u>	lorisse	tte	Title_PF	Р	Address					- a 8 8 8
Source of	Material	Calk [.]	ins, Cove	entry		_Quant1	ty Repres	ented		1 cy	nismus ang san sa mag sa sa sa sa sa
Coarse Aggregate Calkins, Coventry Fine Aggregate Pike, Waterford											
Cement Brand Independent Type II Lbs. 660											an - an
Air Entrai	ning Adm	ixture_	Darex Al	EA Dosa	ge <u>50</u> z	<u>/cy_</u> A	dmixture	RDA Hycol	_Dosage_	3 oz/	<u>cwt</u>
Maximum al	lowable	water c	ontent,	Gal/Cy	have be accorded to generat	Total	Aggregate	, Dry Wgt		-	
Field Tested by M. Morissette Lab. Tested by Eaton											
Sampled from truck #26 @ Plant Date Sampled: August.18, 1981											
Location U	ised or t	o be Us	ed	1 10							
Examined f	or Mod.	of Rupt	ure			Com	pressive	Strength			
				TES	T RESULT	S					
Unit Weigh							20 00 00 00 00 00 00 00 00 00 00 00 00 0				
Total Wate	r, Gal/C	y Used_		Slump	31	Cemperat	ure, Conc	rete7	20 ⁰ FAn	nbient	72 ⁰ F
	Cyl.	Data	Data	Destrod		Treat	Pro els 1	Prost 2	A-+	Prost	
Specimen No.	Unit Wgt. P.C.F. 147	Date Rec'd	Date Broken	Desired age at break	Age at Break	Type* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break 1	2 2
PCA 1 - 2	147	8/24	9/25	7	7	S	4032	4014	4023		
3 - 4	147	8/24	9/1	14	14	S	4465	4350	4408		
5 - 6	147	8/24	9/15	28	28	S	4837	4996	4917		
) 				
+0.0.1		 									
*S = Stand Types of Br		d; F =	Field C	ured	ľ	-					
		M		´		S 1	. Gage, P.	F Chief F	Ingineer		
Comments:		1 2	2 3 4	5 6	4					1	
TA 183H Re 2M 4/81	ev.					ву:	C.A.M			IRa7	

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Ву: ____ R. F. Nicholson, P.E., Materials & Research Engineer

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Project Na W.P. No.	81-C-6			AGENCY OF		RTATION	Lover						
Project Nu	mber		MATER	IALS AND ontpelier	, Vermon	DIVISI(t 0560))N 2	Lentra	al Files				
				n Concret				<u>A</u>	PPENDI X	C			
Laboratory	No(8101005	(2	8)Report	of 7,14	,28	Day Break	s Date	typed Sep	ot. 16,	1981		
Pay Item									an a				
Submitted	ъуМ.	Moriss	ette	Title	PFP	Address			-				
Source of													
Coarse Agg	regate	Calk	ins, Cov	entry	Fine	Aggreg	ateCal	kins, Cov	/entry	ومعقاده فالمعالي			
Cement Bra	nd	Inde	pendent		T	уре	II	Lbe	. 660				
Air Entrai	ning Ado	ixture_	Darex AE	A Dosa	ge_ 6 OZ,	/cy_A	dmixture <u>W</u>	RDA Hycol	_Dosage_	3 oz¢cv	vt		
Maximum al	lowable	water c	ontent,	Gal/Cy		Total	Aggregate	, Dry Wgt	•				
Field Tested by M. Morissette Lab. Tested by Eaton													
Sampled from truck #26 @ plant Date Sampled: Aug 18, 1981													
Location U	lsed or t	o be Us	ed					a a state and a state of the st					
Examined f	or Mod.	of Rupt	ure			Com	pressive	Strength_					
				TES	T RESULT	.s							
Unit Weigh	t Fresh	Concret	e <u>145</u>	.66	_Air: Pr	essure_	6.2%	_ Chace_					
Total Wate				Slump			ure, Conc		76 ⁰ F An		74 ⁰ F		
Speedmap	Cyl. Unit	Date	Date	Desired	Age at	Type*	Break 1	Break 2	Ave.	Break	Тупе		
Specimen No.	Wgt. P.C.F.	Rec'd	Broken	age at break	Break	S – F	P.S.I.	P.S.I.	P.S.I.	$\frac{break}{1}$	2		
CCA 1-2	148 145	8/24	8/25	7	7	S	4120	4112	4116				
3-4	146 148	8/24	9/1	14	14	S	4456	4492	4474				
5-6	146 145	8/24	9/15	28	28	S	4615	4978	4797	-			
<u>.</u>													
W indow <i>at the little contract of the second se</i>													
*S = Stand		ed; F =	Field (ured		L				·	<u> </u>		
Types of B	Leaks:			/	_	·S	J. Gage, P	E., Chief	Engineer				

By:

Comments: TA 183H Rev. 2M 4/81

R.A. Michos 17 R. F. Nicholson, P.E., Materials & Research Engineer

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APPENDIX D

APPENDIX A

STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS & RESEARCH DIVISION

RESEARCH INVESTIGATION

Work Plan No. 81-C-6

SubjectPerformance evaluation of new coarse aggregate source, Pike Ind., Inc., Waterford, Vt.

Investigation Requested By Pike Industries, Inc. Date April 10, 1981

Date Information Required June 2, 1981

Purpose of Investigation To evaluate the Pike Industries Ind. crushed stone from their

Waterford quarry as a structural concrete aggregate source.

Proposed Tests or Evaluation Procedure See Performance in Concrete Procedure attached. Evolutions Guneni pre party DF. Proposal Discussed With R. I. Fascoia Projected Manpower Requirements 10 man days Investigation To Be Conducted By STructural Concrete Subdivision Proposed Starting Date April 29, 1981 Estimated Completion Date June 2, 1981 Approval)Disapproval by Materials & Research Engineer L. T. M. Church Comments by Materials & Research Engineer Materials & Research Division Agency of Transportation-Date Typed: 4/27/81 33

APPENDIX D

STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS & RESEARCH DIVISION – STRUCTURAL CONCRETE SUBDIVISION

PERFORMANCE-IN-CONCRETE

PROCEDURE FOR EVALUATING A NEW AGGREGATE SOURCE

- 1. Mix proportions shall be submitted for each class of concrete required; or designed by, the Materials and Research Division and shall conform to Table 501.03A.
- 2. Test shall be run on both Field and Laboratory Concrete.
- 3. Field Concrete shall be produced at an approved Ready-Mixed Concrete Plant. Cement, sand, water, and admixtures shall all be the same as in current use at the plant, and as approved by the Agency of Transportation.
- 4. Laboratory Concrete shall be prepared at the Central Laboratory with the same materials used in the Ready Mixed Concrete.
- 5. An approved aggregate in normal use at the Ready-Mixed Concrete plant shall be used as a control in a separate batch for both Field and Laboratory Concrete.
- 6. At least one cubic yard of Ready Mixed concrete shall be produced for each class of concrete containing each new and control aggregate being evaluated.
- 7. Test cylinders shall be fabricated and cured in accordance with AASHTO T23-76.
- 8. Tests of Slump, Air Content, and Unit Weight and Yièld shall be in accordance with AASHTO T119-74, AASHTO T152-80I, and AASHTO T121-79I, respectively.
- 9. Batching, mixing, field, testing, and specimen fabrication using Field Concrete shall be witnessed by a representative of the Materials and Research Division.
- 10. Cylinder specimens shall be tested at the Materials and Research Laboratory for compressive strength at ages 7, 14, and 28 days in accordance with AASHTO T22-74.
- 11. The Materials and Research Division's involvement in the evaluation shall be documented in a Materials & Research Division report. The procedure in current use by the Research Subdivision shall be followed (including the drafting and approval of a Work Plan before work has begun).