EVALUATION OF PIKE/WATERFORD 3/4" CRUSHED STONE FOR USE IN STRUCTURAL CONCRETE

> **INITIAL REPORT 81-9** DECEMBER 1981

REPORTING ON WORK PLAN 81-C-6

STATE OF VERMONT AGENCY OF TRANSPORTATION MATERIALS & RESEARCH DIVISION

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Date: January 15,1982

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Appendix D Work Plan No. 81-C-6

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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 initial report documents results of tests performed on a proposed new source of coarse aggregate for structural concrete. The new material is a 3/4" crushed stone produced by Pike Industries Incorporated at their facility in Waterford, Vermont.

Initial results to date indicate that the material performs satisfactorily.

#### INTRODUCTION

There have been instances in the past, where a source of aggregate for Structural Concrete has conformed to Section 700 requirements, but has subsequently failed to produce concrete of acceptable strength. A procedure called "Procedure For The Evaluation Of New Structural Concrete Aggregate Sources To Determine Compliance With Agency of Transportation Specifications"; (PENCAS), was recently developed to provide, in addition to the existing Section 704.02 tests of physical properties, a basis to determine whether concrete containing a new aggregate, could achieve acceptable strength. (see Appendix A for PENCAS). Pike Industries Incorporated, of Tilton, New Hampshire, requested late in January 1981 that the Agency approve 3/4 inch Crushed Stone being produced at their crushing operation in Waterford, Vermont for possible use in Structural Concrete on the Waterford-St. Johnsbury I 93 projects.

This material was sampled by Materials and Research Division representatives and tested for compliance with Section 704.02 of the Standard Specifications. The PENCAS procedure was then used to compare concrete mixtures containing this aggregate, with mixtures containing a reference aggregate. Concrete was produced under both laboratory and field conditions. The field concrete was produced at the Lawrence Sangravco Plant in St. Johnsbury, Vermont at the request of Pike Industries, Inc. Laboratory concrete was produced at the Central Laboratory of the Materials and Research Division.

#### TESTING PROGRAM

#### PHASE I - SECTION 704.02 TESTS

Pike/Waterford 3/4 inch crushed stone was sampled from an existing stockpile at Pike's quarry in Waterford, Vermont on February 24, 1981. This material was found not to conform to the Gradation requirement, being deficient in the 3/8 inch fraction, and also appeared to be a blend of crushed gravel and crushed stone.

Pike Industries subsequently screen-blended this material with 1/2 inch stone to adjust the 3/8 inch deficiency and created a new stockpile. This new stockpile was sampled on April 17, 1981 and was found to comply with Section 704.02 requirements. The report on Laboratory No. A81-0218 which documents the Section 700 tests is 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 both laboratory and field conditions. Mixtures were designed by Structural Concrete personnel for Class A, Class B, and Class C concrete using the following materials:

#### Coarse Aggregate:

- A. Proposed New Aggregate 3/4 inch Crushed Rock Pike Industries, Inc., Waterford, Vt.
- B. Reference Aggregate 3/4 inch Crushed Gravel Lawrence Sangravco, Guildhall, Vt.

#### Fine Aggregate:

Lawrence Sangravco, Guildhall, Vt.

Cement:

Glens Falls Type II Glens Falls, New York

#### Air Entraining Admixtures:

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

#### Water Reducing Admixture:

WRDA with Hycol W. R. Grace & Co., Cambridge, Mass.

Aggregate properties used for preparing mix designs are as

# follows:

#### Pike Coarse Aggregate:

Bulk Specific Gravity		2.94
Absorption, percent	-	0.5
Dry rodded unit weight, 1bs./ft <sup>3</sup>	-	107.13

# Guildhall Coarse Aggregate:

Bulk Specific Gravity	-	2.74
Absorption, percent	-	0.9
Dry rodded unit weight, lbs./ft <sup>3</sup>		101.80

#### Guildhall Fine Aggregate:

Bulk Specific Gravity	-	2.64
Absorption, percent	-	1.3
Fineness modulus	-	2.90

#### FIELD CONCRETE

Ready mixed concrete was produced and tested at the Lawrence Sangravco plant in St. Johnsbury, Vermont during the day of May 15, 1981. Moisture content of the aggregates was determined prior to the start of mixing, and aggregate weights were adjusted. Concrete was mixed in a standard truck mixer with batch size being one cubic yard. Batches were prepared for each Class A, Class B, and Class C concrete containing the Pike 3/4 inch Crushed Stone, as well as for Class A, Class B, and Class C concrete containing the reference aggregate; Guildhall 3/4 inch Crushed Gravel.

#### LABORATORY CONCRETE

Laboratory concrete was produced and tested in the Central Laboratory on the day of May 20, 1981. Aggregates were dried prior to mixing, which was carried out in a Lancaster pan mixer. Batch size was approximately 1.75 cubic feet. Batches were prepared for each Class A, Class B, and Class C concrete containing the Pike 3/4 inch Crushed Rock, as well as for Class A, Class B, and Class C concrete containing the reference aggregate. Mix proportions for the Lab-produced concrete are as shown in Tables 1 and 2, and for the Field-produced concrete in Tables 3 and 4.

TABLE 1						
	RI	EF	ERENCE	AGGREGATE		
LAB	<b>MI XTURES</b>	-	BATCH	QUANTITIES	PER	CY.

	Class A	Class B	Class C
*Reference Coarse Aggregate, lbs. *Fine Aggregate, lbs. Cement, lbs. Air Entraining Admixture, oz. Water Reducing Admixture, oz.	1692 1275 660 4 19.8	1692 1428 611 3 18.3	1692 1535 565 1 1/2 17.0
Net Water, Gals.	33.1	33.3	36.3

\*Aggregates batched dry, weights converted to saturated surfacedry condition.

## TABLE 2 NEW AGGREGATE LAB MIXTURES - BATCH QUANTITIES PER CY.

	Class A	Class B	Class C
*New Coarse Aggregate, 1bs. *Fine Aggregate, 1bs. Cement, 1bs. Air Entraining Admixture, oz. Water Reducing Admixture, oz.	1773 1290 660 4 19.8	1773 1438 611 3 18.3	1773 1550 565 1 1/2 17.0
Net Water, Gals.	34.3	35.0	34.2

\*Aggregates batched dry, weights converted to saturated surfacedry condition.

		TABLE	3		
	REFER	ENCE A	GGREGATE		
FIFID			QUANTITIES	DFD	CV
LILLD	HINIONLS -	DATON	QUANTITIES	I LIV	01.

	Class A	Class B	Class C
*Reference Coarse Aggregate, 1bs. *Fine Aggregate, 1bs. Cement, 1bs. Air Entraining Admixture, oz. Water Reducing Admixture, oz.	1692 1275 660 3 1/2 19.8	1692 1428 611 3 18.3	1692 1535 565 1 1/2 17.0
Net Water, Gals.	30.1	28.9	25.5

\*Weights converted to saturated surface-dry condition.

TABLE 4		
NEW AGGREGATE		
FIELD MIXTURES - BATCH QUANTITIES	PER	CY.

	Class A	Class B	Class C
*New Coarse Aggregate, lbs. *Fine Aggregate, lbs. Cement, lbs. Air Entraining Admixture, oz. Water Reducing Admixture, oz.	1773 1290 660 3 1/2 19.8	1773 1438 611 3 18.3	1773 1550 565 1 1/2 17.0
Net Water, Gals.	29.6	25.5	28.1

\*Weights converted to saturated surface-dry condition.

Tests were performed on the fresh concrete to determine; Air Content, Unit Weight, Slump and Yield. Seven standard 6" & x 12" cylinders were prepared from each batch. Six of the cylinders were tested for compressive strength, two each at ages 7, 14 and 28 days. The remaining cylinder from each batch was moist-cured for 28 days. At age 28 days, three 2 inch cubes were cut from the center section of these cylinders and the cubes subjected to the Agency of Transportation Test Procedure No. 25 for freeze-thaw durability. The results of tests on the fresh and hardened concrete are shown in Tables 5, 6, 7, and 8.

TABLE 5 **REFERENCE AGGREGATE** LAB MIXTURES; TEST RESULTS

	Class A	Class B	Class C
Slump, inches Air Content, percent Unit Weight, lbs/ft <sup>3</sup> Relative yield, percent Compressive strength, psi	2 3/4 5.4 148.01 97.6	2 1/4 4.2 148.97 99.7	3 4.8 148.05 102.4
7 days 14 days 28 days	3489 4134 4696	31 92 3524 4390	3356 3857 4271

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

TABLE 6 NEW AGGREGATE LAB MIXTURES; TEST RESULTS

	Class A	Class B	Class C
Slump, inches Air Content, percent Unit Weight, lbs/ft <sup>3</sup> Relative yield, percent Compressive Strength, psi	2 1/2 5.0 152.03 97.7	2 4.9 151.60 100.5	2 4.4 152.08 102.2
7 days 14 days 28 days	3616 4172 4766	3214 3935 4594	3365 3939 4253
(Design compressive strength, psi)	(4000)	(3500)	(3000)

(Design compressive strength, psi) (4000)

	Class A	Class B	Class C
Slump, inches Air content, percent Unit weight, lbs/ft <sup>3</sup> Relative yield, percent Compressive strength, psi	3 1/4 3.4 149.67 95.2	3 1/2 6.2 144.95 100.6	3 4.0 147.91 99.4
7 days 14 days 28 days	4435 4747 5292	3701 4069 4819	3577 4085 4505
(Design Compressive Strength, psi)	(4000)	(3500)	(3000)

## TABLE 7 REFERENCE AGGREGATE FIELD MIXTURES; TEST RESULTS

TABLE 8 NEW AGGREGATE FIELD MIXTURES; TEST RESULTS

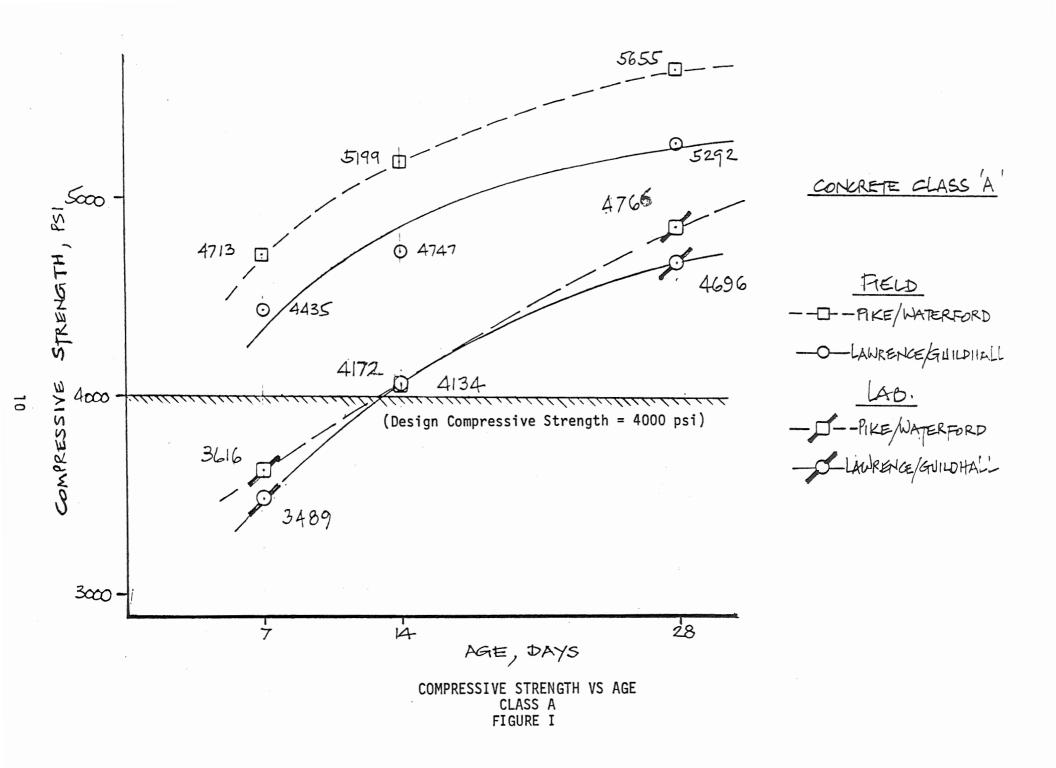
	Class A	Class B	Class C
Slump, inches Air content, percent Unit weight, lbs/ft <sup>3</sup> Relative yield, percent Compressive strength, psi	3 1/2 3.6 151.40 96.5	3 3.7 152.12 96.0	2 1/2 4.4 150.56 100.7
7 days 14 days 28 days	4713 5199 5655	4315 4753 5186	3639 4094 4643
(Design Compressive Strength, psi)	(4000)	(3500)	(3000)

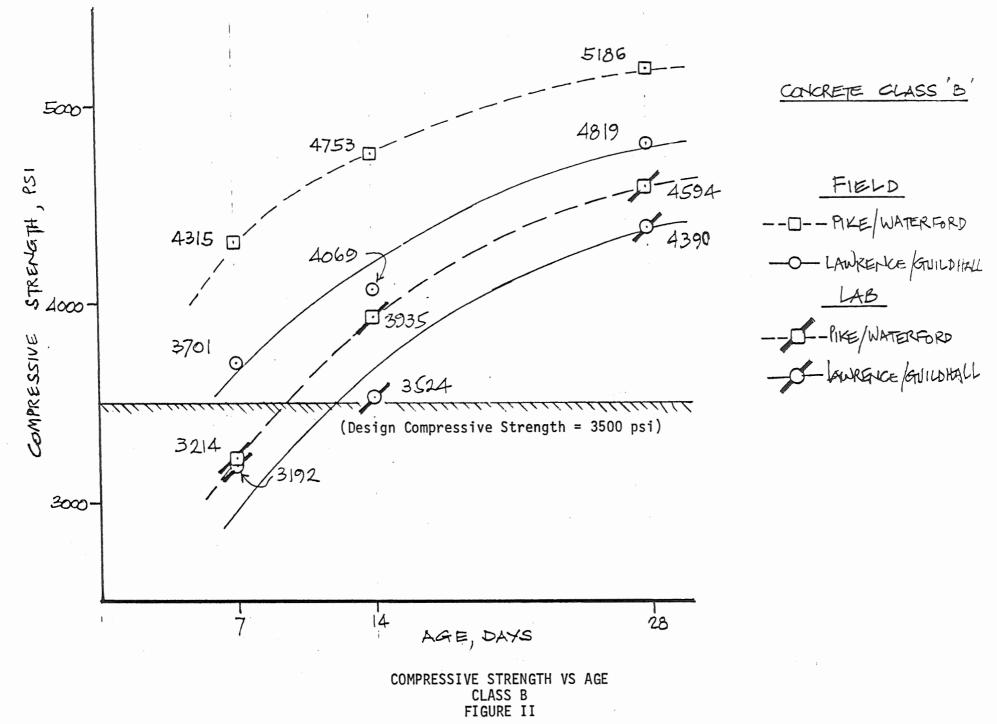
In Appendix C the results of compressive strength tests are shown on Laboratory Report Nos. C8100251 to C8100256 for the field produced concrete, and Nos. C8100306 to C8100311 for the lab-produced concrete. Strength-age plots for the field and lab-produced concrete are shown in Figures I, II, and III.

The results of the Freeze-thaw tests will be reported, in a final version of this report.

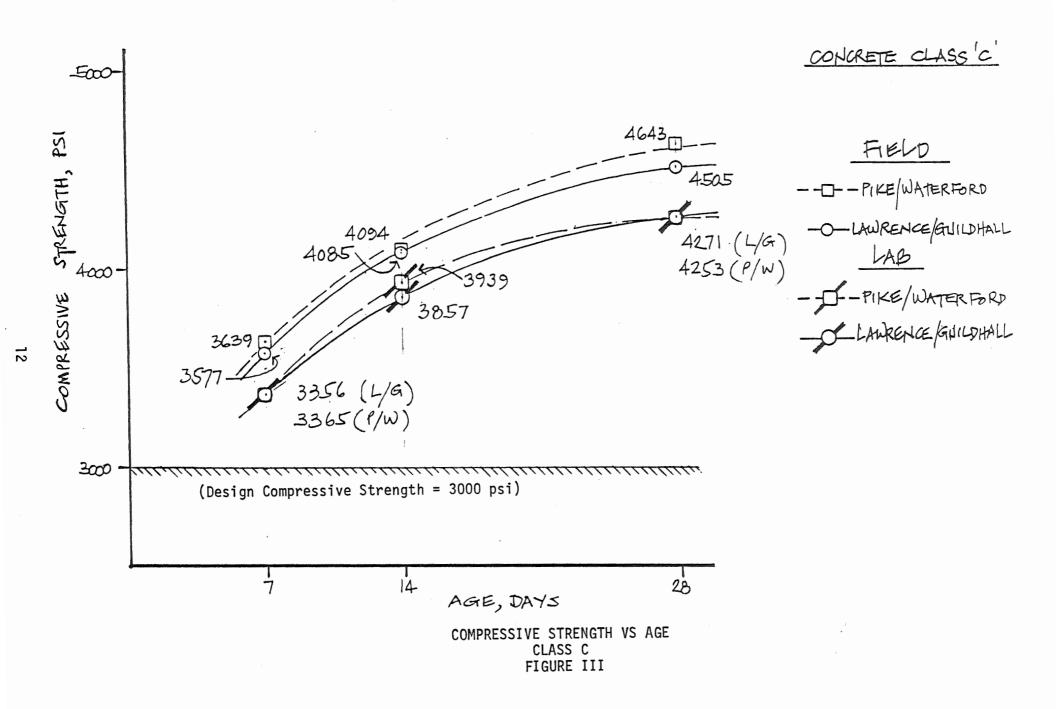
#### CONCLUSIONS AND RECOMMENDATIONS

- The 3/4" crushed stone coarse aggregate from Pike Industries, Inc., Waterford, Vermont complied with all requirements of Section 704.02 when tested in conjunction with this evaluation.
- 2. For all classes of concrete using Guildhall sand, whether produced in the laboratory or as ready mixed concrete; the Pike/Waterford concrete had strengths equal to or greater than the reference concrete.
- 3. It is recommended that 3/4 inch crushed stone from the Pike Industries Inc. quarry in Waterford, Vermont be approved for use in structural concrete, subject to freeze-thaw test results.
- 4. The results of the Freeze-thaw tests will be reported when available, in a final version of this report.





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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

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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 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.
- 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.
- 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, 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.
- 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).

ΤA	182F Rev. 2M 4/81	S	TATE OF VERMON Y OF TRANSPORT		2 Central Files Cover	
			LS & RESEARCH pelier, Vermon		APPENDIX B	
		REPORT	ON SAMPLE OF	ACGREGATE		
				Report	April 21 , 19 81	1
	Laboratory No	A81-0218		Tested By		
	Name	Coars	e Aggregate fo			
	Identification Man					
						-
	Sampled _ 4/17 , 19					
	Sample from		1			_
						-
	Source of Material					
	Location used or t	o be used	Possible	Future Use		-
	Examined for					-
			TEST RESULTS			-
	Total Sample	e F	ineness Modul	us		
	Sieve Size % Pa	issing	% Coarser Than	n	Percent of Wear	
	4 1/2"		o. 100		AASHTO T3	-
	4" 3 1/2"		o. 50		AASHTO T4	-
	3"		o. 30 o. 16		AASHTO T96 16.4	
	2 1/2"		o. 8		Fractured Faces, %	100
	2"	N	o. 4			
	1 3/4" 1 1/2"	F	ineness Modulu	15 7	Thin & Elongated Pieces, %	9
		00 97			•	
	5/8"		omments:		Soundness, % Loss	
		31				
	No.         4           No.         8           No.         10           No.         16	8 3 Sand	This materia fractured fa	l was examined fo ce and T & E. Th	or gradation, wear, he results are as indi	icated
	No. 30	Portion		. Gage, P.E., Chief	Engineer	
	No. 100 No. 200			07. Miche	Son Inna	
			By:		10/07 Decentral Engineer	

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

M.P. No. 81-C-5       MATERIALS AND RESEARCH DIVISION       Central files         Project Numbor       Montpelier, Vermont 05602       APPENDIX C         Report on Concrete Test Beam or Cylinders       APPENDIX C         Laboratory No.       C8100251 (28) Report of 7, 14, 28 Day Breaks Date typed 6-15-81       Pay Item Performance in Concrete Type of Sample Field         Subnitted by M. Morissette       Title PFP Address       Source of Material Lawrence - St. Johnsbury Quantity Represented 1 cy         Coarse Aggregate       Lawrence - St. Johnsbury Quantity Represented 1 cy       Coarse Aggregate Lawrence - Guildhall         Cement Brand       'Glens Falls       Type II       Lbs. 565         Air Entraining Admixture Darex AFA       Dosage 1½ cy/cy AdmixtureWRDA Hycol Dosage 3 o2/cwt         Maximum allowable water content, Gal/Cy Total Aggregate, Dry Wgt       Field Tested by	Project Name			AGENCY OF	OF VER: TRANSP,C	RTATION			2 Cover				
APPENDIX C         Report on Concrete Test Beam or Cylindera         Laboratory No. <u>C8100251 (28) Report of 7, 14, 28</u> Day Breaks Date typed <u>6-15-81</u> Pay Item Performance in Concrete Type of Sample Field         Submitted by M. Morissetie	W.P. No. 81-C-6 Project Number		MATER	RIALS AND	RESEARCH	DIVISI	ОН		Central	files			
Laboratory No.       C8100251 (28)Report of 7, 14, 28Day Breaks Date typed6-15-81				-					ENDIX C				
Pay ItemPerformance in ConcreteType of SampleField			-						6	6-15-1	21		
Submitted by M. Morissette       Title       PFP       Address         Source of Material       Lawrence - St. Johnsbury       Quantity Represented       1 cy         Coarse Aggregate       Lawrence - Guildhall       Fine Aggregate       Lawrence - Guildhall         Cement Brand       'Glens Falls       Type       II       Lbs.       565         Air Entraining Admixture       Darex AEA       Dosage       1½ oz/cy       Admixture MRDA Hycol Dosage       3 oz/cwt         Maximum allowable water content, Gal/Cy													
Source of Material_Lawrence - St. JohnsburyQuentity Represented1 cy         Coarse AggregateLawrence, Guildhall       Fine AggregateLawrence - Guildhall         Cement BrandGlens FallsTypeII       Lbs565         Air Entraining Admixture_Darex AEADosageYoz/cy _Admixture/WRDA Hycol Dosage Oz/cwt         Maximum allowable water content, Gal/Cy Total Aggregate, Dry Wgt         Field Tested byM. Morissette       Lab. Tested byEaton         Sampled fromTrk #26 @ plant       Date Sampled:5-15-81         Location Used or to be Used       Compressive Strength													
Coarse Aggregate       Lawrence, Guildhall       Fine Aggregate       Lawrence - Guildhall         Cenent Brand       'Glens Falls       Type       II       Lbs.       565         Air Entraining Admixture       Darex AFA       Dosage       1½ oz/cy       Admixture/MRDA Hycol       Dosage       3 oz/cwt         Maximum allowable water content, Gal/Cy													
Cement BrandGlens FallsTypeII													
Air Entraining Admixture_Darex AEA       Dosage       14 or/cy       Admixture MRDA Hycol Dosage       3 oz/cwt         Maximum allowable water content, Gal/Cy	Coarse Aggregate	awrenc	ce, Guil	dha11	Fine	e Aggreg	ate Law	rence - (	Guildhall				
Maximum allowable water content, Gal/CyTotal Aggregate, Dry Wgt	Cement Brand 'Gle	ens Fal	<u>ls</u>		<u>'</u>	Гуре	II	Lbs	56	55			
Field Tested by       M. Morissette       Lab. Tested by       Eaton         Sampled from       Trk #26 @ plant       Date Sampled:       5-15-81         Location Used or to be Used	Air Entraining Admix	ture_[	Darex AE	A Dosa	ge <u>1½</u> 0	z/cy A	dmixture <u>k</u>	IRDA Hyco	l_Dosage_	3 oz/	cwt		
Sampled from	Maximum allowable wa	ater co	ontent,	Gal/Cy		Total	Aggregate	, Dry Wgt			and a state of the space		
Location Used or to be Used	Field Tested by	M, Mor	rissette	·		Lab. Te	sted by	Eator	n	19-19-19-19-19-19-19-19-19-19-19-19-19-1			
Compressive StrengthTEST RESULTSUnit Weight Fresh Concrete 147.91 Air: Pressure 4.0 ChaceTotal Water, Gal/Cy Used	Sampled from Trk	#26 @	plant				Date Sam	pled:	5-15-	-81			
TEST RESULTS         Unit Weight Fresh Concrete 147.91       Air: Pressure 4.0       Chace         Total Water, Gal/Cy Used	Location Used or to	be Use	ed										
Unit Weight Fresh Concrete <u>147.91</u> Air: Pressure <u>4.0</u> Chace Total Water, Gal/Cy Used <u>Slump 3</u> Temperature, Concrete <u>710</u> Ambient <u>700</u> Specimen Unit Date Broken Berked Age at Type* Break 1 Break 2 Ave. Break Type <u>No.</u> Wgt. Rec'd Broken break Break <u>5 - F</u> P.S.I. P.S.I. P.S.I. <u>1 2</u> GC <u>2</u> 151 5-18 5-22 7 7 3616 3537 3577 <u>1 2 3616 3537 3577 5 5 151 5-18 5-28 13 13 4067 4103 4085 5 5 151 5-18 6-12 28 28 4527 4483 4505 5 5 151 5-18 6-12 28 28 4527 4483 4505 5 5 151 5-18 6-12 28 28 4527 4483 4505 5 5 151 5-18 6-12 28 28 4527 4483 4505 5 5 151 5-18 6-12 28 5 28 4527 5 5 151 5-18 6-12 5 28 5 28 5 5 5 151 5-18 6-12 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5</u>	Examined for Mod. of	Ruptu	ire		1	Com	pressive	Strength_					
Total Water, Gal/Cy Used       Slump       3       Temperature, Concrete $71^{\circ}$ Ambient $70^{\circ}$ Specimen       Out       Date       Desired age at       Break       Type*       Break       Break       Ave.       Break Type         No. $\begin{bmatrix} Cy1.\\ Wgt.\\ P.C.F.\\ P.C.F.\\ \hline       Desired age at break       S - F       Break       Break       Ave.       Break Type         GC       1       151       5-18       5-22       7       7       3616       3537       3577       Image: addition of the state of the stat$				TES	T RESULI	ſS							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Unit Weight Fresh Co	ncrete	147	.91	_Air: Pr	essure_	4.0	Chace					
Specimen No.       Unit Wgt. P.C.F.       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 I         GC       1       151 151       5-18       5-22       7       7       3616       3537       3577       Image: Comparison of the comparison	Total Water, Gal/Cy	Used		Slump	<u> </u>	Cemperat	ure, Conc	rete <u>71</u>	0An	bient_	70 <sup>0</sup>		
No.       Wgt.       Rec'd       Broken       age at break       Break       S - F       P.S.I.       P.S.I.       P.S.I.       I <thi< th=""> <thi< th="">       I       <thi< th="">       &lt;</thi<></thi<></thi<>													
GC       2       151       5-18       5-22       7       7       3616       3537       3577 $3$ 151       5-18       5-28       13       13       4067       4103       4085 $5$ 151       5-18       6-12       28       28       4527       4483       4505 $6$ 151       5-18       6-12       28       28       4527       4483       4505 $4$ $151$ 5-18       6-12       28       28       4527       4483       4505 $4$ $151$ $5$ -18 $6$ -12 $28$ $28$ $4527$ $4483$ $4505$ $4$ $151$ $5$ -18 $6$ -12 $28$ $28$ $4527$ $4483$ $4505$ $4$ $151$ $6$ $12$ $10$ $10$ $10$ $10$ $10$ $*S$ $5$ $5$ $10$ $10$ $10$ $10$ $10$ $10$ $10$ $*S$ $5$ $5$ $10$ $10$ $10$ $10$ $10$ $10$ $10$ $1$	No. Wgt. R			age at	-		1	1 1					
4       151       5-18       5-28       13       13       4007       4103       4007         5       151       5-18       6-12       28       28       4527       4483       4505         6       151       5-18       6-12       28       28       4527       4483       4505         -       -       -       -       -       -       -       -       -         -       -       -       -       -       -       -       -       -       -         -		5-18	5-22	7	7		3616	3537	3577				
5       151       5-18       6-12       28       28       4527       4483       4505         6       151       5-18       6-12       28       28       4527       4483       4505         6       151       5-18       6-12       28       28       4527       4483       4505         8       4527       4483       4505       1       1       1       1       1         8       4507       5       1		5-18	5-28	13 ·	13		4067	4103	4085				
*S = Standard Cured; F = Field Cured		5-18	6-12	28	28		4527	4483	4505				
		F =	Field Cu	ured				J					
S. J. Gage, P.E., Chief Engineer	Types of Breaks:						S. J. Gage	e, P.E., Ch	ief Engin	eer			
mlm $A = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 6 \\ 6 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 6 \\ 6 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 6 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 6 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 6 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 6 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 6 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 6 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 6 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 7 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 7 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 7 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 7 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 3 \\ 7 \\ 7 \end{bmatrix} \begin{bmatrix} 2 \\ 7 \\ 7 \end{bmatrix} \begin{bmatrix} $	mlm [/					D	R.A.	Mich	obor	- 10	24-7		
TA 1831: Rev. TA 1831: Rev. Dy. 10747 R. F. Nichtloon, P.E., Materials & Res. 17			•		17	-	Nichtloon, P.	E., Materials	& Res.	19	47		

Project Na	ıme			STATI AGENCY OF	E OF VER		ł		2		
W.P. No. Project Nu			MATE	RIALS AND	ang ang dala telih many prote man parin ,	ilite you knot king 600			Co	over entral 1	files
				fontpelier	r, Vermo	nt 0560	02	100			1103
							Cylinders	3	NDIX C		
Laboratory	No. C	87 00 -	252(28	Report	of 7/1	41.28	Day Break	ks Date	typed	6-15-8	
Pay Item											
Submitted	byM	. Moris	<u>sette</u>	Title	огр	_Address	3				
Source of	Materia	L_Lawre	<u>nce - St</u>	. Johnsbur	ry	Quanti	Lty Repres	sented	1	сy	
Coarse Agg	gregate	Lawre	nce - Gu	ildhall	Fin	e Aggrea	gate La	wrence -	Guildhal	1	
Cement Bra	and Glen	s Falls	- Marine and State State and State States	ang		Гуре[	<u>.</u> Т	Lb	s. <u>6</u>	60	naaraan ahaa ahaan ahaan ahaa ahaa ahaa
Air Entraj	lning Ada	nixture_	Darex Al	EA Dose	age <u>31</u> 2 02	<u>/cy   </u>	dmixture_	WRDA Hyco	<u>]</u> Dosage	<u>3 oz/c</u>	wt
Maximum al	lowable	water o	content,	Gal/Cy		Total	Aggregate	e, Dry Wg	t		
Field Test	ed by	. М.	Morisset	tte		Lab. Te	ested by	Eato	n		
Sampled fr	om	Trk .	#40 @ p1a	ant			Date Sam	pled:	5-15-81		
Location U	lsed or t	to be Us	sed								<u></u>
Examined f	or Mod.	of Rupt	ure			Cou	pressive	Strength			
	2			TES	ST RESULT	rs					
Unit Weigh	it Fresh	Concret	.e <u> 149</u> ,	67	_Air: Pr	essure_	3.4	Chace			
Total Wate	r, Gal/C	Cy Used_		Slump_3	1/4 7	Cemperat	ure, Conc	rete	72 <sup>0</sup> An	nbient_	68 <sup>0</sup>
	Cyl.	,				1					
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	Туре · 2
1 2	152 152	5-18	5-22	7	7		4492	4377	4435		
3	152 152	5-18	5-28	13 ·	13		4860	4633	4747		
5 6	152 152	5-18	6-12	28	28		5208	5376	5292		
*S = Stand. Types of Br		d; F =	Field C	ured	·			·i			
	cars.			1111-							
mlm				5 6	I		Gage, P.E			/	
Comments: TA 183H Re 22/1/31	·V.				В	y:	2. M.	chos	~//	PA7	

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R. F. Nichel M. J. M. J. M. & Patrick Solition

Project Na				STATI AGENCY OF	e of ver: TRANSPO		l		2		
W. P. Project Ni	No. 81-0 umber		MATE	RIALS AND	RESEARCH	I DIVISI	ON			ver ntra <b>l f</b>	iles
<b></b>				Montpelier				AF	PENDIX (	2	
			-				Cylinders				
Laborator											
Pay Item	Perfor	mance iı	n Concret	te n	Cype of S	Sample	Field	an an a' constant an	4 		Salan darman fan yn dias yn differio Sife
Submitted											
Source of											
Coarse Agg											
Cement Bra	and Gl	ens fal	s		5	Гуре	II	Lba	5 •	61	1
Air Entra	Lning Ada	nixture	Darex AEA	A Dose	age_3 OZ	/cy /	dmixture_	WRDA Hyco	Dosage	2 oz	/cwt
Maximum al	llowable	water d	content,	Gal/Cy		_ Total	Aggregate	e, Dry Wgi	•		
Field Test	ed by	M. Mo	orissette	2		Lab. Te	ested by		Eaton		
Sampled fr							Date Sam				
Location l	Jsed or t	to be Us	sed								
Examined f	For Mod.	of Rupt	ure			Con	pressive	Strength_			
				TES	ST RESULT	rs					
Unit Weigh	nt Fresh	Concret	.e <u>15</u> 2	2.12	_Air: Pr	essure_	3.7	Chace			
Total Wate	er, Gal/(	Cy Used_		Slump	3 1	Cemperat	ure, Conc	rete	Ar	mbient_	70
	Cyl.	1		1		1					1 ef :
Specimen No.	Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Туре* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break 1	Type 2
PB 2	155 154	5-18	5-22	7	7	S	4288	4341	431 <b>5</b>		
3 4	155 156	5-18	5÷28	13 ·	13	S	4748	4868	4753		
5 6	156	5-18	6-12	28	28	S	5102	5270	5186		
	100										
	-										
		d; F =	Field C	ured				<u> </u>			i
Types of Bi	reaks:					c I	. Gage, P.	F Chief F	ngineer		
mlm					]		-			,	
Comments: TA 183H Re 2M 4/81	۷.		-			By:	P.A.M			<i>Ra7</i>	

R. F. Nicholata, P.E.,

Project Na	ame			STATE AGENCY OF	COF VERN				2		
W.P. Project Nu	No. 81-			RIALS AND					Co	ver	ilor
				fontpelier				400		ntral f	1162
			Report d	on Concret	e Test l	Beam or	Cylinders	APP	ENDIX C		
Laborator	y No	C8100	0254 (28	B]_Report	of 7, 1	4, 28	Day Break	s Date	typed	6-15-	81
Pay Item	Perform	<u>ance în</u>	Concrete	<u>e</u> I	ype of S	Sample	Fie	1d	and in the second s	ana da della della managentet	an a dan an an Anna an
Submitted	by <u>M.</u>	Morisse	ette	Title	PFP	Address	8				
Source of	Material	Law	rence - S	St. Johnsb	oury	_Quanti	ty Repres	ented	1cy	- (2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2	an a
Coarse Agg	gregate	Lawren	ce - Gui	ldha11	Fine	e Aggreg	ate La	wrence -	Guildhal	1	
Cement Bra	and G	lens Fa	l1s		]	Гуре	II	Lb	s. <u>61</u>	1	
Air Entra	ining Ada	ixture_	Darex Al	EA Dosa	ge_ 3 02	z/cy A	dmixture	WRDA Hyco	l Dosage	3 oz/cw	t
Maximum al	llowable	water c	ontent,	Gal/Cy		Total	Aggregate	, Dry Wgi	- - 0		
Field Test	ted by	M. Mor	issette			Lab. Te	sted by	Eaton			
Sampled fi	com	Trk #39	0 plant				Date Sam	pled: 5-	15-81		
Location l	Jsed or t	o be Us	ed								
Examined i	for Mod.	of Rupt	ure			Cou	pressive	Strength_			
				TES	T RESULT	ſS					
Unit Weigh	nt Fresh	Concret	e144.9	95	_Air: Pr	essure_	6.2	_ Chace_			
Total Wate	er, Gal/C	y Used_		S1ump3	<u>1/2</u> 1	Cemperat	ure, Conc	rete	72 <sup>0</sup> An	nbient	70 <sup>0</sup>
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
1 GB 2	148 148	5-18	5-22	7	7	S	3705	3696	3701		
3	148	5-18	5-18	13	13	S	4145	3993	4069		
5	148 148	5-18	5-18	28	28	S	4845	4792	4819		
						-			×		
$\star$ S = Stand		d; F =	Field C	ured	•						
Types of B	геакь:			1111		S.	J. Gage,	P.E., Chiel	Enginee	r	
mlm					1	-	P.A.	Miche	son	-10	
Conments: T 183H Re	ev.					By:	choice of	1	D	RAG	7

1/81

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

Project Nam	ne			STATE AGENCY OF	COF VERM				0		
W.P. N Project Nur	0. 81-C-	-6		RIALS AND						over	6:1
				lontpelier				ΔΡΙ	C PENDIX C	entral	riles
			•				Cylinders	ł			
Laboratory	No	C810025	55 (28)	Report	o <u>f</u> 7, 1	4, 28	Day Break	s Date	typed	6-	15-81
Pay Item	Perfor	rmance i	in Concre	ete 1	Type of S	Sample	1 cy	<u> </u>			ge, sy system a ge all south
Submitted h	by M. I	Morisse	tte	Title	PFP	Address	:				Annal 2011-201-201-201-201-201-201-201-201-201
Source of M											aran da ada da ara
Coarse Aggi											ter tid av som tid after sjøre
Cement Brar											
Air Entrair	ning Adm	ixture[	Darex AEA	Dosa	$1202$ $1\frac{1}{2}$ $02$	/cy_A	dmixture_	WRDA Hyco	Dosage	3 oz/	cwt
Maximum all	lowable	water c	ontent,	Gal/Cy		_ Total	Aggregate	, Dry Wgt			
Field Teste	ed by	1	M. Moriss	sette		Lab. Te	sted by	Eato	1		
Sampled fro	om Trk #	#50 @ p`	lant				Date Sam	pled:	May 15,	1981	
Location Us	sed or t	o be Us	ed								
Examined fo	or Mod.	of Rupt	ure			Com	pressive	Strength			
				TES	T RESULT	S					
Unit Weight	t Fresh	Concret	e <u>150.5</u>	6	_Air: Pr	essure_	4.4	_ Chace_			
Total Water	r, Gal/C	y Used_	2	Slump	2 1/2 1	emperat	ure, Conc	rete <u>74</u>	оАл	mbient_	70 <sup>0</sup>
Specimen	Cyl. Unit	Date	Date	Desired	Age at	Type*	Break 1	Break 2	Ave.	Break	Type
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
1 PC 2	153 153	5-18	5-22	7	7	S	3643	3634	3639		
3	153 153 153	5-18	5-28	13 ·	13	S _	4023	4165	4094		
5	153 153	5-18	6-12	28	28	S	4669	4616	4643		1
0	100										
							· · · · · · · · · · · · · · · · · · ·				
*S = Standa		d; F =	Field C	ured				<u> </u>			·
Types of Bro	еакs:	F.V	111	1111-		S.	J. Gage,	P.E., Chief	Enginee	r	
mlm					]	<b>-</b>	R.Z. B cholson, P.E.	Ticho	500	-BAF	2
Comments: TA 183H Rev 2M 4/81	ν.					By: R. F. Ni	cholson, P.E.	, Materials &	Research I	Engineer	×

Project Na				STATE AGENCY OF	E OF VER		1		2 [0]	/er	
Work Pla Project Nu	an No. umber	81-C-6	MATE	RIALS AND	RESEARCI	H DIVISI	ON			itral f	iles
<b>C</b>	- 1994 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 197		}	fontpelier	, Vermon	nt 0560	)2	APPEND	DIX C		
							Cylinders				
Laboratory	7 No. <u>C</u>	8100256	(28)	Report	o <u>f 7, 14</u>	, 28	Day Break	ts Date	typed	6-	15-81
Pay Item	Perform	mance in	Concret	ie 1	Sype of S	Sample	Field	Nga alimitana ang kanala ing kana			anna a suisean aine ann an ann an ann an ann an ann an ann
Submitted	by <u>M</u> , M	Morisset	te	_Title	PFP	Address	<u> </u>			Second State	
Source of	Material	1 <u>Eawren</u>	<u>ce - St.</u>	Johnsbur	<u>у</u>	_Quanti	ty Repres	sented		1 cy	an a
Coarse Agg	gregate	Pike	- Water	ford	Fine	e Aggreg	gate <u>Lawr</u>	ence 🖲 Gi	ildhall		
Cement Bra	ind (	<u>Glens Fa</u>	<u>11s</u>			Гуре	11	Lba	3 • <u> </u>	660	
Air Entrai	ning Ada	mixture_	Darex AE	A Dose	ige <u>3₿</u> 0Z	/cy_A	dmixture	RDA Hycol	Dosage	3 oz/	'cwt
Maximum al	lowable	water o	ontent,	Gal/Cy		_ Total	Aggregate	, Dry Wg			
Field Test	ed by	M. Mo	rissette			Lab. Te	ested by		Eaton		
Sampled fr	omT	rk # 5	0 plant				Date Sam	pled:	5-15-81		
Location U	lsed or t	to be Us	ed								
Examined f	or Mod.	of Rupt	ure			Cou	pressive	Strength_			
				TES	T RESULT	rs					
Unit Weigh	t Fresh	Concret	e1	51.40	_Air: Pi	cessure_	3,6	_ Chace_			
Total Wate	r, Gal/C	Cy Used_		Slump	3 1/2	Cemperat	ure, Conc	rete <u>72</u>	A	bient_7	0
	Cyl.					1					
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
PA 2	155 155	5-18	5-22	7	7		4633	4792	4713		
3 4	155 155	5-18	5-28	13	13		5188	5210	5199		
5 6	156 156	5-18	6-12		28		5491	5818	5655		
						-					
<b>44</b>		_									
*S = Stand Types of Br		d; F =	Field C	ured	 T						
Types of br	cars.			1111-		S.	J. Gage, I	P.E., Chief	Engineer		
mlm					1	-	P.A.V	Ticho	5	- lana	
Corments: TA 183H Re 214 1/31	· V •				22		Harran, P.E.,			Mat	

Project Na	me			STATE AGENCY OF	E OF VER TRANSPO				2		
WP 81- Project Nu	<u>C-6</u> umber		MATE	RIALS AND	RESEARCH	H DIVISI	ON		Cover Central	l files	
				Yontpelier				APPE	NDIX C		
Tabazatorz	- No. C01	100306							typed	6-18-	81
Laboratory				•							
Pay Item_											
Submitted											
Source of											
Coarse Agg	-										
Cement Bra											oz/cwt
Air Entrai											an a
Maximum al											
Field Test	ed by	W. Mey	'er								
Sampled fr	om Lan	icaster	Mixer				Date Sam	npled:	5-20-81		
Location U	lsed or t	o be Us	sed <u>Te</u>	st Mix							
Examined f	or Mod.	of Rupt	ure			Cou	pressive	Strength_			
				TES	ST RESULT	rs					
Unit Weigh	t Fresh	Concret	e152	.08	_Air: Pr	essure_	4.4	% Chace			
Total Wate	er, Gal/C	y Used_	37.1	Slump	2" 1	Cemperat	ure, Conc	rete <u>7</u> (	) <sup>0</sup> Ал	bient_	
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
LPC 2	152 152		5-27	7	7	S	3316	3431	3365		
3	152 152		6-2	13 ·	13	S	3908	3970	3939		
5 6	153 153		6-17	28	28	S	4279	4226	4253		
$\star$ S = Stand Types of Br		d; F =	Field C	ured	1.						
mlm	cuno,						J. Gage, P.A.				1

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By: \_\_\_\_\_\_ R. F. Nicholand P.E. Mulerou & Annor Engineer

Project Na	Ime			STATE AGENCY OF	E OF VER				2 Cover		
WP 8 Project Nu	<u>1-C-6</u> mber			RIALS AND					Central	files	
			Report d	on Concret	e Test l	Beam or	Cylinders		ENDIX C		
Laboratory	y NoC	8100307	(28)	Report	o£7, 14	, 28	Day Break	s Date	typed	6-18	8-81
Pay Item										a a far a	
Submitted	ъу <u> W. Me</u>	yer		Title	CLP	Address	3				
Source of	Material	. Mater	ials & R	esearch La	ab,Berli	n_Quanti	ty Repres	ented	1.75 cf		
Coarse Agg	gregate L	awrence	- Guild	hall, Vt.	Fine	e Aggreg	<sub>ate</sub> Lawren	ce - Guil	dha <b>ll, V</b>	/t	
Cement Bra	ind Gle	ns Fall	S		j	Гуре	II	Lb	B •	565	and the second
Air Engrai	ining Adm	ixture_	Darex AE	A Dosa	ge <u>1<sup>1</sup></u> 2 0Z	/cy_A	dmixture	RDA Hycol	Dosage	3 oz	/cwt
Maximum al	lowable	water c	ontent,	Gal/Cy	8	_ Total	Aggregate	, Dry Wg	t	3193	
Field Test	ed by	W. M	eyer			Lab. Te	sted by		Eaton		
Sampled fr	om Lan	caster	Mixer				Date Sam	pled:	5-2	20-81	
Location U	lsed or t	o be Us	ed	Refere	ence Mix						
Examined f	or Mod.	of Rupt	ure			Con	pressive	Strength_	,		
				TES	T RESULT	rs.	•				
Unit Weigh	t Fresh	Concret	.e14	8.05	_Air: Pr	essure_	4.8%	Chace			
Total Wate	er, Gal/C	y Used_	36.4	Slump	3" ]	Cemperat	ure, Conc	rete	Ar	mbient	
Specimen No.	Cyl. Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Туре* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave.' P.S.I.	Break 1	Туре 2
$LGC \frac{1}{2}$	150 148		5-27	7	7	S	3360	3351	3356		
3 3	149 150		6-2	13 ·	13	S	3820	3894	3857		
5 6	150 150		6-17	28	28	S	4262	4279	4271		
				-							
							-				
*S = Stand Types of Br		d; F =	Field C	ured	]					-	
mlm		MK		JЩĆ		S. J. Ga	ege, P.E., C	hief Engi	neer		
Comments: TA 1831: Re 2M 4/81	2V.	1 2	2 ز :	24	· • • • •		k. Min	Kobo	-190	17	

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- 2. A. 20 25 & R. - -

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Project Na	ime			STATE AGENCY OF	COF VERME TRANSPO		1		2 Cover			
WP 8 Project Nu	1-C-6 umber		• • • • •	RIALS AND	RESEARCH	I DIVISI	ON	Central files				
				fontpelier				APPEND	IX C			
. '			Report d	on Concret	e Test I	Beam or	Cylinders					
Laborator	y NoC	8100308	(28)	Report	o£7, 14.	28	Day Break	s Date	typed	6-18-81		
Pay Item_p	erforman	<sub>ce</sub> in C	oncrete	I	Sype of S	Sample		Service and a sum of the group of the application of the service o	Lab	ېدې – کې د دې د وې د دې د وې د دې د وې د دې د		
Submitted	by W. M	leyer		_Title	CLP	Address	3				an water and a state of the state	
Source of	Material	L <u>Materi</u>	als & Re	search Lat	, Berlin	l_Quanti	Lty Repres	ented	1.75 cf		ana aireannaichte thailte anns	
Coarse Agg	gregate	Låwr	ence, Gu	ildhall, V	/tFine	e Aggreg	gate Lawre	nce - Gui	1dha11,	Vt.		
Cement Bra	and <u>G1</u>	ens Fal	<u>ls</u>	mentering	1	Гуре	11	Lbs	ð	611	an a	
Air Entra	Lning Ada	nixture_	Darex_AE	ADosa	ige 3 0Z/	/cy A	dmixture_	WRDA Hyco	Dosage	3 oz/c	wt	
Maximum al	llowable	water c	content,	Gal/Cy	1	Total	Aggregate	, Dry Wgi		3087		
Field Test	ed by	W. Me	yer			Lab. Te	ested by		Eaton	ang sa		
Sampled fr							Date Sam					
Location l												
Examined f	for Mod.	of Rupt	ure			Cou	pressive	Strength_		·		
		-	<b></b>		T RESULT							
Unit Weigh	nt Fresh	Concret	e 148	.97	Air: Pr	essure	4.2%	Chace				
Total Wate										nbient		
	Cyl.		1	1	1	-	]					
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	
LGB 1 2	150 150		5-27	7	7	S	3210	3174	3192			
3 4	150 151		6-2	13	13	S	3130	3917	3524			
5 6	150 150		6-17	28	28	S	4209	4571	4390			
							<u> </u>					
·												
*S = Stand		d; F =	Field C	ured								
Types of B	геакs:			1111		S. J.	Gage, P.E	., Chief E	ngineer			
mlm					]	2	P.Z.N	ichos	~~~~(i	DAI		
Corments: TA 183H Re	2 <b>v</b> .					By:			jeart (Elim	<u>147</u>		

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Project Na	AGENCY OF TRANSPORTATION 2										
WP Project Nu	81-C-6 umber		Coyer Central files								
			Report	on Concret	e Test	Beam or	Cylinder	A	PPENDIX	С	
Laboratory	y No	C810030	9 (28	)Report	o <del>£</del> 7, 14	, 28	Day Break	s Date	typed	6-18	8-81
Pay Item	Perform	iance in	Concret	<u>e</u> 7	Type of S	Sample	Lab	10			
Submitted	by <u>W. M</u> e	eyer	ange, on av de order of a ball of the second	_Title	CLP	_Address					
Source of	Material	L <u>Materi</u>	als & Re	search Lal	b,Berlin	_Quanti	ty Repres	sented	1.75 c <sup>-</sup>	f	anan Bahawa asa dina manakata asa
Coarse Age	gregate	L.M.	Pike, Wa	terford,	Vt. Fine	e Aggreg	ate Law	rence - (	Guildhal	]	
Cement Bra	and	G	lens Fal	ls		Гуре	II	Lb	8	611	
Air Entrai	Lning Ada	mixture_	Darex AE	A Dose	ige <u>3 0Z</u>	/cy_A	dmixture	IRDA Hycol	Dosage	3 oz/	'cwt
Maximum al	llowable	water o	content,	Gal/Cy	s talaan oo ugu usaa sabaa magaa ay	Total	Aggregate	e, Dry Wg	t	3184	
Field Test	ed by <u>W.</u>	Meyer				Lab. Te	sted by	E	aton		
Sampled fr							Date Sam			20-81	
Location U	Jsed or t	to be Us	sedT	est Mix							
Examined f	for Mod.	of Rupt	ure			Con	pressive	Strength			
				TES	T RESULT	[S					
Unit Weigh	nt Fresh	Concret	e <u>151.6</u>	0	_Air: Pr	essure_	4.9%	_ Chace_			
Total Wate	er, Gal/C	Cy Used_	35.0	Slump	21	Cemperat	ure, Conc	rete	72 <sup>0</sup> _A	mbient	<u></u>
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
1 _LPB 2	152 152		5-27	7	7	S	3227	3201	3214		
3	152 153		6-2	13 ·	13	S	3846	4023	3935		
5	152 152		6-17	-28	28	S	4669	4518	4594		
						· .			۰.		
*S = Stand Types of Br		d; F =	Field C	ured			Gage, P.E.,	Chief En	- inee <b>r</b>		
mlm					1						
Comments: TA 1831 2M 4/3	···,			26	Ey R	: F iv	Z. Ni		-10	fa F	

Project Na		STATE OF V Agency of trans					l	2				
WP 81-C-6 Project Number				RIALS AND	Cover							
		and the second		fontpelier	Central files							
			Report o	on Concret	e Test l	Beam or	Cylinder	з A	PPENDIX	С		
Laboratory	y No. CE	3100310	(28)	Report	of 7, 1	4, 28	_Day Break	s Date	typed	6-18-8	31	
Pay Item	Perform	nance in	Concret	e 1	Type of S	Sample_			Lab		an ang tang tang tang tang tang tang tan	
Submitted	Ъу <u> </u> W.	Meyer		_Title	CLP	Address	5					
Source of	Material	<u>Materi</u>	als & Re	search Lal	b, Berli	n Quant:	ity Repres	sented	1.75 c	f	1	
Coarse Age	gregate	L.M. Pi	ke, Wate	rford, Vt	•Fine	e Aggreg	gate Lawr	rence, Gu	ildhall			
Cement Bra	and		Glens F	alls	]	Гуре	II	Lb	s(	560		
Air Entraj	Lning Ada	nixture_	Darex AE	A Dosa	ige 4 0	z/cy	Admixture_	WRDA Hyc	<u>OlDosage</u>	3 oz/o	wt	
Maximum al	llowable	water c	content,	Gal/Cy	the support of the state of the	_ Total	Aggregate	e, Dry Wg	t	3037	and the second	
Field Test	ed by	W. ME	yer			Lab. Te	ested by		Eaton			
Sampled fr		Lanca	ster Mix	er			Date Sam	npled:	5-20-81	1		
Location U	Jsed or t	to be Us	ed	test mix								
Examined f	for Mod.	of Rupt	ure			Con	npressive	Strength		an agusta an tarthan an s- a tha anga shaga		
				TES	T RESULT	rs						
Unit Weigh	nt Fresh	Concret	e 152.	03	_Air: Pr		5.0%	_ Chace_				
Total Wate				Slump2			ure, Conc		0	mbient_		
	Cyl.					1		1	Ι.			
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	
LPA 2	152 152		5-27	7	7	S	3563	3669	3616			
3 4	152 152		6-2	13 ·	13	S	4219	4124	4172			
5 6	152 152		6-17	. 28	28	S	4403	5128	4766			
*S = Stand Types of Bi		d; F =	Field C	ured	I			DE Chie	of Engine	⊃r		
		$f_{\Lambda} V$		1111-		5	5. J. Gage,	$\gamma_{i}$	, Q			
m]m				5 6	1	P.::	P.A.	1 ca		TRA	7	
Comments: TA 183H Re 2M 4/81	2V.					(	, walitza, P.E	., nialerials	& Research	Enginee <b>r</b>		

Project Na	ime			STATE AGENCY OF	COF VERM						
WP 8 Project Nu	1-C-6 mber			RIALS AND				Cover Central files			
				lontpelier					APPENDIX	С	
			Report o	on Concret	e Test I	Beam or	Cylinders	,		C	
Laboratory	7 No	C8100	<u>311 (28</u>	)Report	of7, 14	, 28	Day Break	s Date	typed	6-18-	81
Pay Item	Performa	nce in	<u>Concrete</u>	I	ype of S	Sample			Lab		an fan sen staar op fan de fan staar st
Submitted	Ъу <u>   W.  M</u>	eyer		Title Cl	_P	Address	3				
Source of	Material	. Materi	als & Re	search Lat	o, Berlin	n_Quanti	ty Repres	ented	1.75 c	f	
Coarse Agg	gregate	Lawrenc	e, Guild	ha <b>ll, V</b> t.	Fine	e Aggreg	ate Lawre	nce, Guil	dhall, V	′t.	
Cement Bra	ind	Glens F	alls		P	Гуре	II	Lbe	6	60	
Air Entrai	ning Ado	ixture_	Darex A	EA Dosa	.ge4 (	oz/cy_A	dmixture_	WRDA Hyco	l Dosage	3 oz	/cwt
Maximum al	lowable	water c	ontent,	Gal/Cy		_ Total	Aggregate	, Dry Wgt	. a	3036	and a star of some spectrum and a spectrum spe
Field Test	ed by	٧.	Meyer			Lab. Te	ested by		Eaton	an and a state of the second	
Sampled fr							Date Sam				
Location U	lsed or t	o be Us	ed	Ref	ference m	nix					
Examined f							pressive	Strength_			
				TES	T RESULT	rs.					
Unit Weigh	t Fresh	Concret	e148.0	01	_Air: Pr	essure_	5.4	% Chace	5		
Total Wate							ure, Conc		70 <sup>0</sup> An		
	Cyl.	1				1					
Specimen No.	Unit Wgt. P.C.F.	Date Rec'd	Date Broken	Desired age at break	Age at Break	Туре* S - F	Break 1 P.S.I.	Break 2 P.S.I.	Ave. P.S.I.	Break 1	Type 2
LGA 2	148 148		5-27	7	7	S	3431	3546	3489		
3 4	149 148		6-2	13	.13	S	4244	4023	4134		
5 6	148 148		6-17	28	28	S	4722	4669	4696		
			s.								
*S = Stand Types of Br		d; F =	Field C	ured	ī						
	caro.			/			. Gage, P.I				
nlm					1	Dun d	P.I.N	ichol	www.	RA7	
Concents: TA 183E Re 26 -/31	2V.					ву:	olson, P.E., M		/ •	ineer	

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Prepared By: P. A. C Date: 4-27-81 Sheet 1 of 1

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APPENDIX D

## 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 Inc. crushed stone and washed sand from their Waterford quarry as a structural concrete aggregate source.

Proposed Tests or Evaluation Procedure See Performance in Concrete Procedure { attached. }
for Evelenctions a nexi Acquiente
Fourse SE answer to Fill Course
- for Evelenching a new Acquicate - force at property too F. M. Cover - Catud May 5 1581
·
Proposal Discussed With <u>R. I. Fascooia</u> Projected Manpower Requirements <u>10 man days</u>
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 2.7. Micholan
Comments by Materials & Research Engineer $5/5/F/$
Materials & Research Division
Agency of Transportation Date Typed: 4/27/81

#### 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, 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.
- 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).