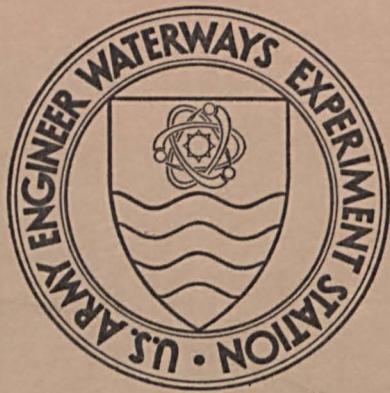


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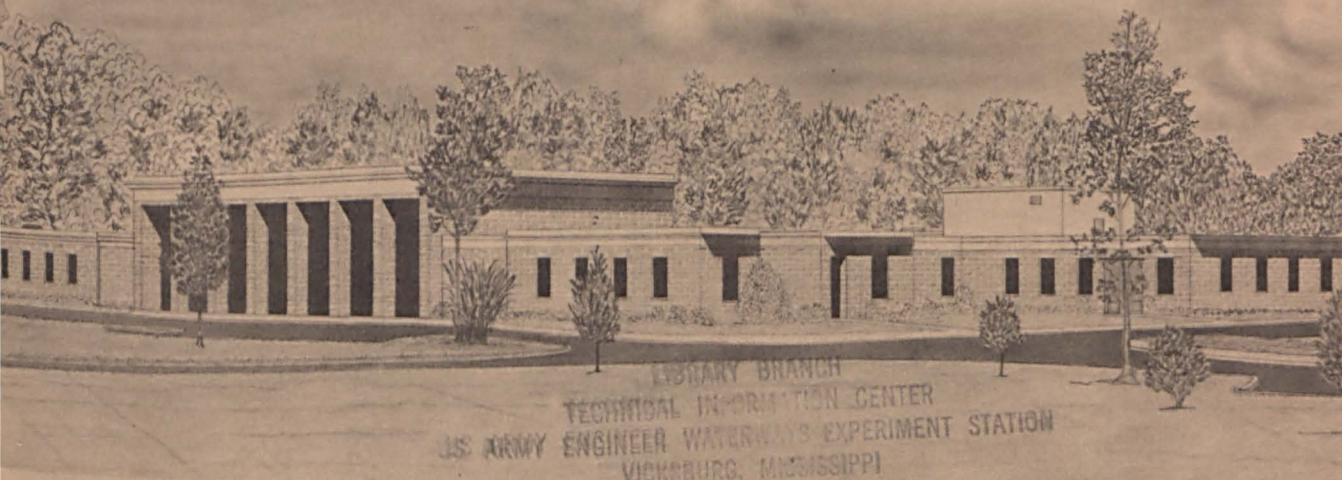


MISCELLANEOUS PAPER C-72-24

CONCRETE TECHNOLOGY INFORMATION ANALYSIS CENTER (CTIAC), EVALUATION OF PILOT STUDY

by

B. Mather



December 1972

Conducted by **U. S. Army Engineer Waterways Experiment Station**
Concrete Laboratory
Vicksburg, Mississippi

US-CE-1
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ARMY-MRC VICKSBURG, MISS.

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

TISA Project Report No. 41

CONCRETE TECHNOLOGY INFORMATION
ANALYSIS CENTER (CTIAC), EVALUATION
OF PILOT STUDY

by

Bryant Mather



December 1972

Technical Information Support Activities (TISA)
Project 02-07

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED

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Foreword

The Department of Defense Concrete Technology Information Analysis Center (CTIAC) was established on 18 April 1968 at the U. S. Army Engineer Waterways Experiment Station (WES). On 29 April 1970 Technical Information Support Activities (TISA) Project 02/07, "Cost Analysis of Information Centers," was activated. The objective was "to develop information relative to the level of effort being expended...in the operation of the CTIAC...its nature, the clientele served, and the cost....The need for supporting funds and personnel spaces will be evaluated."

This report summarizes CTIAC activity in the period April 1968-April 1972 in terms of inquiries of record acted upon; the clientele served, examples of the sorts of inquiries treated, exchange agreements, reports issued, and related activity. The Research Project Plan for FY 73-77 for establishment and operation of the CTIAC is included also.

This project was conducted by Mr. Bryant Mather, Director, CTIAC, with cooperation and assistance of the staff of the Concrete Laboratory, WES, and the WES Technical Information Center.

Directors of the WES during the period covered by the project were COL John R. Oswalt, Jr., CE; COL Levi A. Brown, CE; and COL Ernest D. Peixotto, CE. Technical Directors were Messrs. J. B. Tiffany and F. R. Brown.

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Summary

The pilot study reported herein provided funding for partial operation of the Concrete Technology Information Analysis Center from May 1970 to April 1972. During this period many inquiries were received for service. The inquiries were classified as to source: Department of Defense, not Army; Department of Army, not Corps of Engineers; Corps of Engineers; U. S. Government, not DOD; U. S., private industry; U. S., universities; Foreign, Governmental; and Foreign, Nongovernmental. Examples of inquiries are given. Seven reports (CTIAC-1 through -7) were prepared. Four reports were in response to inquiries received, respectively, from a contractor on Air Force research; a contractor on a National Cooperative Highway Research Program project; a state Department of Transportation; and a state Institute of Marine Science. The other three were state-of-the-art reports initiated in-house on electron micrography, geologic-formation-matching grout and concrete, and stain removal from concrete. Mention is made of information analysis activity funded from other sources conducted in the field of concrete technology by U. S. Army Engineer Waterways Experiment Station. Suggestions are made for future activity of the CTIAC in support of the Corps of Engineers and the DOD.

CONCRETE TECHNOLOGY INFORMATION ANALYSIS CENTER (CTIAC)

EVALUATION OF PILOT STUDY

Introduction

1. The U. S. Army Corps of Engineers has been deeply involved in concrete technology--the intelligent use of concrete as a construction material--for over a century. Deep involvement in concrete technology inevitably includes analysis of information on concrete technology. Since concrete technology is an important element of the technological base of the civilian economy as well as of military technology, there has necessarily been an interchange of information between the military and civilian sectors and the public and private sectors. The research and development center for concrete technology of the Corps of Engineers, the U. S. Army Engineer Waterways Experiment Station (WES), has been and is the principal point of contact for information exchange within the Federal establishment, the defense establishment, and between these and the civilian and private sectors of the economy. It was, therefore, highly appropriate that when a Department of Defense (DOD) Concrete Technology Information Analysis Center (CTIAC) was established in April 1968, it was established at the WES and that its Director be the Chief, Concrete Laboratory, WES.

2. The current statement describing the CTIAC, as given on page 66 of DDC-TR-71-6/AD 724 700 "Defense Documentation Center, Referral Data Bank Directory," by Alice L. Cox, July 1971, is reproduced as fig. 1.

Background

3. Under date of 17 March 1965, the Office, Chief of Engineers (OCE), requested the Director, WES, to review AR 70-22 "Centers for Analysis of Scientific and Technical Information" and comment on the extent to which WES was already engaged in work of this sort, areas for which establishment of centers at WES should be considered, and related

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /AC001

REFERRAL 990 073

CONCRETE TECHNOLOGY INFORMATION ANALYSIS CENTER VICKSBURG
MISS

ARMY ENGINEER WATERWAYS EXPERIMENT STATION,

P. O. BOX 631, VICKSBURG, MISS. 39180.

TELEPHONE AC 601-636-3111, EXT. 3264,

MAY 70

DIRECTOR/CONTACT/ALTERNATE CONTACT/MILITARY MONITOR;

MATHER, BRYANT, DIR.; MATHER, BRYANT, DIR.;

TYE, R. V.;

MILITARY COGNIZANCE/TYPER OF SOURCE: US ARMY,

INFORMATION ANALYSIS CENTER

LANGUAGE INPUT: ENGLISH, FRENCH

GERMAN, RUSSIAN

COVERAGE: ALL DATES

AVAILABILITY: DOD + ITS CONTRACTORS WITH CLEARANCE +
NEED-TO-KNOW,

SIZE OF COLLECTION AND/OR SPECIAL COLLECTIONS:

THIS INFORMATION ANALYSIS CENTER IS SUPPORTED BY THE
RESEARCH LIBRARY, ARMY ENGINEER WATERWAYS
EXPERIMENT STATION, WHICH CONTAINS APPROXIMATELY
190,000 ITEMS.

DESCRIPTORS: (*CONCRETE), (*REINFORCED
CONCRETE), (*REINFORCING MATERIALS),
(*CEMENTS), MIXTURES, CONSTRUCTION MATERIALS,
AGING(MATERIALS), LOADING(MECHANICS),
FRACTURE(MECHANICS), DEFORMATION, DEGRADATION,

...
SERVICES/MATERIALS: TYPES OF SERVICES, BIBLIOGRAPHY
COMPILATION, CONSULTANT, DATA COMPILATION,
IDENTIFICATION SERVICE, INDEXING, LITERATURE
SURVEYS, LOANS, REFERRAL, STATE-OF-THE-ART STUDIES,
TECHNICAL ANALYSIS + EVALUATION, TECHNICAL ANSWERS,
TYPES OF MATERIALS, BOOKS, CLASSIFIED MATERIAL,
MICROFORM, REPRINTS, RESEARCH REPORTS, SCIENTIFIC
JOURNALS, SCIENTIFIC + TECHNICAL DATA, TRANSLATIONS,
UNPUBLISHED MATERIALS

PUBLICATIONS: NONE TO DATE.

ANNOTATION: CONCRETE TECHNOLOGY INFORMATION
ANALYSIS CENTER, ARMY ENGINEER WATERWAYS
EXPERIMENT STATION, P.O. BOX 631, VICKSBURG,
MISS. 39180, NOW IN PROCESS OF ORGANIZATION, WILL
ACQUIRE, ANALYZE, EVALUATE, CONDENSE AND DISSEMINATE THE
WORLD'S LITERATURE IN THE SUBJECT AREAS INVOLVED.

Fig. 1. Current statement describing CTIAC

topics. In reply, it was stated that WES was rather deeply engaged in this sort of activity and recommended consideration of the establishment of several centers, one of which was in the area of concrete technology which would deal specifically with (a) mass concrete materials and construction methods, (b) analytical procedures and test methods, and (c) portland cement grout mixtures; with initial service responsibility to the DOD. It was noted that the WES Concrete Laboratory had gathered, analyzed, evaluated, condensed, and published reports on the state-of-knowledge or state-of-the-art in a number of areas, and that the capability of its staff is superior to that found elsewhere in the world for treating some of these areas. Estimates of needed funds and spaces were made. A memorandum dated 29 March 1965 (Appendix A) expressed the views of the WES Concrete Laboratory.

4. In August 1965, in accordance with AR 70-22, proposals for establishment of six centers were sent from WES to OCE. It was proposed that the CTIAC draw upon the work of other groups such as the Centre Internationale du Batiment (CIB), CEMBUREAU, Portland Cement Association (PCA), American Concrete Institute (ACI), Highway Research Board (HRB), American Society for Testing and Materials (ASTM), RILEM, National Bureau of Standards (NBS), etc. Annual costs of \$127,000 were forecast.

5. In April 1966 OCE submitted proposals to the Office, Chief of Research and Development (OCD), for approval of the establishment of eight centers to serve the DOD, with continuing annual costs for the CTIAC at \$122,000. The CTIAC was established by memorandum dated 18 April 1968 from the Director, Defense Research and Engineering (DDRE), to the Assistant Secretary of the Army, R&D, which stated that the Department of Army (DA) will be solely responsible for programming, budgeting, financing, and administering these centers for use as DOD-wide information sources.

6. A 5-yr plan for the CTIAC was prepared contemplating funding at a level of \$207,000 annually.

7. In July 1968 the question of user charges was raised by the DDRE. At a meeting at the Army Research Office (ARO) on 4 Feb 1969,

these matters were reviewed. At OCE request, a concept was submitted in which it was proposed that no charge be made to the user when the servicing of his request cost less than \$100, but where greater costs were involved a reimbursement basis could be established.

8. On 29 April 1970 TISA Project 02/07 "Cost Analysis of Information Centers" was activated, as described in the DD 1498 reproduced herein as fig. 2.

Operation of CTIAC, April 1968-April 1972

Inquiries acted upon

9. Following establishment in April 1966 of the CTIAC, there was some modest increase in the level of activity relating to concrete technology information analysis at the WES, particularly among the senior staff of the Concrete Laboratory, in matters of the sort that the CTIAC was established to deal with. Some inquiries were given slightly more complete replies, some increase in the efforts to obtain and store information took place, and some of the correspondence relating to these matters was signed "Director, CTIAC" rather than "Chief, Concrete Laboratory," especially when otherwise the correspondence would have gone to a "miscellaneous" file. In addition there was a rather modest, but noticeable, increase in the amount of correspondence received as a result of dissemination of information that the center had been established. Some of this correspondence was from others in the information analysis center field inquiring as to the services that were available. A number of specific inquiries were received. The Batelle Information Research Center and General Technology Corporation were among those making such inquiries. Among the specific requests were items such as the following: 18 July 1968 from Olin Mathieson Chemical Corporation (Defense Documentation Center (DDC) User Code 1353) seeking a 10-year literature search on explosively fired fasteners for metals and concrete with respect to penetration and adhesion. A reply with an annotated bibliography was provided. The request from the General Technology Corporation was for information on the dynamic response of

RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY				1. AGENCY ACCESSION ^a	2. DATE OF SUMMARY ^a	REPORT CONTROL SYMBOL	
				DA OB 8168	72 02 29	DD-DR&F(AR)636	
3. DATE PREV. SUMM'Y	4. KIND OF SUMMARY	5. SUMMARY SCTY ^a	6. WORK SECURITY ^a	7. REGRADING ^a	8. ORGN INSTR ^a	9a. SPECIFIC DATA- CONTRACTOR ACCESS	9. LEVEL OF SUM A. WORK UNIT
69 01 01	D. CHANGE	U	U	NA	NL	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
10. NO./CODES ^a	PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER			
	62101A	2 P062101A725	02	017			
11. TITLE (Precede with Security Classification Code) ^a	(U) Concrete Technical Information Analysis Center Operations						
12. SCIENTIFIC AND TECHNOLOGICAL AREAS ^a	005100 Documentation and Information Technology						
13. START DATE	14. ESTIMATED COMPLETION DATE	15. FUNDING AGENCY		16. PERFORMANCE METHOD			
70 04	72 06	DA		C. IN-HOUSE			
17. CONTRACT GRANT	18. RESOURCES ESTIMATE		19. PROFESSIONAL MAN YRS		20. FUNDS (In thousands)		
A. DATES/EFFECTIVE: NA	B. EXPIRATION:		C. FISCAL YEAR		D. CURRENT		
C. TYPE:	E. AMOUNT:		71		0.3		
F. KIND OF AWARD:	G. CUM. AMT:		72		0.3		
21. RESPONSIBLE DOD ORGANIZATION				22. PERFORMING ORGANIZATION			
NAME: U. S. Army Engineer Waterways Experiment Station ADDRESS: P. O. Box 631 Vicksburg, Mississippi 39180				NAME: U. S. Army Engineer Waterways Experiment Station ADDRESS: P. O. Box 631 Vicksburg, Mississippi 39180 PRINCIPAL INVESTIGATOR (Furnish BRAN if U.S. Academic Institution) NAME: Mather, Bryant TELEPHONE: 601-636-3111, Ext 3264 SOCIAL SECURITY ACCOUNT NUMBER:			
RESPONSIBLE INDIVIDUAL NAME: Mather, Bryant TELEPHONE: 601-636-3111, Ext 3264				ASSOCIATE INVESTIGATORS NAME: Tye, R. V., Jr. DA			
23. GENERAL USE Foreign intelligence not considered							
24. KEYWORDS (Precede EACH with Security Classification Code)							
(U) Information Storage; (U) Information Analysis							
25. TECHNICAL OBJECTIVE, 26. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)							
<p>23. (U) To develop information relative to the level of effort being expended by the Waterways Experiment Station Technical Library and the staff of the Concrete Division (CD) in the operation of the Concrete Technical Information Analysis Center (CTIAC). Information collected will include the activity that is conducted and its nature, the clientele served, and the cost. This information will serve as a basis for cost distribution comparison with other Information Analysis Centers (IAC) in which document acquisition, storage, etc., is chargeable wholly to IAC accounts rather than to other supporting studies.</p> <p>24. (U) A member of the technical staff of the CD will be assigned as project leader. The CD staff and the WES Library will maintain records of all requests for services from CTIAC, action taken, response made, difficulties encountered, time expended, and elapsed time required to complete the necessary action. Reports will be submitted to the Project Leader for analysis and assembly. Problem areas will be studied with a view to improving the services. The need for supporting funds and personnel spaces on a regular basis will be evaluated. A report will be issued.</p> <p>25. (U) 70 04-72 02: A record has been maintained of all requests for services of CTIAC, action taken, difficulties encountered, time expended and elapsed time required to complete the necessary action. The activity has been extended to include the preparation of four CTIAC reports. A summary and analysis of the CTIAC activity to date is in progress and will be published in report form this fiscal year.</p>							

DD FORM 1498
1 MAR 68

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE. DD FORMS 1498A, 1 NOV 68 AND 1498-1, 1 MAR 68 (FOR ARMY USE) ARE OBSOLETE.

Fig. 2. Research and technology work unit summary

concrete. A bibliography of 45 references and an analysis were provided. The Du Pont Company sought information on protective coatings for reinforced concrete citing DDIC user Code 15571-F/1. A reply was provided.

10. In May 1968, when word was received that the CTIAC had been established, members of the staff of the Concrete Laboratory were directed to keep an informal record of inquiries for information and information analysis received and acted upon that did not relate to the Concrete Laboratory's authorized and funded work program, i.e., information analysis activity that could not be charged to any reimbursable work order.

11. The keeping of these records has not been implemented in any very complete manner. There has been an understandable tendency to minimize the time spent on such unreimbursed activity--which tendency has led to the failure to spend the additional time required to record the nature of the activity. The available monthly records are summarized below:

<u>Month</u>	<u>Foreign Government</u>	<u>Foreign Non-government</u>	<u>DOD Not DA</u>	<u>DA Not CE</u>	<u>CE</u>	<u>Private</u>	<u>University</u>	<u>Government Not DOD</u>
May 1968	1	1		1	4	8	3	3
Jun 1968					5	4	1	1
Jul 1968	1	2	1		2	4	2	6
Aug 1968		2			3	4	1	3
Sep 1968					5	14		4
Oct 1968					1	3	1	2
Nov 1968		2			1	2	1	2
Dec 1968						5		2
Jan 1969					2	3	1	
Feb 1969		1			1	10	1	
Mar 1969						7		
Apr 1969					4	6	1	3
May 1969			1		1	7		
Jun 1969					1	5		1
Jul 1969		1				8	1	3

(Continued)

<u>Month</u>	<u>Foreign Government</u>	<u>Foreign Non-government</u>	<u>DOD Not DA</u>	<u>DA Not CE</u>	<u>CE</u>	<u>Private</u>	<u>University</u>	<u>Government Not DOD</u>
Aug 1969		1				11		2
Sep 1969		1			1	6		3
Oct 1969	1	1			8	9		1
Nov 1969		1		1		1	1	2
Dec 1969	1				3	5	1	
Jan 1970					3	4	1	2
Feb 1970	1					9		1
Mar 1970		1				4		
Apr 1970		1		2	1	3	1	
May 1970	2			1	10	11	2	5
Jun 1970	1	1	1		14	3	1	
Jul 1970		1			4	2	1	4
Aug 1970		1	2		3	7	1	1
Sep 1970						3		2
Oct 1970		6			4	3		
Nov 1970					2	5		
Dec 1970	1	2	1		4	8		2
Jan 1971						3	1	3
Feb 1971			3		3	5	2	4
Mar 1971	1	1	1		8	8	2	3
Apr 1971		2			3	8	1	5
May 1971					2	4		
Jun 1971					2	4		4
Jul 1971		2			3	8	2	4
Aug 1971					2	10	1	
Sep 1971		2			4	8	3	3
Oct 1971					3	4		2
Nov 1971		1	1		2	5	2	1
Dec 1971				2	7	3	2	1
Jan 1972	1		1	1	3	6	3	4
Feb 1972			1	1	3	10	1	1
Mar 1972	1			2	2	7		4

12. Some of these inquiries are noted below as examples. In all these cases information was furnished in accordance with the request made.

Foreign government

13. The National Research Council of Canada sought information on artificial fabric fibers for reinforcing concrete.

14. The Scandinavian Documentation Center sought information on recycling solid municipal wastes on behalf of the Finnish State Building Research Institute.

Foreign nongovernmental

15. Dr. Philippe Pichat of the University of Lyon, France, sought information on polymer concrete.

16. The International Union of Testing and Research Laboratories for Materials and Structures (RILEM), Paris, forwarded a questionnaire from the Bundesanstalt für Materialprüfung (BAM), Berlin, on methods and apparatus for measuring humidity in building materials. A reply was made including an annotated bibliography prepared in connection with work being done for the U. S. Atomic Energy Commission (AEC). Subsequently, additional copies of the same questionnaire were referred to CTIAC from the University of Illinois and the NBS.

17. N. V. Bekaert SA, Zwevegem, Belgium, sought information on the behavior of concrete in multiaxial creep as related to nuclear power reactor containment. A copy of a technical paper by a staff member was supplied, with comments.

18. H+H Industri A/S Lyngby, Denmark, sought information on the use of fluid coke from petroleum refining as an expansion-producing ingredient in grout and concrete.

19. M. F. Dumas, a consulting engineer in France, sought information on expansive cements.

Foreign universities

20. A research associate of the University of the West Indies, Trinidad, desired background and references on concrete research and construction to assist in planning a study tour of the United States.

21. A lecturer at the University of New South Wales, Australia, sought data on the use of polystyrene beads as concrete aggregate.

U. S. Government - CE

22. The CE Construction Engineering Research Laboratory requested an analysis of the applications of fracture mechanics to pavement systems.

23. An engineer with the Galveston District sought comments on

porous concrete drain plugs for canal linings.

24. The Chief, Engineering Division, Philadelphia District, sought advice on factors causing deterioration of concrete in bridge decks. (N. B. This inquiry led to a project study by the Concrete Laboratory, WES.)

25. An engineer with the Huntsville Division requested information on the use of expansive cement to compensate for drying shrinkage of concrete.

26. An engineer with the Missouri River Division sought information on the properties and behavior of specially prepared buff-colored portland cement.

27. An engineer at the Directorate of Military Construction, OCE, sought information on polymer-impregnated concrete.

28. The Chief, North Pacific Division Laboratory, sought information on chemical effects of ferrophorous as aggregate in concrete.

29. The Chief, New England Division Laboratory, sought information on specifications and methods of testing epoxy resins and similar adhesives.

U. S. Government - DOD not CE

30. Representatives of the Land Warfare research group sought information on polyurethane as a structural material.

31. An engineer with the Air Force requested comment on specifications for concrete aggregate.

32. A representative of the U. S. Army Foreign Scientific and Technical Center requested explanation of technical terminology in concrete technology.

U. S. Government - not DOD

33. An engineer with the Federal Aviation Agency sought information on specification limits on coarse aggregate for concrete for rigid airfield pavements.

34. The Director of the Technical Information Center of Puerto Rico wrote several times for data on production techniques for concrete aggregate, cost of concrete production, and manufacture of concrete masonry units.

35. An engineer at the NBS sought advice on needed changes in concrete calculations resulting from the change in standard units of cement from 94 lb to 100 lb and their conversion to SI ("metric") units.

36. A research scientist at the Brookhaven National Laboratory of AEC sought data on production of high-strength concrete.

37. An engineer with the Tennessee Valley Authority (TVA) sought information on the behavior of high-density shielding concrete made with ferrophorous aggregate.

38. An engineer with the Environmental Protection Agency requested information on work done in the field of recycling waste concrete.

U. S. governmental - state

39. An engineer with the Wyoming Highway Commission sought information on devices for load spreading during movement of very heavy items of machinery over low capacity bridges.

40. An engineer with the Kansas Highway Department sought information on the effect on concrete in poured-in-place piles of the presence of gypsum in the foundation into which the hole was drilled.

41. An engineer with the Louisiana Department of Public Works sought advice on interpretation of cracking in a dam. (This inquiry led to an investigational project by the Concrete Laboratory, WES.)

42. An engineer with the Pennsylvania Department of Transportation sought comments on the effect of silica in aggregates on the performance of air-entraining admixtures in concrete.

43. An engineer with the Virginia Department of Highways sought data on the product of a limestone quarry said to have been used as a source of aggregate by the Nashville District, CE.

44. An engineer with the Florida Department of Transportation sought information on sulfate attack on concrete pipe.

45. An engineer with the Virginia Highway Research Council sought information on the effectiveness of hydrogen gas generated in concrete by the reaction of metallic aluminum with alkalis in solution, in increasing frost resistance.

U. S. governmental - local

46. The New York City Transit Authority sought information on the use of a chemical densifier for concrete and its long-term effects on durability.

47. The Pasadena (California) Public Library sought references on the effects of utility trench excavation on the longevity of pavements.

U. S. nongovernmental - universities

48. The Manager, Infrared Information Analysis Center, University of Michigan, sought information on CTIAC operations to use in a panel discussion at a meeting of the American Society for Information Science.

49. Stanford Research Institute desired information on services of CTIAC.

50. The Research Director, Building Industrialization R&D Center, Washington University, sought information on research on forming, finishing, and curing concrete.

51. An Army officer doing graduate work at Princeton University sought information on the state-of-the-art of sheet pile construction.

52. A graduate student at Lowell Technological Institute sought references on ultrasonic measurements of modulus of elasticity and strength of concrete.

53. The Librarian at Case Western Reserve University sought a 5-yr bibliography on optimum concrete mixture design from DDC and was referred to CTIAC. A reply was provided.

54. A candidate for a master's degree in civil engineering at Villanova sought literature on the relative effects of sea water, brackish water, and fresh water on reinforced concrete for his thesis.

55. The University of New Mexico, Technology Application Center, sought, and was given, data on neutron moisture meters for concrete aggregate.

56. A candidate for a master's degree at Virginia Polytechnic Institute and State University sought information on the effects of prestressing on concrete durability for his thesis. This was a subject the WES Concrete Laboratory had studied for the OCE and two reports had been published; copies of these reports were sent to him with comments.

57. Other inquiries were seeking financial support for research and development. These included the Technology Application Center, University of New Mexico; Purdue University; and University of Illinois.

58. A faculty member at Pennsylvania State University sought information on thermal properties of concrete and their relation to permeance in roof construction.

59. A professor at Purdue University sought information on the effects on concrete of the presence of gypsum in aggregate and the likelihood of such occurrence.

60. A professor at the University of Missouri at Rolla sought information on methods of testing concrete aggregate for particle shape.

U. S. nongovernmental - industry

61. The Expanded Shale, Clay, and Slate Institute sought information on the compressive-to-tensile strength ratios of concretes as a function of unit weight. Data developed through research sponsored by OCE were sent to the Institute, with discussion.

62. The Mitre Corporation sought reports on cement and concrete research.

63. The president, Birmingham Southern Railroad Company, sought information on causes of nondurability of concrete bridge piers on his railroad.

64. The Missouri Portland Cement Company sought information on alkali in fly ash.

65. The Johnson-March Corporation desired information on the use of fuller's earth as an admixture to concrete.

66. The GOA Corporation sought data on a concrete form release coating.

67. Mr. W. E. Parks of Newellton, La., sought advice on road building using concrete slabs in connection with lumber production.

68. A research engineer with W. R. Grace and Company, Cambridge, Mass., sought data on fly ash-lime-cement-slag products.

69. A consulting engineer sought data on the relation of various compositions of masonry cement to performance of mortar in unit masonry construction.

70. The National Referral Center at the Library of Congress referred the Capitol Concrete Co. of Jacksonville to CTIAC for information on the use of electrical resistance changes in freshly mixed concrete as a measure of moisture content. A reply with references was supplied plus a portion of a draft report then in preparation by WES Concrete Laboratory for AEC.

71. The Construction Products Division, W. R. Grace and Company, sought information on carbon fibers as reinforcement for mortars and concrete.

72. The Dolese Company in Oklahoma City sought information on the use of fly ash in concrete.

73. The Dravo Corporation sought literature on the behavior of reinforced concrete in an ocean environment.

74. Stahly and Harrington, consulting engineers, Helena, Mont., and representatives of the Montana Highway Department sought advice on testing the structural sufficiency of an old reinforced concrete bridge. Suggestions were made.

75. Mr. Robert C. Youngs of Vancouver, Wash., sought information on floating concrete breakwaters in preparation for building a marina in Puget Sound.

76. A Texas firm of consulting engineers sought information on expansive cement.

77. Kaiser Sand & Gravel, Oakland, Calif., sought information to assist the California Bureau of Mines in evaluating concrete aggregate resources, especially when the deposits contain volcanic glass.

78. A research chemist with the Construction Products Division, W. R. Grace and Company, sought data on techniques for improving performance of concrete aggregates.

79. Benjamin Hinckley of Southwest Harbor, Maine, sought information on concrete pilings for repair of a wharf.

80. Baganoff Associates, Inc., for example, desired CTIAC to advise others of their capabilities for providing instrumentation to monitor seismic stresses in concrete dams. Columbia Scientific Research

requested a market survey on a device to sell for \$2000 to measure cement content of concrete.

81. The Research Institute of Martin Marietta and the American Cement Research Center sought support for their research and development efforts.

82. A representative of a testing laboratory in New Orleans sought advice on the interpretation of the phenolphthalein test for cement content and carbonation of cement in a soil-cement base.

83. The technical manager of a cement producer sought information on rapid setting compositions for repair work. He was referred to the material in CTIAC-1 (see paragraph 108a herein).

84. A research chemist with Philip Carey Corp., Cincinnati, sought information on levels of moisture in concrete roof decks and factors affecting changes in such levels.

85. An engineer with U. S. Pipe and Foundry, Birmingham, sought information on resistance to cracking of mortar linings in ductile iron pipe during flexing of the pipe.

86. A research physicist with the Southwest Research Institute sought comments on a modified sonar technique for nondestructive testing of concrete.

87. A producer of regulated-set portland cement sought assistance in the development of national specifications for this class of product.

88. An official of W. R. Grace and Company sought information on automatic apparatus for measuring time of setting of cement pastes.

89. The research director of Ideal Cement Company sought information on a Japanese product marketed as "FUJI-BETON."

90. A consulting engineer in Memphis sought information on factors that would produce a given cracking pattern in a reinforced concrete floor slab.

91. The executive secretary of the Mississippi Ready Mixed Concrete Association sought comments on the effects of sulfate in portland cements.

92. A consulting engineer in New Jersey sought information on characteristics of concrete admixtures.

93. A consulting engineer in California sought information on factors affecting concrete durability in Saudi Arabia.

94. An engineer at Batelle Institute requested information on polymer impregnation of concrete in highway bridge decks.

95. An engineer with a public utility in Alabama sought information about time-dependent volume change of concrete due to temperature and load.

96. A ready mixed concrete producer in Memphis desired information on the use of fly ash in concrete and on properties of fly ash produced by TVA.

97. An aggregate producer in California sought an explanation of anomalous behavior of a sand used as fine aggregate in concrete.

98. A producer of prestressed concrete in New York sought information on chemical admixtures.

99. A producer of concrete pipe sought comments on an expansive additive for concrete.

100. A representative of the Portland Cement Association requested information on methods of sampling and testing cement used by Federal agencies.

101. A representative of a testing laboratory sought references to the chill-factor effect in curing concrete.

102. An engineer with a testing laboratory in Ohio sought references on sulfate and acid resistance of concrete drain tile.

103. A manufacturer of fiberglass rods requested assistance in locating literature on the use of fiberglass in concrete.

104. A firm in Massachusetts sought information on techniques for combating oil spills at sea.

Exchange Agreements

105. Additional exchange agreements were negotiated to ensure the receipt of relevant publications. These included agreements with:

- a. Centre d'Etude et de Recherches de l'Industrie du Beton Manufacture (CERIB), Epernon, France.

- b. Centre d'Etudes et de Recherches de l'Industrie des Liants Hydrauliques (CERILH), Paris, France.
- c. Instituto Eduardo Torroja de la Construcción y del Cemento, Madrid, Spain.
- d. Cement Research Institute of India (CRI), New Delhi, India.

106. Some agencies with whom publication exchange agreements exist made inquiries institutionally or had staff members do so.

DDC - Bibliographies

107. As a result of telephone conversations with DDC, arrangements were made to have DDC provide a monthly report bibliography (Search Control CA 038-A) for current awareness on concrete technology. The first-level search terms used are "concrete" and "reinforced concrete." The first monthly bibliography received was sent on 22 June 1971; others have since been received. A few items have been noted from these bibliographies that were not already known of from other sources, but very few.

Reports

108. A number of projects leading to designated reports listed below were completed:

- a. CTIAC-1, "Fast-Setting Cement - Literature Survey," prepared by C. F. Derrington for Dow Chemical Company, transmitted 8 June 1970, 17 pages. This was cited and acknowledged in "Latex Modification of Fast-Fix C-1 Cement for the Rapid Repair of Bomb-Damaged Runways," by R. D. Eash and G. M. Hart, May 1971 (page 7)(WES CR C-71-1). (Also published as WES MP C-73-1.)
- b. CTIAC-2, "Waterproof Membrane Systems for Use on Concrete Bridge Decks," prepared by C. F. Derrington for Materials Research and Development, Inc., for use in National Cooperative Highway Research Program Project 12-11 for the Highway Research Board, transmitted 3 Feb 1971. (Also published as WES MP C-73-2.)
- c. CTIAC-3, "Test Data on Aggregate Sources, New York State," prepared by A. D. Buck for New York State

Department of Transportation, transmitted 9 Feb 1971. A total of 133 data sheets with comments, reproduced from Vol 5 of WES TM 6-370. (Also published as WES MP C-73-3.)

- d. CTIAC-4, "Reference Data File of Scanning Electron Micrographs." The need for such a data file was recognized, and a proposal for its development was submitted for funding under the In-House Laboratory Independent Research Program. Upon review of the proposals for this program it was authorized for initiation under the TISA program. It was begun on 15 April 1971 by A. D. Buck.
- e. CTIAC-5, "New Applications of Grout and Concrete as Shock Impedance Matching Materials for Geologic Formations." This state-of-the-art report, based on a series of studies conducted over several years for various agencies including Defense Nuclear Agency (DNA), AEC, and DOD, was prepared by D. L. Ainsworth and presented at the 1970 meeting of the Mississippi Academy of Sciences. Its reproduction cost was defrayed by the TISA project. It was published in April 1972 as WES MP C-72-10.
- f. A sixth item, prepared as a response to an inquiry, is here designated CTIAC-6, although not assigned a number at the time of preparation. Mr. Wyman Harrison of the Virginia Institute of Marine Sciences sought comments on samples of objects recovered from the ocean. A reply prepared by K. Mather was transmitted to Mr. Harrison on 20 July 1970 and was quoted by him in his research report "Atlantis Undiscovered-Bimini, Bahamas" in Nature, Vol 220, 2 April 1971, pages 287-289. (Also published as WES MP C-73-4.)
- g. CTIAC-7, "Investigation of Methods for Removing Stains from Mortar and Concrete." This report of the state-of-the-art, prepared by C. F. Derrington, R. L. Stowe, and W. G. Miller, was originally issued in Oct 1968 as WES MP C-68-8 as a part of CWI-ES Subproject 620.5. In March 1971 it became apparent that there was a large continuing need for additional copies and the original supply was exhausted. Consequently, the sum of \$200 was allotted to defray the cost of preparing 200 additional copies for sale at \$1.00 each.

Other Information Analysis Activity

109. During the period of the pilot study reported herein, the Concrete Laboratory, WES, conducted its customary level of information

analysis activity as this forms an integral part of many of its funded investigational and R&D projects. As was noted in 1965 (Appendix A) a substantial amount of activity has existed and may be expected to continue. A few of the reports of this sort that have been prepared and are distributed as requested, as permitted, include:

- a. "Applications of Light Microscopy in Concrete Research" (ASTM STP 148, 1953, pages 51-69).
- b. "Shape, Surface Texture, and Coatings of Concrete Aggregates" (ASTM STP 169-A, 1966, pages 415-431 (w/116 references); also WES MP 6-710).
- c. "Petrographic Examination of Hardened Concrete" (ASTM STP 169-A, 1966, pages 125-413).
- d. "Water for Mixing and Curing Concrete" (WES TR 6-440, 1956).
- e. "Pozzolan" (WES MP 6-460, also Geological Society of America, Reviews in Engineering Geology; II, pages 105-118).
- f. "Investigation of Expanding Cements; Summary of Information Available as of 1 July 1963" (WES TR 6-691, Report 1, 1965).
- g. "Study of Vibration of Concrete; Review of Literature" (WES TR 6-780, Report 1, 1967).
- h. "The Effect of Temperature on Creep of Concrete; A Literature Review" (WES MP C-70-1, 1970).
- i. "Investigation of Gap Gradings of Concrete Aggregates - Review of Available Information" (WES TR 6-593, Report 1, 1962).
- j. "High-Compressive-Strength Concrete; A Review of the State-of-the-Art" (WES MP 6-520, Report 1, 1962; also AFSWC-TDR-62-56; also (in revised form) WES MP 6-581, 1966, and Highway Research Record 210, 1967, pages 1-28).
- k. "Epoxy Resins for Use on Civil Works Projects - Summary of Data Available as of 1 March 1959" (WES TR 6-521, Report 1, 1959).
- l. "Survey of Applications of Epoxy Resins for Civil Works Projects" (WES TR C-71-1, 1971).
- m. "Plastic-Glass Fiber Reinforcement for Reinforced and Prestressed Concrete; Summary of Information Available as of 1 July 1955" (WES TM 6-421, Report 1, 1955) and *ibid.*...to 1 January 1959 (WES TM 6-421, Report 2, 1959).

- n. "Strain Meters and Stress Meters for Embedment in Models of Mass Concrete Structures: Summary of Information Available as of March 1967" (WES TR 6-811, Report 1, 1968).
- o. "Shock-Isolating Backpacking Materials; A Review of the State-of-the-Art" (WES MP 6-780, 1966).
- p. "Investigation of Sinking Methods for Removal of Oil Pollution from Water Surfaces; Survey of the State-of-the-Art" (WES MP C-71-9, 1971).
- q. "Research in Foundation Grouting with Cement" (WES MP 6-384, 1960).
- r. "Sulfate-Resistant Concrete; Literature Review" (WES TR 6-569, Report 1, 1961).
- s. "Effects of Sea Water on Concrete" (WES MP 6-690, 1964).
- t. "Soundness Tests of Concrete Aggregate" (WES MP 6-278, 1958).
- u. "Test Data; Concrete Aggregates in Continental United States" (WES TM 6-370, 5 Vol, loose-leaf, with annual supplements).

110. As part of the planning for the OCE Civil Works R&D Five-Year Program, FY 73-77, a project plan was prepared on 22 July 1971 entitled "Establish and Operate Concrete Technology Information Analysis Center." This plan, later combined with others for submittal to OCE, contemplated funding at \$250K PA (\$125K PA minimum) and discussed primarily service to the Corps of Engineers (Appendix B).

111. During the period, two senior members of the Concrete Laboratory staff continued their service on separate panels of The Technical Cooperation Program (TTCP) involving representatives of the defense establishments of the United States, the United Kingdom, Canada, and Australia. The panels involved are P-2 on Non-Metallic, Inorganic Materials on which Mr. Leonard Pepper has served, and P-4 on Methods of Test and Evaluation on which Mrs. Katharine Mather has served. The major work of these staff members in carrying out the mission of the panels, as assigned to them by the chairmen, has been in information analysis and evaluation.

112. During the period 2-6 March 1970, slightly before activation of TISA Project 02/07, the Director, CTIAC, was a member of a delegation

of six individuals from the United States, and the only representative of the U. S. Government, at the Conference on International Exchange of Information on Cement and Concrete Research, held at the Institution of Civil Engineers, London, England. There were 30 registrants from 18 organizations in 10 countries. The host was the Cement and Concrete Association (C&CA) in conjunction with The Concrete Society. U. S. participation was coordinated by the ACI. A full report was distributed by the ACI in April 1971.* As a result of informal agreement at this conference, the CTIAC has received a very substantially increased amount of useful information from the other organizations that participated. Fig. 3 shows an example of the transmittal slips adopted following this conference by the C&CA (London) and the IET (Madrid). Fig. 4 is an example of activity by CTIAC in this connection. Information obtained by examining an issue of Concrete received from The Concrete Society, London, as part of the International Exchange of Information Scheme, was correlated with related information published by the ASTM in its Journal of Materials and the reference to the latter was called to the attention of the readers of the former.

Discussion

113. The experience gathered in the operation of the CTIAC from April 1968 to date, during part of which period (April 1970 to date) TISA Project 02/017 provided the means for recording and assessing the experience, suggests the following principal conclusions.

- a. The WES has operated a kind of CTIAC for many years and will continue to do so for the foreseeable future.
- b. The WES operates a CTIAC because it needs to do so in certain areas as a necessary part of its mission in concrete technology R&D.
- c. The WES, as the DOD concrete technology R&D center, distributes the product of its R&D activity to interested

* American Concrete Institute, Conference on International Exchange of Information on Cement and Concrete Research, London, England, March 2-6, 1970, Detroit, Michigan.

Cement and Concrete Association
52 Grosvenor Gardens, London SW1, England

International exchange of information scheme

Instituto Eduardo Torroja

DE LA CONSTRUCCION Y DEL CEMENTO
COSTILLARES, CHAMARTIN - MADRID-16 - ESPAÑA

International exchange of information scheme

Fig. 3. Example of transmittal slips adopted by C&CA (London)
and IET (Madrid)

Correspondence

Structural assessment of lightweight aggregate concrete

SIR, The paper in the July 1971 issue of CONCRETE by J. Bobrowski and N. K. Bardhan-Roy was most valuable because it put the design advantages and the material characteristics of lightweight concrete into perspective.

A correction is required however concerning the mix design details for the precast roof beams over the grandstand at Doncaster racecourse, because Tunnel white cement was used in these units and not the brand stated.

J. A. Curtis

Technical Services Manager,
Tunnel Cement Ltd

Procedure for the determination of chloride in concrete

SIR, With reference to the letter from Mr Andrews (Civil Engineer, S.E. Gas Board) in the November issue of CONCRETE, concerning a test for chloride in concrete, you may be interested to learn that this has been published with slightly more analytical detail, in Chemistry & Industry. The reference is: Chemistry & Industry (1971), No. 43, pp. 1,227-8, 'A field test for the determination of excess chloride in concrete,' by A. V. Smith and P. R. Banfield.

A. V. Smith

Senior Chemist,
Analytical Laboratory,
South Eastern Gas Board,
Central Laboratories,
709 Old Kent Road,
London SE15

SIR, Mr Andrew's letter (CONCRETE, November 1971, p. 342), describing a field test for excessive chloride content of concrete, suggested that others might desirably have their attention called to the 'greatly simplified' procedure for laboratory determination of chlorides in mortar described in the paper by Browne and Bolling in the ASTM *Journal of Materials*, September 1971, p. 524. Using their method, it is said that a single technician can sample, prepare, and measure several hundred samples a week. The work is related to a study of deicer chlorides on pavements at Pennsylvania State University.

Bryant Mather

Director,
Concrete Technology Information
Analysis Centre,
Department of the Army,
Vicksburg, USA

Fig. 4. Example of CTIAC activity

users as widely as permissible under security requirements and seeks to receive the product of similar activity by others throughout the world. Analyzed information on the state-of-knowledge or the state-of-the-art is a necessary prerequisite to justifiable and economical initiation of additional R&D effort.

- d. Since the concrete technology community of the world is generally aware of the WES contributions to the advancement of that technology, that community approaches WES when it needs information and information analysis.
- e. It is believed proper for the information gathering, storing, retrieval, analysis, and dissemination activities of the WES that are conducted as integral features of its funded concrete technology R&D projects to be funded by the sponsors of these projects, as they have in the past.

- f. It is further believed proper for those similar activities, unrelated to any currently funded R&D projects, but which relate directly and specifically to areas of concrete technology covered by specifications and manuals issued by the Office, Chief of Engineers, to be funded by the OCE as has been proposed in the project plan prepared for OCE in July 1971.
- g. The remaining functions that WES is called upon to perform that do not represent reimbursable work for a sponsor of R&D nor direct support of the mission of the Corps of Engineers should be supported by other funding. These activities can, as they have generally in the past, be conducted in a generally perfunctory, inadequate, cost-minimizing way that provides very limited response but holds down charges to overhead. Such a course of action ignores the responsibility to make knowledge usefully available, that goes with having developed knowledge.

APPENDIX A: "CENTERS FOR ANALYSIS OF SCIENTIFIC AND TECHNICAL INFORMATION," WES-CD MEMORANDUM, 29 MARCH 1965

MEMORANDUM FOR: TECHNICAL DIRECTOR

SUBJECT: Centers for Analysis of Scientific and Technical Information

1. Reference:

a. Your memorandum dated 23 March 1965, subject as above, requesting comments and recommendations.

b. AR 70-22 dated 14 January 1965.

c. Letter dated 17 March 1965 from OCE (ENGCW-E), subject as above, requesting comments.

2. The Concrete Division, WES, has gathered, analyzed, evaluated, condensed, and published reports on the state-of-knowledge or state-of-the-art on certain areas within the scope of its work. In some cases the reports issued as a result of such activity have been of a level of completeness and adequacy such that they could have qualified under the provisions of reference lb as output of a center of the sort contemplated. In some of these cases, the existing capability of the staff of the Concrete Division is regarded as superior to that existing anywhere else in the world for the purpose of preparing the treatment of the particular material assembled and treated. It is estimated that such work, completed to date, and contemplated by existing authorizations, might cover 0.1% of the total area of the field of concrete. Examples of such coverage include: Applications of Light Microscopy in Concrete Research (ASTM STP No. 143, 1953, pp 51-69) and Shape, Surface Texture, and Coatings -- Concrete Aggregates (ASTM STP 169, 1955, pp 284-296). It may be noted that the first of these examples represents a discipline-oriented subject area while the latter represents a subject matter (or mission)-oriented subject area, as described in paragraph Jb of reference lb.

3. At the present time a number of efforts are being made to improve facilities for information storage, information retrieval, and information analysis both specifically in the general area of the mission of the Concrete Division and in broader areas that include portions of the mission of the Division. Some of these include the following:

a. Centre Internationale du Batiment. This organization, created, in part, by the United Nations, is intended to serve as a

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world repository of information on building with appropriate facilities for storage, retrieval, and analysis of data. Dr. A. Allan Bates, National Bureau of Standards, represents the United States.

b. CEMBUREAU. This organization created by the European cement producers is attempting an information service. The WES library has been receiving material from it.

c. Portland Cement Association. The PCA, which for many years has maintained what is probably the most complete library, translation staff, and bibliographic compilation facility in the world concerned with literature on concrete, has recently raised this function from that of a service organization attached to its R&D laboratories to a status equal to that of research and development. Under the PCA vice-president for R&D are now three directors, for research, development, and information, respectively. Mr. J. J. Shideler is director of information. PCA has issued more analyses of world literature than has the Concrete Division.

d. American Concrete Institute. The ACI, in cooperation with the Japan National Concrete Council, the Comite European du Beton, and the Latin American Concrete Organization, is working on the creation of an International Council of Concrete Organizations. ACI has also created for itself a long-range planning committee. In both connections ACI is exploring the degree to which it, unilaterally or through international cooperation, might become a world center for documentation in the concrete field.

e. Highway Research Board. At the January 1965 meeting of HRB preliminary reports were made regarding the automated data storage and retrieval system being set up by HRB to cover the world's literature on highways. This project was described by Paul E. Irick and W. N. Carey, Jr., in a paper given at Session G on 12 January 1965 entitled "The New Highway Research Information Service." This would supplement rather than replace such activities as those that culminated on 15 March 1965 by the issuance by HRB of "Recent Russian Research on Cement and Concrete -- An Annotated Bibliography," 285 pp covering over 2000 items, prepared under the supervision of the Concrete Division, HRB.

f. ASTM. It will be noted that the two analyses prepared here taken as examples in paragraph 2 above were published by ASTM. ASTM is also reviewing its function in the data compilation, storage, retrieval, and analysis field.

g. U. S. National Science Foundation. See excerpt from Nature, 2/6/65, inclosed.

SUBJECT: Centers for Analysis of Scientific and Technical Information

h. Other. Other groups having an interest in the concrete field that are engaged in activities or are contemplating activities in this area include: National Bureau of Standards, Bureau of Public Roads, Bureau of Reclamation, Cement and Concrete Assn. (London), RILEM, Joint Highway Research Project (Purdue), and several in the USSR. Other groups having a broader interest that overlaps the concrete field include: National Referral Center (Smithsonian Institution), Engineering Societies Library, UNESCO, and various materials science activities of DOD.

4. An initial basis for activity in this area would be to review the available published abstracting and indexing services to select those containing material in the selected areas. At present in the field of abstracting and indexing, there are at least 365 different publications now being produced in the United States and at least 1855 in the world; there are listed in "A Guide to the World's Abstracting and Indexing Services in Science and Technology" published by the National Federation of Science Abstracting and Indexing Services, Washington, D. C. It is estimated that between 60 and 80 percent of these 1855 publications include material that should be covered by activities of the sort contemplated by reference lb as it relates to the field of concrete.

5. It is regarded as feasible for the Concrete Division, WES, to have its capabilities for service as a center for analysis of scientific and technical information recognized and expanded. It is regarded as improbable that the management of the program outlined in references lb and lc would consider proper the establishment of centers of such exceedingly limited scope as to comprehend only those very small areas in which the Concrete Division, WES, has already so functioned and might continue to function with no increase in staff or funding. Consequently, it is felt that any proposal for designation of a center at WES in the field of cement and concrete must contemplate a broader coverage than can be provided without a significant increase in staff and funding. On the other hand, it seems infeasible to propose a complete coverage of all aspects of cement and concrete -- materials, structures, structural design, pavements, bridges, etc. (see the EJC Thesaurus of terms).

6. It is therefore proposed that a few rather limited fields be selected and a proposal that CD, WES, be designated as the center for these be prepared. Fields that might merit consideration for inclusion in this proposal include:

- a. Behavior of hydraulic cement concrete in hydraulic structures.
- b. Nature and properties of mineral aggregates for hydraulic cement concrete.

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c. Nature and properties of hydraulic cements for use in civil engineering construction.

d. Materials and methods used in stabilizing foundations of hydraulic structures.

e. Construction methods for locks, dams, and floodwalls constructed of hydraulic cement concrete.

f. Thermal properties of hydraulic cement concrete.

g. Chemical, microscopic, and X-ray analysis of hydraulic cements and hydraulic cement concrete.

7. If a majority of the areas outlined in paragraph 6 were selected and assigned to CD, WES, for treatment in accordance with the provisions of reference lb, it is believed another Branch should be created, that it should be staffed at the GS-14 level and should have a budget of at least \$300,000 p.a., and all present members of the technical staff should serve as consultants to this effort and additional outside consultants obtained.

8. The major portion of this memorandum was prepared by B. Mather. He and I discussed the subject at some length. I am not at all in favor of attempting to act as a scientific and technical information center in the field of concrete with the present staff. There are multiple hundreds of establishments and thousands of researchers in the world-wide field producing a plethora of paper difficult in magnitude to imagine. I think \$300,000 per annum is quite modest to cover the areas mentioned in paragraph 6.

9. My solicitation of comments among the CD staff drew eager response from Dr. Smith and Mr. Polatty. They both feel that the field should be broadened outside those mentioned in paragraph 6 to include grouting, rock mechanics, concrete structures, and the equation of state of materials. If the field were broadened to the extent mentioned in this paragraph, the annual cost of operating such a center could easily double \$300,000.

1 Incl
as

THOMAS B. KENNEDY
Chief, Concrete Division

U.S. NATIONAL SCIENCE FOUNDATION SUPPORT FOR THE DISSEMINATION OF SCIENTIFIC INFORMATION

A PAMPHLET on the dissemination of scientific information, issued by the National Science Foundation*, outlines the Foundation's programmes to discharge the responsibilities for interchange of scientific information and support of the dissemination of such knowledge placed on it by the Congress Act of 1950, and extended in 1958 by directives from the Congress and from the President. An Act of 1958 also established a Science Information Council to be an advisory group to the Foundation's Office of Science Information Service. The Foundation's programmes have two fundamental objectives: promotion of newer and better techniques for handling and disseminating scientific information, and making existing systems more effective. Its scientific information activities are carried out under five programmes organized in two Sections: the Studies and Support Section, which includes programmes of basic studies, improved processes and systems and support of communication; and the Science Information Co-ordination Section, which includes programmes of Federal science information and of the domestic and foreign science information.

Under the first section, support is provided for research development, experimental application and evaluation of systems of information retrieval, mechanical translations, libraries and publications, with the principal emphasis on improving basic understanding of general problems rather than on establishing particular systems. The Foundation continues to support long-range research on systems for the automatic processing of natural language text with the

eventual aim of mechanizing procedures for indexing, abstracting, organizing and storing information. Research in mechanical translation is a part of this broader field, while, in the work on publication systems, projects have been undertaken to analyse the part played by computers in scientific publication and to investigate machine recording of textual information during the publication of scientific periodicals.

As part of the Foundation's general programme for strengthening the science library network of the country, the information systems programme is seeking ways to improve the effectiveness of those libraries which provide substantial science information services. The publication support programme provides support for journals publishing results of original research, as well as temporary financial assistance for the cover-to-cover and selective translation of research published in Russian, Japanese and Chinese. Any publication considered favourably for support must be making, or showing good promise of making, a significant contribution to the scientific research literature; moreover, its proposed mechanics of publication must be efficient and economically sound.

The principal interests of the programmes for science information co-ordination are to promote non-Federal science information activities in the United States and to co-ordinate these with developments in foreign countries. Two major federal information centres are supported and administered. The first is the Science Information Exchange, which acts as a clearing house for information on current research, while the second is the National Referral Center for Science and Technology, located at the Library of Congress.

* National Science Foundation. *Programs for Improving the Dissemination of Scientific Information.* (NSF-64-22.) Pp. 16. (Washington, D.C.: National Science Foundation, 1964.)

APPENDIX B: RESEARCH PROJECT PLAN, FY 73-77, "ESTABLISH AND
OPERATE CONCRETE TECHNOLOGY INFORMATION ANALYSIS CENTER,"

22 JULY 1971

Submitting Office: WES

Date: 22 July 1971

Prepared by: Mr. Bryant Mather, Director, Concrete Technology

Information Analysis Center, WESCV, 601; 636-3111-3264.

RESEARCH PROJECT PLAN FOR THE CW R&D 5-YEAR PROGRAM, FY 73-77

1. Project Title: Establish and Operate Concrete Technology Information Analysis Center.

2. Problem Requiring Research.

a. Relevant OCE and Field Office Problems: The problem addressed by this project plan is subitem 3 of the first item shown on p 15 of Incl 1 to ENGCV-RR letter dated 16 July 1971.

b. Statement of the Problem: The CW mission in managing the Nation's water and related resources involves the design and construction of a variety of concrete structures, the use of portland-cement-based grouts in foundation work, and other technological and engineering activity based on concrete and cement technology. Related to this mission is the need to accomplish the necessary R&D so these activities will be conducted efficiently, reliably, and economically--in accordance with the current standards of good practice, and to know and set forth these standards in specifications and manuals. There needs to be a Corps facility charged with responsibility to keep aware of the state of knowledge in the several aspects of concrete technology to which designers, planners, specifiers, researchers, constructors, and contract administrators can turn to learn what the state-of-the-art is in this area. This facility will also provide output of assistance in planning R&D and in preparing specifications and manuals.

c. Present Procedure and Possible Improvements: At present the sort of need mentioned in para 2b above is not met because no such facility is functioning effectively. When a question arises as to the state-of-the-art or the state-of-knowledge it may be and often is addressed to a variety of agencies in the hope that among those addressed an answer may be found. Depending on the nature of the problem one seeks assistance of technical societies, other Federal or State agencies, universities, corporations, research organizations in other countries, individual experts, etc. Often the information is not located. The most complete collection of data in concrete technology in the Department of Defense is at the WES. The CTIAC has been authorized. It has not been funded. The improvement proposed by this project plan is that it be funded on a continuing basis.

d. Impacts: See Incl 1.

e. Urgency: It is believed especially urgent that this project be initiated promptly. One previous source of much valuable assistance of

this nature, the Portland Cement Association, has drastically reduced its activity in this area, to about 10 percent of that which was formerly provided. The initiation of the Soils Mechanics IAC in FY 71 provides a pilot basis for extending the WES IAC to include the CTIAC with fresh experience at starting an IAC which will enable such start-up to be accomplished more smoothly. The volume of requests for such service is increasing as the concrete technology community both within and without the DOD becomes increasingly aware of the existence of the CTIAC.

f. Additional Information: An allocation of \$30 K for research on the operation of the CTIAC will be exhausted in FY 72.

3. Research Plan and Schedule.

a. Concept and Approach: The concept and approach is exemplified in the statement given in referral number 990 073 in the Defense Documentation Center Referral Data Bank Directory, Report DDC-TR-71-6 which is reproduced as Incl 2.

b. Sequential Phasing of Tasks: The project will be undertaken in steps. The first phase will involve establishment of priorities for the creation of the several functioning elements. This will be followed by the creation of these elements. Finally, there will be the expansion as required by demand for services and available funding. As noted in Incl 2, the functions to be served include:

- (1) Bibliography compilation.
- (2) Consultant.
- (3) Data compilation.
- (4) Identification service.
- (5) Indexing.
- (6) Literature surveys.
- (7) Loans.
- (8) Referral.
- (9) State-of-the-art studies.
- (10) Technical analysis and evaluation.
- (11) Technical answers.

To a limited extent items (1), (2), (6), (7), (8), (9), (10), and (11)

are now being performed. It is proposed to announce the availability of these services and develop procedures for dealing with them on a priority basis. During a recent period it was determined that of 150 requests for service, 28 percent came from within the Corps of Engineers, 2 percent from DA not CE, 9 percent from DOD not DA, 9 percent from US Government agencies not DOD, and 58 percent from outside the US Government. The last three reports prepared were for an Air Force Research Contractor, a National Academy of Science Contractor, and the New York State Department of Transportation.

c. Work to be Accomplished by Others: None of the work funded under this project is expected to be performed outside of WES.

d. Execution Capability and Resources Required: No difficulties are anticipated in executing this project with respect to personnel, facilities, equipment, or other relevant and critically controlling resources. All that is regarded as needed is funding.

e. Estimated Magnitude of Payoff: Analyses of information in the field of concrete technology that have been made previously, using funding available for such analyses as a preliminary phase of an investigation, have in several cases revealed that the proposed investigation was not needed, that the sought-for results were available. When such is the case there is a tendency to do the work anyhow if funds have been made available. This can be avoided by obtaining the information on the state-of-knowledge before authorizing the investigation. Today it often occurs that CE specifications and Engineer Manuals, as they are revised, are updated to a state-of-the-art that represents only the personal expertise of the revisers and are obsolete before being promulgated with regard to matters not brought to the attention of the revisers. These are examples of the payoff to be expected from this project. It is estimated that the savings to the Corps of Engineers from avoiding unneeded investigations and from having its specifications and manuals reflecting the current state-of-the-art would be of the order of \$1,000,000 p.a., in the field of concrete technology.

f. Cost Estimate:

(1) Dollar Cost: \$250,000 p.a.

(2) Professional Man-Years:

(a) In-House: 4 p.a.

(b) Other CE: 0

(c) Outside CE: 0

(3) Nonresearch Components: No portion of the costs of this project is to be used for training or for planning or design. It is

noted that the NSF definition quoted in the instructions pertaining to this paragraph as given in Incl 2 to the ENGCW-RR letter dated 16 July 1971 regards "activities concerned primarily with the dissemination of scientific information" as "supposed to be excluded from R&D." Since the title of this project is "Establish and Operate STINFO," it is assumed that such activity, conducted in accordance with the previously established regulations for such establishment and operation is regarded as R&D in support of the CE mission, as outlined above, rather than dissemination of information for its own sake.

g. Significant Dates in Project Scheduling:

(1) Project Initiation: The CTIAC was established some years ago. As noted in para 2e above, a very small one-time allocation of funds was made to conduct a research project regarding its operation. Its initiation on an operating basis is proposed for the beginning of FY 73.

(2) Initiation and Completion of Major Phases: The sequential phasing as discussed in para 3b above will be carried out with the employment of flexibility appropriate to meeting the demands for service that develop and the needs of the community being served. It is believed that by the end of FY 74 the Center will be on a stable operating basis.

h. Progress and Accomplishments through FY 72:

(1) To date this project has received no CW-ES funding nor will it receive any according to available plans for such allocations in FY 72. Some of the activity properly conducted by the CTIAC has been funded on an ad hoc basis as a part of other research projects, as is noted in para 2c above. The research project in the area is mentioned under para 2e above and mention of recent accomplishments is made in para 3b above. The fundamental conclusion that is indicated from the progress and accomplishments to date and anticipated in FY 72 is that the Corps needs to have a Concrete Technology Information Analysis Center funded as an on-going element of its CW R&D program in order to conduct that program effectively in the field of concrete technology, and to apply concrete technology effectively and with optimum economy in its CW construction, maintenance, and operations programs.

(2) Anticipated in Remainder of FY 72: Discussed in (1) above.

i. Alternative Funding Schedules:

FY	Optimum		Minimum		Recommended	
	\$ K	Prof. Man- Years	\$ K	P	\$ K	P
Thru 71	0	0	0	0	0	0
72	0	0	0	0	0	0

FY	Optimum		Minimum		Recommended	
	\$ K	Prof. Man- Years	\$ K	P	\$ K	P
73	250	4	125	2	250	4
74	250	4	125	2	250	4
75	250	4	125	2	250	4
76	250	4	125	2	250	4
77	250	4	125	2	250	4
Bal to complete	250 pa	4 pa	125 pa	2 pa	250 pa	4 pa

j. Justification for Budget FY 73 Recommendation: The desirability and urgency for initiating this project in FY 73 are discussed above; urgency is particularly addressed in para 2e.

(1) Anticipated Progress and Accomplishments with Amount Recommended for FY 73: See para 3h above.

(2) Basis for Increase over FY 72: See para 3h above.

(3) Effect to Reducing Project Execution Rate to:

(a) Same Level as FY 72: The project would be unfunded and the status would revert to that which existed in FY 69.

(b) Minimum Practicable Level: The project would operate at about half the anticipated required level of output.

(c) Zero: See para 3j(3)(a) above.

k. Nonresearch Components of the Project in FY 73: On the basis of the comments given in para 3f(3) above there are no nonresearch components of this project.

l. Coordination: This project will be coordinated on several levels as noted below.

(1) Within the WES: Within the WES the establishment and operation of the CTIAC will be closely coordinated with the establishment and operation of the Hydraulics Center and the continuation of the Soil Mechanics Center particularly as these are all jointly served by the WES Research Center Library and related Information Service Activities.

(2) Within the Concrete Technology Community: The CTIAC will not generate new knowledge based on experiments or construction experience. It will assemble, analyze, and provide such knowledge to others as needed. It will therefore maintain contacts with and coordinate with the entire concrete technology community in the United States and in other countries.

(3) Duplication: This project does not overlay or duplicate work accomplished or under way by others within or outside the Corps. Others are accumulating and analyzing concrete technological data but no one is doing this for the scope of the needs of the CE and the DOD.

4. Remarks: The operation of the CTIAC as proposed in this project plan will enable the reservoir of concrete technological information available and increasingly collected at WES to be put to use efficiently in assisting the CE to effectively and economically accomplish its mission. It is not intended that the four professional man-years of effort per annum contemplated be four individuals who work full-time conducting the professional part of this project but rather that all the available professionals at WES, who jointly constitute the largest and most expert available pool of talent in the field of concrete technology available to the CE, in-house, would contribute as required to the accomplishment of this work assisted by the library and information specialists also available at WES.

IMPACT MATRIX

Item Affected	Degree of Problem Constraint			
	:Extreme	:Major	:Moderate	:Minor
<u>Objectives</u>				
National Economic Development and Efficiency		x		
Environmental Quality			x	
Social Well-Being			x	
Regional Economic Development			x	
<u>Purposes (beneficial outputs of CW activities)</u>				
Flood Damage Reduction (including enhanced land use)	x			
Major Drainage			x	
Shore Protection (coastal and Great Lakes)	x			
Hurricane Protection	x			
Tsunami Damage Reduction			x	
M&I Water Supply			x	
Irrigation			x	
Low-Flow Augmentation for Pollution Abatement			x	
Wastewater Management			x	
Salinity Intrusion			x	
Commercial Fisheries			x	
Sport Fish and Wildlife			x	
Recreation - General			x	
Recreation Boating at Reservoirs			x	
Small Boat Harbors for Recreational or Commercial Fishing Craft			x	
Coastal and Great Lakes Commercial Harbors and Channels	x			
Inland and Intracoastal Commercial Harbors, Channels, and Canals	x			
Hydropower	x			
<u>Functional Activities</u>				
Planning (Framework Studies and Assessments; Regional or River Basin Plans; Implementation Studies)			x	
Design and Construction (essentially post-authorization)	x			
Operation and Maintenance (including Major Rehabilitation)	x			

IMPACT MATRIX (Continued)

Item Affected	Degree of Problem Constraint			
	:Extreme	:Major	:Moderate	:Minor
<u>Geographic Applicability</u>				
Urban	x			
Rural	x			
Coastal (including Intracoastal Waterways)	x			
Inland Waters	x			
Great Lakes	x			
Other River Basin or Region (identify specifically; if essentially Corps-wide and solution would be applicable to at least 75% of CW field offices use the term "Corps-wide" for this item)				Corps- wide

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13. ABSTRACT The pilot study reported herein provided funding for partial operation of the Concrete Technology Information Analysis Center from May 1970 to April 1972. During this period many inquiries were received for service. The inquiries were classified as to source: Department of Defense, not Army; Department of Army, not Corps of Engineers; Corps of Engineers; U. S. Government, not DOD; U. S., private industry; U. S., universities; Foreign, Governmental; and Foreign, Nongovernmental. Examples of inquiries are given. Seven reports (CTIAC-1 through -7) were prepared. Four reports were in response to inquiries received, respectively, from a contractor on Air Force research; a contractor on a National Cooperative Highway Research Program project; a state Department of Transportation; and a state Institute of Marine Science. The other three were state-of-the-art reports initiated in-house on electron micrography, geologic-formation-matching grout and concrete, and stain removal from concrete. Mention is made of information analysis activity funded from other sources conducted in the field of concrete technology by U. S. Army Engineer Waterways Experiment Station. Suggestions are made for future activity of the CTIAC in support of the Corps of Engineers and the DOD.			

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