

PERSONAL SERVICE AGREEMENT

REG 2A REV 12/96 (Block No 6938-170-07)

PRINT OR TYPE

STATE OF CONNECTICUT
OFFICE OF THE STATE COMPTROLLER
ACCOUNTS PAYABLE DIVISION

4

PREPARE IN QUINPLICATE

THE STATE AGENCY AND THE CONTRACTOR AS LISTED BELOW HEREBY ENTER INTO AN AGREEMENT SUBJECT TO THE TERMS AND CONDITIONS STATED HEREIN AND / OR ATTACHED. THIS AGREEMENT IS SUBJECT TO THE PROVISIONS OF SECTION 4-98 OF THE CONNECTICUT GENERAL STATUTES AS APPLICABLE. THE ACCEPTANCE OF THIS CONTRACT IMPLIES CONFORMANCE WITH TERMS AND CONDITIONS STATED ON THE REVERSE SIDE OF PART 1.

(1) <input checked="" type="checkbox"/> ORIGINAL <input type="checkbox"/> AMENDMENT		(2) IDENTIFICATION NO. P.S. 5592
CONTRACTOR NAME University of Massachusetts Dartmouth	(4) ARE YOU PRESENTLY A STATE EMPLOYEE? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
CONTRACTOR ADDRESS Office of Grants and Contracts 285 Old Westport Road, North Dartmouth, MA 02747-2300		CONTRACTOR FEIN / SSN
STATE AGENCY CT Department of Transportation, 2800 Berlin Trpk., Newington, CT 06131-7546	(6) AGENCY NO. 5000	
CONTRACT PERIOD (7) DATE (FROM) 9/1/03 THROUGH (TO) 8/31/05	(8) INDICATE <input type="checkbox"/> MASTER AGREEMENT <input type="checkbox"/> CONTRACT AWARD NO 6.06-04(03) <input checked="" type="checkbox"/> NEITHER	
ANCELLATION CLAUSE	(9) REQUIRED NO. OF DAYS WRITTEN NOTICE SPECIFIED AT RIGHT. 60	

(10) CONTRACTOR AGREES TO (include special provisions - Attach additional blank sheets if necessary.)

Conduct a research study for NETC Project No. 02-1 entitled, "Relating Hot Mix Asphalt Pavement Density to Performance."

(See attached Proposal.)

(11) PAYMENT TO BE MADE UNDER THE FOLLOWING SCHEDULE UPON RECEIPT OF PROPERLY EXECUTED AND APPROVED INVOICES.

COST AND SCHEDULE OF PAYMENTS
Maximum payment not to exceed \$103,524 for contract period. Payment shall be in accordance with the provisions of Sections 2.(C), 3.(B), 3.(C) and 3.(D).

ACT CD	(13) DOC TYP	(14) COM TYP	(15) LSE. TYP.	(16) ORIG. AGENCY	(17) DOCUMENT NO	(18) COMMIT. AGENCY	(19) COMMIT. NO.	(20) VENDOR FEIN / SSN - SUFFIX		
				5400						
COMMITTED AMOUNT 103,524				OBLIGATED AMOUNT \$ 103,524		CONTRACT PERIOD (FROM / TO) 9/1/03 8/31/05				
LINE NO	(25) COMM LINE NO	(26) COMMITTED AMOUNT	(27) COMM. AGENCY	(28) COST CENTER		(29) OBJECT	AGENCY TAG			(33) F.Y.
				FUND	SID		(30) FUNCTION	(31) ACTIVITY	(32) EXTENSION	

Individual entering into a Personal Service Agreement with the State of Connecticut is contracting under a "work-for-hire" arrangement. As such, the individual is an independent contractor, and does not satisfy the characteristics of an employee under the common law rules for determining the employer/employee relationship of Internal Revenue Code section 3121(d). Individuals performing services as independent contractors are not employees of the State of Connecticut and are responsible themselves for payment of all State and local income taxes, federal income taxes and Federal Insurance Contribution Act (FICA) taxes.

ACCEPTANCES AND APPROVALS		(34) STATUTORY AUTHORITY ConnDOT 13b-4 and 13b-23
CONTRACTOR (OWNER OR AUTHORIZED SIGNATURE) <i>Deborah Marisi</i>	TITLE Deborah Marisi Director, Office of Grants & Contracts	DATE 8/24/03
AGENCY (AUTHORIZED OFFICIAL) <i>James M. Sime</i>	TITLE James M. Sime Manager of Research	DATE 8/18/03
OFFICE OF POLICY & MGMT., DEPT. OF ADMIN. SERV. <i>Will B. [Signature]</i>	TITLE Assoc. Atty. General	DATE 9/2/03
ATTORNEY GENERAL (APPROVED AS TO FORM) <i>Will B. [Signature]</i>	TITLE Assoc. Atty. General	DATE 9/2/03

EXECUTIVE ORDERS

This contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill promulgated June 16, 1971, and, as such, this contract may be canceled, terminated or suspended by the State Labor Commissioner for violation of or noncompliance with said Executive Order No. Three, or any state or federal law concerning nondiscrimination, notwithstanding that the Labor Commissioner is not a party to this contract. The parties to this contract, as part of the consideration hereof, agree that said Executive Order No. Three is incorporated herein by reference and made a part hereof. The parties agree to abide by said Executive Order and agree that the State Labor Commissioner shall have continuing jurisdiction in respect to contract performance in regard to nondiscrimination, until the contract is completed or terminated prior to completion. The contractor, as part consideration hereof, that this contract is subject to the Guidelines and Rules issued by the State Labor Commissioner to implement Executive Order No. Three, and that he will not discriminate in his employment practices or policies, will file all reports as required, and will fully cooperate with the State of Connecticut and the State Labor Commissioner. This contract is also subject to provisions of Executive Order No. Seventeen of Governor Thomas J. Meskill promulgated February 15, 1973, and, as such, this contract may be canceled, terminated or suspended by the contracting agency or the State Labor Commissioner for violation of or noncompliance with said Executive Order No. Seventeen, notwithstanding that the Labor Commissioner may not be a party to this contract. The parties to this contract, as part of the consideration hereof, agree that Executive Order No. Seventeen is incorporated herein by reference and made a part hereof. The parties agree to abide by said Executive Order and agree that the contracting agency and the State Labor Commissioner shall have joint and several continuing jurisdiction in respect to contract performance in regard to listing all employment openings with the Connecticut State Employment Service.

I. NON-DISCRIMINATION

(a) For the purposes of this section, "minority business enterprise" means any small contractor or supplier of materials fifty - one per cent or more of the capital stock, if any, or assets of which is owned by a person or persons: (1) who are active in the daily affairs of the enterprise; (2) who have the power to direct the management and policies of the enterprise; and (3) who are members of a minority, as such term is defined in subsection (a) of Conn. Gen. Stat. § 32-9n; and "good faith" means that degree of diligence which a reasonable person would exercise in the performance of legal duties and obligations. "Good faith efforts" shall include, but not be limited to, those reasonable initial efforts necessary to comply with statutory or regulatory requirements and additional or substituted efforts when it is determined that such initial efforts will not be sufficient to comply with such requirements.

For purposes of this Section, "Commission" means the Commission on Human Rights and Opportunities.

For purposes of this section, "Public works contract" means any agreement between any individual, firm or corporation and the state or any political subdivision of the state other than a municipality for construction, rehabilitation, conversion, extension, demolition or repair of a public building, highway or other changes or improvements in real property, or which is financed in whole or in part by the state, including but not limited to, matching expenditures, grants, loans, insurance or guarantees.

(b) (1) The Contractor agrees and warrants that in the performance of the contract such Contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation or physical disability, including, but not limited to, blindness, unless it is shown by such Contractor that such disability prevents performance of the work involved, in any manner prohibited by the laws of the United States or of the State of Connecticut. The Contractor further agrees to take affirmative action to insure that applicants with job related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, or physical disability, including, but not limited to, blindness, unless it is shown by the Contractor that such disability prevents performance of the work involved; (2) the Contractor agrees, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, to state that it is an "affirmative action - equal opportunity employer" in accordance with regulations adopted by the Commission; (3) the Contractor agrees to provide each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding and each vendor with which the Contractor has a contract or understanding, a notice to be provided by the Commission, advising the labor union or worker's representative of the Contractor's commitments under this section and to post copies of the notice in conspicuous places available to employees and applicants for employment; (4) the Contractor agrees to comply with each provision of this section and Conn. Gen. Stat. § 46a-56 and 46a-58e and 46a-58f and with each regulation or relevant order issued by said Commission pursuant to Conn. Gen. Stat. § 46a-56, 46a-58e and 46a-58f; (5) the Contractor agrees to provide the Commission on Human Rights and Opportunities with such information requested by the Commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the Contractor as relate to the provisions of this section and section 46a-56. If the Contract is a public works contract, the contractor agrees and warrants that he will make good faith efforts to employ minority business enterprises as subcontractors and suppliers of materials on such public works projects.

(c) Determination of the Contractor's good faith efforts shall include, but shall not be limited to the following factors: The Contractor's employment and subcontracting policies, patterns and practices; affirmative advertising, recruitment and training; technical assistance activities and such other reasonable activities or efforts as the Commission may prescribe that are designed to ensure the participation of minority business enterprises in public works projects.

(d) The Contractor shall develop and maintain adequate documentation, in a manner prescribed by the Commission, of its good faith efforts.

(e) The Contractor shall include the provisions of subsection (b) of this Section in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the State and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the Commission. The Contractor shall take such action with respect to any such subcontract or purchase order as the Commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with Conn. Gen. Stat. § 46a-56; provided, if such contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the Commission, the Contractor may request the State of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the State and the State may so enter.

(f) The Contractor agrees to comply with the regulations referred to in this Section as they exist on the date of this contract and as they may be adopted or amended from time to time during the term of this contract and any amendments thereto.

(g) The contractor agrees to the following provisions: The contractor agrees and warrants that in the performance of the agreement such contractor will not discriminate or permit discrimination against any person or group of persons on the grounds of sexual orientation, in any manner prohibited by the laws of the United States or of the state of Connecticut, and that employees are treated when employed without regard to their sexual orientation; the contractor agrees to provide each labor union or representative of workers with which such contractor has a collective bargaining agreement or other contract or understanding and each vendor with which such contractor has a contract or understanding, a notice to be provided by the commission on human rights and opportunities advising the labor union or workers' representative of the contractor's commitments under this section, and to post copies of the notice in conspicuous places available to employees and applicants for employment; the contractor agrees to comply with each provision of this section and with each regulation or relevant order issued by said commission pursuant to Section 46a-56 of the general statutes; the contractor agrees to provide the commission on human rights and opportunities with such information requested by the commission, and permit access to pertinent books, records and accounts, concerning the employment practices and procedures of the contractor which relate to the provisions of this section and section 46a-56 of the general statutes.

(h) The contractor shall include the provisions of the foregoing paragraph in every subcontract or purchase order entered into in order to fulfill any obligation of a contract with the state and such provisions shall be binding on a subcontractor, vendor or manufacturer unless exempted by regulations or orders of the commission. The contractor shall take such action with respect to any such subcontract or purchase order as the commission may direct as a means of enforcing such provisions including sanctions for noncompliance in accordance with section 46a-56 of the general statutes; provided, if such contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the commission, the contractor may request the state of Connecticut to enter into any such litigation or negotiation prior thereto to protect the interests of the state and the state may so enter.

INSURANCE

The contractor agrees that while performing services specified in this agreement that he shall carry sufficient insurance (liability and / or other) as applicable according to the nature of the service to be performed so as to "save harmless" the State of Connecticut from any insurable cause whatsoever. If requested, certificates of such insurance shall be filed with the contracting State agency prior to the performance of services.

STATE LIABILITY

The State of Connecticut shall assume no liability for payment for services under the terms of this agreement until the contractor is notified that this agreement has been accepted by the contracting agency and, if applicable, approved by the Office of Policy and Management (OPM) or the Department of Administrative Services (DAS) and by the Attorney General of the State of Connecticut.

**EXTRACT FROM THE RECORDS OF
UNIVERSITY OF MASSACHUSETTS**

Granting Authority to Execute Contracts and All Other Instruments

I, Barbara DeVico, Secretary to the Board of Trustees of the University of Massachusetts, do hereby certify that the following is a true and complete copy of a vote duly adopted by the Board of Trustees of the University of Massachusetts at a meeting duly called and held on the fifth day of February, nineteen hundred and ninety-seven at the University of Massachusetts, Chancellor's Conference Room, Boston, Massachusetts:

"Further, to affirm that, except as to matters governed by the University of Massachusetts Intellectual Property Policy (Doc. T96-040), the Treasurer of the University of Massachusetts or his designee shall be the sole contracting officer of the University with the Authority to execute all contract grants, restricted gifts (excluding endowments), and amendments thereto for sponsored programs in instruction, research, or public service, unless and until otherwise voted by the Board of Trustees."

I further certify that the Vice President for Management and Fiscal Affairs and Treasurer of the University, Stephen W. Lenhardt, has retained the right to remain the sole contracting officer of the University of Massachusetts, but in his absence, he has designated Philip J. Marquis, Assistant Vice President for Central Administrative Services and Associate Treasurer.

I further certify that effective August 23, 2002, the following is a list of designated individuals authorized in accordance with the aforereferenced votes to review and execute all grants and contracts for sponsored programs in instruction, research and public service that are applicable to and received on behalf of the University of Massachusetts for their respective campuses.

Amherst Campus

John V. Lombardi, Chancellor, Amherst Campus, Amherst, Massachusetts,
John Dubach, Deputy Chancellor, Amherst Campus, Amherst, Massachusetts,
Frederick W. Byron, Jr., Vice Chancellor for Research, Amherst Campus, Amherst, Massachusetts,
Bruce F. McCandless, Assistant Vice Chancellor for Research, Amherst Campus, Amherst, Massachusetts,
Carol P. Sprague, Director of the Office of Grants and Contracts Administration, Amherst Campus, Amherst, Massachusetts,
Jennifer A. Donais, Associate Director of Grants and Contracts Administration, Amherst Campus, Amherst, Massachusetts,
Harland Sturm, Interim Director, Division of Continuing Education and Public Service, Amherst Campus, Amherst, Massachusetts,
Laura J. Howard, Associate Director, Division of Continuing Education and Public Service, Amherst Campus, Amherst, Massachusetts

Boston Campus

Jo Ann Gora, Chancellor, Boston Campus, Boston, Massachusetts,
David J. MacKenzie, Vice Chancellor for Administration & Finance, Boston Campus, Boston, Massachusetts,
Paul O'Keefe, Director of Research & Sponsored Programs, Boston Campus, Boston, Massachusetts,
Stanley M. Bolotin, Director for Sponsored Programs Administration, Boston Campus, Boston, Massachusetts

Dartmouth Campus

Jean MacCormack, Chancellor, Dartmouth Campus, Dartmouth, Massachusetts,
Donald L. Zekan, Vice Chancellor for Administrative and Fiscal Services, Dartmouth Campus, Dartmouth, Massachusetts,

Thomas Curry, Vice Chancellor for Academic Affairs, University of Massachusetts, Dartmouth Campus, Dartmouth, Massachusetts,
William Mitchell, Associate Vice Chancellor of Finance, University of Massachusetts, Dartmouth Campus, Dartmouth, Massachusetts,
Jeffrey L. Robinson, Controller, Dartmouth Campus, Dartmouth, Massachusetts,
Deborah Marisi, Director of Grants & Contracts, University of Massachusetts, Dartmouth Campus, Dartmouth, Massachusetts

Lowell Campus

William T. Hogan, Chancellor, Lowell Campus, Lowell, Massachusetts,
Susan Goodwin, Vice Chancellor for Administration & Finance, Lowell Campus, Lowell, Massachusetts,
Louis Petrovic, Director of External Funding, Technology Transfer & Partnering, Lowell Campus, Lowell, Massachusetts,
Charles J. Gisondi, Comptroller, Lowell Campus, Lowell, Massachusetts,
Louise Griffin, Associate Director of External Funding, Technology Transfer & Partnering, Lowell Campus, Lowell, Massachusetts

President's Office

Tom Chmura, Vice President for Economic Development, President's Office, Boston, Massachusetts,
Lynn Griesmer, Associate Vice President for Economic Development and Executive Director for the Donahue Institute, President's Office, Boston, Massachusetts

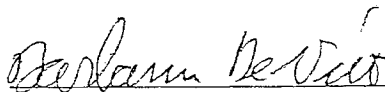
Worcester

Aaron Lazare, Chancellor, University of Massachusetts Medical School, Worcester, Massachusetts,
Richard Stanton, Deputy Chancellor for Finance and Administration, University of Massachusetts Medical School, Worcester, Massachusetts,
John L. Sullivan, Director, Office of Research, University of Massachusetts Medical School, Worcester, Massachusetts,
Sheila Noone, Director of Clinical Research, University of Massachusetts Medical School, Worcester, Massachusetts,
Elaine Zamarro, Manager, Office of Sponsored Programs, University of Massachusetts Medical School, Worcester, Massachusetts,
Joseph F. X. McGuirl, Executive Director, Office of Commercial Ventures and Intellectual Property, University of Massachusetts Medical School, Worcester, Massachusetts,
Patricia McNulty, Director of Sponsored Programs, University of Massachusetts Medical School, Worcester, Massachusetts

I further certify that Stephen W. Lenhardt, Philip J. Marquis, John V. Lombardi, John Dubach, Frederick W. Byron Jr., Bruce F. McCandless, Carol P. Sprague, Jennifer A. Donais, Harland Sturm, Laura J. Howard, Jo Ann Gora, David J. MacKenzie, Paul O'Keefe, Jean MacCormack, Donald L. Zekan, Thomas Curry, William Mitchell, Jeffrey L. Robinson, Deborah Marisi, William T. Hogan, Susan Goodwin, Louis Petrovic, Charles J. Gisondi, Louise Griffin, Tom Chmura, Lynn Griesmer, Aaron Lazare, Richard Stanton, John L. Sullivan, Sheila Noone, Elaine Zamarro, Joseph F.X. McGuirl and Patricia McNulty are members of the University Administration with its principal office located at One Beacon Street, Boston, County of Suffolk in the Commonwealth of Massachusetts.

Date

3/11/03



Barbara DeVico, Secretary to the Board of Trustees



NETC Agreement No. 6.06-04(03)

Research Agreement for NETC Project No. 02-1,

"Relating Hot Mix Asphalt Pavement Density to Performance"

THIS AGREEMENT, concluded at Newington, Connecticut, by and between the State of Connecticut, Department of Transportation, James F. Byrnes, Jr., Commissioner, acting herein by James M. Sime, Manager of Research, Bureau of Engineering and Highway Operations, duly authorized, hereinafter referred to as the "New England Transportation Consortium" or "NETC," and the University of Massachusetts Dartmouth, acting herein by Deborah Marisi, Director, Office of Grants and Contracts, hereunto duly authorized, hereinafter referred to as the University.

WITNESSETH THAT:

WHEREAS, the New England Transportation Consortium (NETC) is a joint undertaking through which the transportation agencies of the six (6) New England states pool their professional, academic and financial resources to focus on the research, development and implementation of improved methods for dealing with common problems associated with transportation systems; and,

WHEREAS, the State of Connecticut, Department of Transportation (ConnDOT), has been authorized as the lead agency for the NETC for the purposes of entering into and administering this Agreement; and,

WHEREAS, the Commissioner of ConnDOT is authorized to undertake the foregoing activities under Sections 13b-4 and 13b-23 of the General Statutes of Connecticut, as revised.

NOW, THEREFORE, KNOW YE THAT:

1. **THE UNIVERSITY AGREES TO:**

- (A) Perform the study, delineated in the attached Proposal and Work Plan, hereinafter called the "Proposal."
- (B) Provide NETC with seven (7) copies of quarterly progress reports which are to be received no later than three (3) working days after the end of each calendar year quarter.
- (C) Provide NETC with seven (7) copies of draft interim reports on specified tasks for review by NETC and the Federal Highway Administration (FHWA). Within ninety (90) calendar days after acceptance of the interim report(s) by NETC, subject to action on review commentary, one hundred and twenty (120) copies of the interim report(s) shall be furnished to NETC. A set of reproducibles, as well as an electronic ADOBE™ Portable Document Format (PDF) document, used in the preparation of the interim report(s), will be provided to NETC within thirty (30) calendar days after the interim report(s) is(are) delivered to NETC.
- (D) At the conclusion of the study, provide NETC with seven (7) copies of a draft of the final report, for review by NETC and FHWA. Within ninety (90) calendar days after acceptance of the draft final report by NETC, subject to action on review commentary, one hundred and twenty (120) copies of the final report shall be furnished to NETC. A set of reproducibles, as well as an electronic ADOBE™ Portable Document Format (PDF) document, used in the preparation of the final report, will be provided to NETC within thirty (30) calendar days after the final report is delivered to NETC.
- (E) Permit NETC and the FHWA to review, during normal business hours, all work performed under the terms of this Agreement at any stage of the work.
- (F) Attend conferences at locations designated by NETC for consultation and discussion upon request of NETC.
- (G) Submit properly executed vouchers on ConnDOT invoices (Service Transfer Invoice) for payment for a billing period not to exceed a calendar quarter.

The invoice shall indicate the total costs incurred for the billing period in accordance with the provisions of Section 2.(C)(1) herein. These vouchers shall be submitted, no later than forty-five (45) calendar days after the end of each billing period, to:

NETC Coordinator
Transportation Institute
U-37-TI
University of Connecticut
Storrs, CT 06269-3037.

- (H) Not sublet any portion of the work required for the completion of this Agreement without the prior written approval of NETC. The form of the Subcontractor's Agreement shall be as developed by the University and be subject to approval by NETC.
- (I) Maintain an accounting system that is adequate to segregate and accumulate reasonable, allocable and allowable costs and maintain accounts and records in accordance with generally accepted accounting principles consistently applied.
- (J) Recognize the authority for determining allowable costs under the Agreement to be OMB Circular A-21, "Cost Principles for Educational Institutions," OMB Circular A-110, "Grants and Agreements with Institutions of Higher Education, Hospitals and other Nonprofit Organizations," which are incorporated herein by reference.
- (K) Permit the authorized representatives of NETC, the United States Department of Transportation and the Comptroller General of the United States to perform an annual inspection and audit of all data and records of the University relating to its performance under this Agreement.
- (L) In the event that this Agreement is terminated under the provisions of Section 3.(E), the University shall permit the authorized representatives of NETC, the United States Department of Transportation, and the Comptroller General of the United States to inspect and audit all data and records of the University relating to its performance under this Agreement until the expiration of three (3) years after termination of this project under this Agreement.

The University further agrees to include in all its subcontracts hereunder a provision to the effect that the Subcontractor agrees that NETC, the United States Department of Transportation and the Comptroller General of the United States, or any of their duly authorized representatives, shall, until the expiration of three (3) years after termination of the project under the subcontract, have access to and the right to examine any directly pertinent books, documents, papers, and records of such Subcontractor, involving transactions related to the subcontract. The term "subcontract" as used in this clause excludes work not exceeding \$25,000.

The periods of access and examination described above, for records which relate to (1) appeals for disputes, (2) litigation of the settlement of claims arising out of the performance of this Agreement, or (3) costs and expenses of this Agreement as to which exception have been taken by NETC, the Comptroller General, or any of their duly authorized representatives, shall continue until such appeals, litigation, claims, or exceptions have been disposed of.

(M) Preserve all of its records and accounts concerning the implementation of this Agreement including, but not limited to, any records, books, or other documents relative to charges, including charges for Extra Work, alleged breaches of Agreement, settlement of claims, or any other matter involving the University's or Subcontractor's demand for compensation by NETC for a period of not less than three (3) years from the date of the termination of this project under this Agreement. If any litigation, claim, or audit is started before the expiration on the three (3) year period, the records shall be retained until all litigations, claims, or audit findings involving the records have been resolved.

(N) In the event that a transfer of funds between budget categories, contained in this Agreement, is required, the University may make cumulative transfers among direct cost categories of up to ten percent (10%) of the total approved budget, without approval of NETC. Larger changes require prior approval of NETC. In no case, however, will NETC be responsible for expenses in excess of the approved total amount.

2. ConnDOT, ON BEHALF OF NETC, AGREES TO:

- (A) Furnish the University copies of any data it may have in its possession such as, but not limited to, plans, maps, reports, aerial photos, data, publications, organizational arrangements, directives, computer tapes, etc., which the University may deem of value for use and analysis.
- (B) Arrange and hold conferences upon reasonable notice as may be necessary to the University's activities covered by this Agreement.
- (C) Pay the University, in accordance with the approved Proposal, for all work authorized by NETC and performed in accordance with the terms specified herein. The University may request partial payments for work performed. These requests for payment may be submitted for a billing period not to exceed a calendar quarter and shall be made on voucher forms supplied by ConnDOT on behalf of NETC. Partial payment will be made by ConnDOT, on behalf of NETC, on the following basis:
 - (1) Partial payments will be equal to one hundred percent (100%) of the University's costs incurred for each billing period, in conformance with the Budget contained in the Proposal, until the cumulative total amount invoiced equals 95% of the total of the Agreement value. If an invoice is submitted which results in the cumulative total amount invoiced exceeding 95% of the total Agreement value, ConnDOT shall withhold payment of that invoice and any further invoices, in accordance with the provisions of Section 2.(C)(3).
 - (2) ConnDOT, on behalf of NETC, agrees to pay the University an amount not to exceed the total amount of the Budget contained in the Proposal, for the contract period, established in accordance with the provisions of Sections 1.(A) and 3.(A).
 - (3) Final payment will be processed following completion of all services called for in the Agreement, as well as receipt of all

project deliverables. The final payment to the University shall include the amount invoiced for the final billing period plus any amount withheld on previous billings, in accordance with the provisions of Section 2.(C)(1).

3. NETC AND THE UNIVERSITY FURTHER MUTUALLY AGREE TO:

- (A) The term of this Agreement shall be from September 1, 2003, to August 31, 2005.
- (B) Payments to the University for work specified shall be based upon the following dated and signed certification: "The undersigned hereby certifies that payment of the sum claimed under the cited Agreement is proper and due and that information on the fiscal report is correct and such detailed supporting information is on file, available for certification and/or audit purposes, and that all services called for by the Agreement to the date of this billing, _____, have been met."

Date

Director or Appropriate

Title

Date

- (C) Payrolls shall be supported by time and attendance or equivalent records for individual employees. Salaries and wages of employees chargeable to more than one grant program or other cost objective will be supported by appropriate time distribution records. The method used shall conform with O.M.B. Circular A-21, "Cost Principles for Educational Institutions," and O.M.B. Circular A-110, "Grants and Agreements with Institutions of Higher Education, Hospitals and Other Nonprofit Organizations."
- (D) Specific Items Costs:
 - (1) Authorized reproduction and printing (including drafts of reports), will be paid for at cost as indicated by vouchers. All costs in connection

with obtaining data such as, but not limited to, plans, maps, reports, aerial photos, traffic data, publications, computer tapes, etc., will be paid for at cost.

- (2) Costs for all travel and subsistence between the University's offices, meetings as well as other trips necessary in connection with the study, will be reimbursed in accordance with the University's approved Travel Regulations and rates.
- (3) Any and all costs and expenses for work in connection with and pertinent to this Agreement as approved by NETC, will be paid for at cost.
- (4) Mainframe computer charges will be based on actual machine time, whether for running programs or de-bugging new programs, and will include the cost of operators and key punchers and supervisors. Charges for outside and University computers will be reimbursed at cost. Salaries for programmers will be reimbursed as other direct salaries.
- (5) For outside consulting services, required in and provided for in the project proposal, direct reimbursement will be paid the University by NETC. The Agreement between the University and the Consultant governing the Consultant services shall be approved by NETC prior to execution.
- (6) To the certified payroll may be added a percentage to cover fringe payroll costs for: F.I.C.A., Health Benefits, Retirement, Longevity, Vacation, Holiday, Sick Leave, etc. Reimbursement for fringe benefits and indirect costs will be based on the rates in effect at the time expenses are incurred. The base against which each rate is applied will be that specified in the University's current Indirect Cost Agreement.
- (7) All equipment purchased with project funds, as listed below, shall remain the property of NETC upon completion or termination of the study:

N/A.

All equipment not listed shall remain the property of the University upon completion or termination of the study.

(E) Termination of Work:

Either party may terminate a project Agreement upon sixty (60) days written notice to the other party. The University will immediately act to minimize project costs upon issuing or receiving such notice, and will submit to NETC a report describing all work completed to date. NETC will reimburse the University a percentage of the total project cost that is equal to the percentage of work completed. Upon receipt of written notification from either party that this Agreement is to be terminated, the University shall immediately cease operations on work stipulated in this Agreement and assemble all material that has been prepared, developed, furnished or obtained under the terms of this Agreement, that may be in its possession or custody and shall transmit the same to NETC on or before the sixtieth (60th) day following the receipt of the written notice of termination. Said material shall include, but not be limited to, documents, plans, computations, drawings, notes, records and correspondence.

(F) Time Extensions:

NETC may extend the completion dates beyond the period specified when the work has been delayed for reasons beyond the control of the University. The University may present to NETC, in writing, requests for extension of allotted time for completion of work. NETC will evaluate such requests and if NETC determines such requests are based on valid grounds, shall grant such extension of time for completion of the work as NETC deems warranted. All requests by the University for extension of time must be made ninety (90) days prior to the scheduled expiration date.

The University further agrees that no charges or claim for damages shall be made by it for any delays or hindrances from any cause whatsoever during the progress of any portion of the services specified in this Agreement. Such delays or hindrances, if any, shall be compensated for by an extension of time for such reasonable period as NETC may determine, it being understood, however, that the permitting of the University to proceed to complete any services or any part of them after the date of completion or after the date to

which time of completion may have been extended, shall in no way operate as a waiver on the part of NETC of any of its rights herein.

- (G) The title to all products of research generated under this Agreement shall reside with the University. However, the University grants to NETC member departments, the United States Government, and the general public, a non-exclusive, irrevocable, royalty-free, worldwide license in such work products to use, reproduce and prepare derivative works. The University may use any of the data, plans and reports completed under the NETC program for whatever purpose and may distribute products in any way. However, the following text must appear on the inside front of any reports or publications: "This report was prepared by the University of Massachusetts Dartmouth for six New England states (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont), in cooperation with the United States Department of Transportation, Federal Highway Administration. The opinions, findings and conclusions expressed in the publication are those of the author(s) and not necessarily those of the six New England States or the Federal Highway Administration. This publication is based upon publicly supported research and is copyrighted. It may be reproduced in part or in full, but it is requested that there be customary crediting of the source."

(H) Publication Provisions:

- (1) The University shall be free to copyright material developed under this Agreement with the provision that NETC and FHWA reserve a royalty-free, non-exclusive and irrevocable license to reproduce, publish, or otherwise use, and to authorize others to use the work for government purposes, as specified in Section 3.(G).
- (2) No reports, articles, papers or publications may be published by the University without the written authority of NETC except as provided for in the following items:
 - (a) All reports, articles, papers or publications shall contain the disclaimer: "This report [article, paper or publication], prepared in cooperation with the New England Transportation

Consortium, does not constitute a standard, specification or regulation. The contents of this report [article, paper or publication] reflect the views of the author(s) who is(are) responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the views of the New England Transportation Consortium or the Federal Highway Administration."

- (b) It is anticipated that, in addition to interim and final reports that may be specified in this project Agreement, the University may wish to publish papers or articles based, in whole or in part, on information developed under this project Agreement. The University shall have the right to so publish provided the manuscript is submitted to NETC for concurrence. NETC will have forty-five (45) calendar days to review the manuscript. If no response is provided by NETC at the end of the specified period, the University may proceed with publication. In the event of nonconcurrence by NETC, the University may publish the manuscript provided the following statement is included: "The New England Transportation Consortium and the Federal Highway Administration do not concur with the findings and conclusions of the manuscript."

(I) Federal Requirements:

The University shall comply with the Regulations of the United States Department of Transportation (Title 49, Code of Federal Regulations, Part 21), issued in implementation of Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 U.S.C. 2000d to 2000d-4, and Appendix CR attached hereto, both of which are hereby made a part of this Agreement.

(J) Patent Rights:

The terms "Invention" or "Discovery," as used herein mean any invention or discovery of the University conceived or first actually reduced to practice in the course of or under this Agreement, and includes any art, method, process,

machine or manufacture, design or composition thereof, or any variety of plant, which is or may be patentable under the Patent Laws of the United States of America or any foreign country.

23 CFR 420.121(j) of the "State Planning and Research Program Administration, Final Rule," and 37 CFR 401.14, "Standard Patent Rights Clauses," are herein by reference made part of this Agreement.

The quarterly report required in Section 1.(B) of this Agreement shall include disclosure of potentially patentable inventions or discoveries first conceived or reduced to practice since the prior report. The University shall have title to such inventions or discoveries. The University shall have the right to file patent applications on such inventions and discoveries. The University shall give written notice of its intention to file a patent application with respect to any such discovery or invention within sixty (60) days after disclosure to NETC. If the University becomes the owner of any patent with respect to any invention or discovery covered by this paragraph, it shall grant to NETC, its members and the Federal Government a paid-up, royalty-free, nonexclusive, irrevocable license, with the right to sublicense to practice or have practiced for or on the behalf of governmental agencies, either Federal, State, or municipal agencies including counties and townships, or quasi-governmental agencies, the patented invention or discovery. Any royalties from sales in the private sector or outside the United States shall be assigned to the University. With respect to inventions or discoveries covered by this paragraph which are not patented or patentable, such inventions or discoveries shall be jointly owned with each party having the unrestricted right to practice or have practiced the same on its behalf.

- (K) 37 CFR, Part 401, "Rights To Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," is herein by reference made part of this Agreement.
- (L) NETC assumes no liability for payment under the terms of a specific project Agreement until such Agreement has been approved and signed by both parties.
- (M) Funding:

The University shall fund all work conducted under this Agreement in the first instance and bill NETC for reimbursement. In no case will NETC be liable for reimbursement of project costs in excess of the amount specified in the project Agreement.

- (N) Schedule A is attached hereto and made a part of this Agreement hereof. To the extent permitted by law, NETC and each of the state universities which belong to NETC shall, as part consideration for the promises of the State, fully comply with each of the terms and conditions set forth within Schedule A. It is understood and agreed among the parties that nothing within this subparagraph of this Agreement may be construed as a waiver of or limitation upon the sovereign immunity, if any, of any of the state universities which belong to the NETC or the NETC membership itself.
- (O) It is mutually understood and agreed by the parties hereto that any official notice from one such party to the other such party (or parties), in order for such notice to be binding thereon, shall:
- (a.) be in writing addressed to:
- (i) when ConnDOT is to receive such notice -
Mr. James M. Sime
Manager of Research
Connecticut Department of Transportation
280 West Street
Rocky Hill, CT 06067; or,
 - (ii) when the University is to receive such notice -
Ms. Michelle Plaud
Assistant Director, Office of Grants and Contracts
University of Massachusetts Dartmouth
Office of Grants and Contracts
285 Old Westport Road
North Dartmouth, MA 02747-2300;

- (b.) be delivered in person or be mailed United States Postal Service - "Certified Mail" to the address recited herein as being the address of the party(ies) to receive such notice; and,
- (c.) contain complete and accurate information in sufficient detail to properly and adequately identify and describe the subject matter thereof.

The term "official notice" as used herein, shall be construed to include, but not be limited to, any request, demand, authorization, direction, waiver, and/or consent of the party(ies) as well as any document(s) provided, permitted, or required for the making or ratification of any change, revision, addition to or deletion from the document, contract, or agreement in which this "official notice" specification is contained.

Further, it is understood and agreed that nothing hereinabove contained shall preclude the parties hereto from subsequently agreeing, in writing, to designate alternate persons (by name, title, and affiliation) to which such notice(s) is (are) to be addressed; alternate means of conveying such notice(s) to the particular party(ies); and/or alternate locations to which the delivery of such notice(s) is (are) to be made, provided such subsequent agreement(s) is (are) concluded pursuant to the adherence to this specification.

- (P) Any standards (i.e., test methods, specifications, guidelines, suggested practices, recommended procedures, etc.) emanating from the research project shall be forwarded to the American Association of State Highway Transportation Officials (AASHTO) for consideration and possible adoption.

During the performance of this Agreement, the Second Party, for itself, its assignees and successors in interest agrees as follows:

(1) Compliance with Regulations: The Second Party shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the United States Department of Transportation, Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this Agreement.

(2) Nondiscrimination: The Second Party, with regard to the work performed by it during the Agreement, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Second Party shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the Agreement covers a program set forth in Appendix B of the Regulations.

(3) Solicitations for Subcontractors, Including Procurements of Materials

and Equipment: In all solicitations either by competitive bidding or negotiation made by the Second Party for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the Second Party of the Second Party's obligations under this Agreement and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

(4) Information and Reports: The Second Party shall provide all information and reports required by the Regulations, or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Connecticut Department of Transportation or the appropriate Federal Agency directly involved therewith, to be pertinent to ascertain compliance with such Regulations or directives. Where any information required of a Second Party is in the exclusive possession of another who fails or refuses to furnish this information, the Second Party shall so certify to the Connecticut Department of Transportation, or the appropriate Federal Agency directly involved therewith, if appropriate, and shall set forth what efforts it has made to obtain the information.

(5) Sanctions for Noncompliance: In the event of the Second Party's noncompliance with the nondiscrimination provisions of this Agreement, the Connecticut Department of Transportation shall impose such sanctions as it or the appropriate Federal Agency directly involved therewith, may determine to be appropriate, including, but not limited to:

- (a) withholding of payments to the Second Party under the Agreement until the Second Party complies, and/or
- (b) cancellation, termination or suspension of the Agreement, in whole or in part.

(6) Incorporation of Provisions: The Second Party shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The Second Party shall take such action with respect to any subcontract or procurement as the Connecticut Department of Transportation or the appropriate Federal Agency directly involved therewith, may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event a Second Party becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the Second Party may request the Connecticut Department of Transportation to enter into such litigation to protect the interests of the State of Connecticut, and in addition, the Second Party may request the United States to enter into such litigation to protect the interests of the United States.

SCHEDULE A

NETC AND THE UNIVERSITY MUTUALLY AGREE TO:

- (A) The University hereby acknowledges and agrees to comply with the Connecticut Required Contract/Agreement Provisions entitled, "Specific Equal Employment Opportunity Responsibilities," dated March 6, 1998, a copy of which is attached hereto and made a part hereof.
- (B) The University hereby acknowledges and agrees to comply with the policies enumerated in "Connecticut Department of Transportation Policy Statement No. ADMIN. - 10 Subject: Code of Ethics Policy," dated March 25, 1999, a copy of which is attached hereto and made a part hereof.

The University shall comply with the provisions contained in Section 1-86e of the Connecticut General Statutes, which provides as follows:

- a. No person hired by the State as a contractor or independent contractor shall:
 - 1. Use the authority provided to the person under the contract, or any confidential information acquired in the performance of the contract, to obtain financial gain for the person, and employee of the person or a member of the immediate family of any such person or employee;
 - 2. Accept another State contract which would impair the independent judgment of the person in the performance of the existing contract; or,
 - 3. Accept anything of value based on an understanding that the actions of the person on behalf of the State would be influenced.
- b. No person shall give anything of value to a person hired by the State as a contractor or independent contractor based on

an understanding that the actions of the contractor or independent contractor on behalf of the State would be influenced.

- (C) The University agrees that the attached "Policy Statement, Policy No. ADMIN. - 19, May 12, 2003, Subject: Policy on Disadvantaged Business Enterprise Program," is hereby made a part of this Agreement. The State advises the University that failure to carry out the requirements set forth in this Policy Statement shall constitute a breach of contract and may result in termination of this Agreement by the State or such remedy as the State deems appropriate.

The University shall comply with this provision in accordance with the "Agreements With Goals Special Provisions Disadvantaged Business Enterprises as Subcontractors and Material Suppliers or Manufacturers For Federal Funded Projects," dated October 16, 2000, attached hereto and hereby made a part of this Agreement.

- (D) The University hereby acknowledges and agrees to comply with the policies enumerated in Administrative Memorandum No. 104, dated August 28, 1984, Re: "Procurement and Property Management of Equipment Purchased by Construction Inspection Consultant Engineers."
- (E) The University hereby acknowledges and agrees to comply with Chapter 219 of the Connecticut General Statutes pertaining to tangible personal property or services rendered that is/are subject to sales tax. The attached copy of the "Governmental Agency Exemption Certificate" is hereby made a part hereof.
- (F) Suspended or debarred University suppliers, materialmen, lessors or other vendors may not submit proposals for a State contract or subcontract during the period of suspension or debarment

regardless of their anticipated status at the time of contract award or commencement of work.

(1) The signature on the Agreement by the University shall constitute certification that to the best of its knowledge and belief the University or any person associated therewith in the capacity of owner, partner, director, officer, principal investigator, project director, manager, auditor or any position involving the administration of Federal or State Funds:

(a.) Is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(b.) Has not within a three (3) year period preceding this Agreement been convicted of or had a civil judgment rendered against him/her for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction, violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

(c.) Is not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b.) of this certification and,

(d.) Has not within a three (3) year period preceding this Agreement had one or more public transactions

(Federal, State or local) terminated for cause or default.

(2) Where the University is unable to certify to any of the statements in this certification, such University shall attach an explanation to this Agreement.

(G) The University agrees to insure that the following certification be included in each subcontract Agreement to which it is a party, and further, to require said certification to be included in any lower tier subcontracts and purchase orders:

(1) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

(H) This clause applies to those University who are or will be responsible for compliance with the terms of the Americans with Disabilities Act of 1990 ("Act"), Public Law 101-336, during the term of the Agreement. The University represents that it is familiar with the terms of this Act and that it is in compliance with the Act. Failure of the University to satisfy this standard as the same applies to performance under this Agreement, either now or during the term of the Agreement as it may be amended, will render the Agreement voidable at the option of the State upon notice to the University. The University warrants that it will hold the State harmless and indemnify the State from any liability which may be imposed upon the State from any liability which may

be imposed upon the State as a result of any failure of the University to be in compliance with this Act, as the same applies to performance under the Agreement.

- (I) The term "date data" as used herein shall mean any program function that utilizes data or input which includes an indication of or reference to the date. The University represents that any hardware, software, data in a computer format and/or firmware [hereinafter referred to as "product(s)"] delivered to or developed for the State shall be capable of accurately processing (including, but not limited to, calculating, comparing and sequencing) date data from, into and/or between the twentieth and twenty-first centuries, including leap year calculations, when used in accordance with the purpose for which the State intends to use the product(s). Such processing shall employ an expanded character format using at least eight digits in the date fields, but shall not be based upon a sliding scale format or increase the processing time of the product(s). The accurate processing of date data by such product(s) from, into and/or between the twentieth and twenty-first centuries, including leap year calculations, shall hereinafter be referred to collectively as "Year 2000 compliant." In addition, said product(s) delivered to or developed for the State shall be capable of accurately processing date data throughout the twenty-first century, as well as from, into and/or between centuries.

- (J) Violence in the Workplace Prevention:

This contract is subject to the provisions of Executive Order No. 16 of Governor John G. Rowland, promulgated August 4, 1999 and, as such, the contract may be cancelled, terminated or suspended by the state for violation of or noncompliance with said Executive Order No. 16. The parties to this contract, as part of the consideration hereof, agree that said Executive Order No. 16 is

incorporated herein by reference and made a part hereof. The parties agree to abide by such Executive Order.

STATE OF CONNECTICUT
BY HIS EXCELLENCY
THOMAS J. MESKILL
GOVERNOR
EXECUTIVE ORDER NO. THREE

WHEREAS, sections 4-61d (b) and 4-114a of the 1969 supplement to the general statutes require nondiscrimination clauses in state contracts and subcontracts for construction on public buildings, other public works and goods and services and

WHEREAS, section 4-61e (c) of the 1969 supplement to the general statutes requires the labor department to encourage and enforce compliance with this policy by both employers and labor unions, and to promote equal employment opportunities, and

WHEREAS, the government of this state recognizes the duty and desirability of its leadership in providing equal employment opportunity, by implementing these laws,

NOW, THEREFORE, I, THOMAS J. MESKILL, Governor of the State of Connecticut, acting by virtue of the authority vested in me under section twelve of article fourth of the constitution of the state, as supplemented by section 3-1 of the general statutes, do hereby ORDER and DIRECT, as follows, by this Executive Order:

I

The labor commissioner shall be responsible for the administration of this Order and shall adopt such regulations as he deems necessary and appropriate to achieve the purposes of this Order. Upon the promulgation of this Order, the commissioner of finance and control shall issue a directive forthwith to all state agencies, that henceforth all state contracts and subcontracts for construction on public buildings, other public works and goods and services shall contain a provision rendering such contract or subcontract subject to this Order, and that such contract or subcontract may be cancelled, terminated or suspended by the labor commissioner for violation of or noncompliance with this Order or state or federal laws concerning nondiscrimination, notwithstanding that the labor commissioner is not a party to such contract or subcontract.

II

Each contractor having a contract containing the provisions prescribed in section 4-114a of the 1969 supplement to the general statutes, shall file, and shall cause each of his subcontractors to file, compliance reports with the contracting agency or the labor commissioner, as may be directed. Such reports shall be filed within such times and shall contain such information as to employment policies and statistics of the contractor and each subcontractor, and shall be in such form as the labor commissioner may prescribe. Bidders or prospective contractors or subcontractors may be required to state whether they have participated in any previous contract subject to the provisions of this Order or any preceding similar Order, and in that event to submit on behalf of themselves and their proposed subcontractors compliance reports prior to or as an initial part of their bid or negotiation of a contract.

III

Whenever the contractor or subcontractor has a collective bargaining agreement or other contract or understanding with a labor organization or employment agency as defined in section 31-122 of the general statutes, the compliance report shall identify the said organization or agency and the contracting agency or the labor commissioner may require a compliance report to be filed with the contracting agency or the labor commissioner, as may be directed, by such organization or agency, signed by an authorized officer or agent of such organization or agency, with supporting information, to the effect that the signer's practices and policies, including but not limited to matters concerning personnel, training, apprenticeship, membership, grievance and representation, and upgrading, do not discriminate on grounds of race, color, religious creed, age, sex, or national origin, or ancestry of any individual, and that the signer will either affirmatively cooperate in the implementation of the policy and provisions of this Order, or that it consents and agrees that recruitment, employment and the terms and conditions of employment under the proposed contract shall be in accordance with the purposes and provisions of the Order.

IV

The labor commissioner may by regulation exempt certain classes of contracts, subcontracts or purchase order from the implementation of this Order, for standard commercial supplies or raw materials, for less than specified amounts of money or numbers of workers or for subcontractors below a specified tier. The labor commissioner may also provide by regulation for the exemption of facilities of a contractor which are in all respects separate and distinct from activities of the contractor related to the performance of the state contract, provided only that such exemption will not interfere with or impede the implementation of this Order, and provided further, that in the absence of such an exemption, all facilities shall be covered by the provisions of this Order.

V

Each contracting agency shall be primarily responsible for obtaining compliance with the regulations of the labor commissioner with respect to contracts entered into by such agency or its contractors. All contracting agencies shall comply with the regulations of the labor commissioner in discharging their primary responsibility for securing compliance with the provisions of contracts and otherwise with the terms of this Order and of the regulations of the labor commissioner issued pursuant to this Order. They are directed to cooperate with the labor commissioner and to furnish the labor commissioner such information and assistance as he may require in the performance of his functions under this Order. They are further directed to appoint or designate from among the personnel of each agency, compliance officers, whose duty shall be to seek compliance with the objectives of this Order by conference, conciliation, mediation, or persuasion.

VI

The labor commissioner may investigate the employment practices and procedures of any state contractor or subcontractor and the practices and policies of any labor organization or employment agency hereinabove described, relating to employment under the state contract, as concerns nondiscrimination by such organization or agency as hereinabove described, or the labor commissioner may initiate such investigation by the appropriate contract agency, to determine whether or not the contractual provisions hereinabove specified or statutes of the state respecting them have been violated. Such investigation shall be conducted in accordance with the procedures established by the labor commissioner and the investigating agency shall report to the labor commissioner any action taken or recommended.

VII

The labor commissioner shall receive and investigate or cause to be investigated complaints by employees or prospective employees of a state contractor or subcontractor or members or applicants for membership or apprenticeship or training in a labor organization or employment agency hereinabove described, which allege discrimination contrary to the contractual provisions specified hereinabove or state statutes requiring nondiscrimination in employment opportunity. If this investigation is conducted for the labor commissioner by a contracting agency, that agency shall report to the labor commissioner what action has been taken or is recommended with regard to such complaints.

VIII

The labor commissioner shall use his best efforts, directly and through contracting agencies, other interested federal, state and local agencies, contractors and all other available instrumentalities, including the commission on human rights and opportunities, the executive committee on human rights and opportunities, and the apprenticeship council under its mandate to provide advice and counsel to the labor commissioner in providing equal employment opportunities to all apprentices and to provide training, employment and upgrading opportunities for disadvantaged workers, in accordance with section 31-51 (d) of the 1969 supplement to the general statutes, to cause any labor organization or any employment agency whose members are engaged in work under government contracts or referring workers or providing or supervising apprenticeship or training for or in the course of work under a state contract or subcontract to cooperate in the implementation of the purposes of this Order. The labor commissioner shall in appropriate cases notify the commission on human rights and opportunities or other appropriate state or federal agencies whenever it has reason to believe that the practices of any such organization or agency violate equal employment requirements or state or federal law.

IX

The labor commissioner or any agency officer or employee in the executive branch designated by regulation of the labor commissioner may hold such hearings, public or private, as the labor commissioner may deem advisable for compliance, enforcement or educational purposes under this Order.

X

(a) The labor commissioner may hold or cause to be held hearings, prior to imposing ordering or recommending the imposition of penalties and sanctions under this Order. No order for disbarment of any contractor from further state contracts shall be made without affording the contractor an opportunity for a hearing. In accordance with such regulations as the labor commissioner may adopt, the commissioner or the appropriate contracting agency may

- (1) Publish or cause to be published the names of contractors or labor organizations or employment agencies as hereinabove described which it has concluded have complied or failed to comply with the provisions of this Order or the regulations of the labor commissioner in implementing this Order.
- (2) Recommend to the commission on human rights and opportunities that in cases in which there is substantial or material violation or threat thereof of the contractual provision or related state statutes concerned herein, appropriate proceedings be brought to enforce them, including proceedings by the commission on its own motion under chapter 563 of the general statutes and the enjoining, within the limitations of applicable law, of organizations, individuals or groups who prevent directly or indirectly or seek to prevent directly or indirectly compliance with the provisions of this Order.
- (3) Recommend that criminal proceedings be brought under chapter 939 of the general statutes.
- (4) Cancel, terminate, suspend or cause to be cancelled, terminated, or suspended in accordance with law any contract or any portion or portions thereof for failure of the contractor or subcontractor to comply with the nondiscrimination provisions of the contract. Contracts may be cancelled, terminated, suspended absolutely or their continuance conditioned upon a program for future compliance approved by the contracting agency.
- (5) Provide that any contracting agency shall refrain from entering into any further contracts or extensions or modifications of existing contracts with any contractor until he has satisfied the labor commissioner that he has established and will carry out personnel and employment policies compliant with this Order.
- (6) Under regulations prescribed by the labor commissioner each contracting agency shall make reasonable efforts within a reasonable period of time to secure compliance with the contract provisions of this Order by methods of conference, conciliation, mediation or persuasion, before other proceedings shall be instituted under this Order or before a state contract shall be cancelled or terminated in whole or in part for failure of the contractor or subcontractor to comply with the contract provisions of state statute and this Order.

(b) Any contracting agency taking any action authorized by this Order, whether on its own motion or as directed by the labor commissioner or pursuant to his regulations shall promptly notify him of such action. Whenever the labor commissioner makes a determination under this Order, he shall promptly notify the appropriate contracting agency and other interested federal, state and local agencies of the action recommended. The state and local agency or agencies shall take such action and shall report the results thereof to the labor commissioner within such time as he shall specify.

XI

If the labor commissioner shall so direct, contracting agencies shall not enter into contracts with any bidder or prospective contractor unless he has satisfactorily complied with the provisions of this Order, or submits a program for compliance acceptable to the labor commissioner, or if the labor commissioner so authorizes, to the contracting agency.

XII

Whenever a contracting agency cancels or terminates a contract, or a contractor has been disbarred from further government contracts because of noncompliance with the contract provisions with regard to nondiscrimination, the labor commissioner or the contracting agency shall rescind such disbarment, upon the satisfaction of the labor commissioner that the contractor has purged himself of such noncompliance and will thenceforth carry out personnel and employment policies of non-discrimination in compliance with the provision of this Order.

XIII

The labor commissioner may delegate to any officer, agency or employee in the executive branch any function or duty of the labor commissioner under this Order except authority to promulgate regulations of a general nature.

XIV

This Executive Order supplements the Executive Order issued on September 28, 1967. All regulations, orders, instructions, designations and other directives issued heretofore in these premises, including those issued by the heads of various departments or agencies under or pursuant to prior order or statute, shall remain in full force and effect, unless and until revoked or superseded by appropriate authority, to the extent that they are not inconsistent with this Order.

This Order shall become effective thirty days after the date of this Order.

Dated at Hartford, Connecticut, this 16th day of June, 1971.


GOVERNOR

GUIDELINES AND RULES
OF STATE LABOR COMMISSIONER
IMPLEMENTING GOVERNOR'S EXECUTIVE
ORDER NO. THREE

SEC. 1. PERSONS AND FIRMS SUBJECT TO EXECUTIVE ORDER NO. THREE AND GUIDELINES AND RULES.

a. Every contractor, or subcontractor as defined in Sec. 2 hereof, supplier of goods or services, vendor, bidder and prospective contractor or subcontractor, having ten or more employees as defined in Sec. 3 of these Guidelines, having or entering into or bidding to enter into any type of contractual relationship with the State of Connecticut or any of its agencies, boards, commissions, departments or officers, and if the consideration, cost, subject matter or value of the goods or services exceeds \$5,000.00, shall be subject to the Governor's Executive Order No. Three and these Guidelines and Rules.

b. A copy of the Governor's Executive Order No. Three and of these Guidelines and Rules shall be available to each said contractor, subcontractor, supplier, vendor, bidder and prospective contractor and subcontractor, and the said Executive Order No. Three and these Guidelines and Rules shall be incorporated by reference and made a part of the contract, purchase order, agreement or document concerned. A copy of the Executive Order and of these Guidelines and Rules shall be furnished to a contracting party or bidder on request.

c. All persons, partnerships, associations, firms, corporations and other entities having less than ten employees as defined in Sec. 3 at the time of the bid and execution of the contract and continuing through the performance of the contract are exempt from the provisions of the said Executive Order and these Guidelines and Rules. All contracts, subcontracts, purchase orders and agreements wherein the consideration is \$5,000.00 or less shall be exempt from Executive Order No. Three and from these Guidelines and Rules.

SEC. 2. SUBCONTRACTORS.

As used herein, subcontractors are persons, partnerships, associations, firms or corporations or other entities having contractual relationship with a contractor who in turn has a contract with the State of Connecticut or any of its agencies, boards, commissions or departments. Subcontractors below this tier are exempt from the Executive Order and from these Guidelines and Rules.

SEC. 3 EMPLOYEES.

As used herein, employees are persons working full or part-time irrespective of personnel classification whose wages, salaries, or earnings are subject to the Federal Insurance Contribution Act and/or to Federal Withholding Tax as a matter of law (whether in fact or not any actual withholding occurs in a given case), in an employee-employer relationship at the time of bid, contract execution, or offer or acceptance, and/or during any time thereafter during the existence of the performance period of the contract to the conclusion thereof.

SEC. 4. REPORTS.

a. Prior to the execution of the contract or prior to acceptance of a bid, as the case may be, the contractor, subcontractor, bidder or vendor shall file a report with the State Labor Commissioner, which report shall be complete and contain all of the information therein prescribed. The report shall be on Form E.O. 3-1, a facsimile of which is attached hereto and made a part hereof, or in lieu thereof the contractor, subcontractor, bidder or vendor shall submit a detailed report containing all of the information required in Form E.O. 3-1.

b. The Labor Commissioner may require the filing of additional reports prior to final payment or prior to any renewal or extension of the contract and during the duration of the contract at such times as the Commissioner may, in his discretion, from time to time deem necessary. The Labor Commissioner may require the filing of additional information or reports, and the contractor, subcontractor, bidder or vendor shall furnish said information or reports within the times prescribed by the Labor Commissioner.

c. The Labor Commissioner may, at his discretion, also require timely statistical reports on the number of minority employees employed or to be employed in the performance of the contract, and the Labor Commissioner may define such minority groups or persons.

d. Reports filed pursuant to these Guidelines and Rules in implementation of Executive Order No. Three are not public records subject to public inspection, but may be inspected only by federal and state officials having jurisdiction and authority to investigate matters of this type. All federal and state agencies empowered by law to investigate matters relating to Executive order No. Three shall have access to these reports for inspection or copying during regular business hours.

e. Any person who wilfully, wantonly or through negligence destroys or permits to be destroyed, alters or allows to be altered after filing, any reports submitted in compliance herewith shall be subject to penalties as prescribed by law.

SEC. 5. MANDATORY CLAUSES IN DOCUMENTS.

a. All contracts shall contain the following provisions verbatim:

This contract is subject to the provisions of Executive Order No. Three of Governor Thomas J. Meskill promulgated June 16, 1971 and, as such, this contract may be cancelled, terminated or suspended by the state labor commissioner for violation of or noncompliance with said Executive Order No. Three, or any state or federal law concerning nondiscrimination, notwithstanding that the labor commissioner is not a party to this contract. The parties to this contract, as part of the consideration hereof, agree that said Executive Order No. Three is incorporated herein by reference and made a part hereof. The parties agree to abide by said Executive Order and agree that the state labor commissioner shall have continuing jurisdiction in respect to contract performance in regard to nondiscrimination, until the contract is completed or terminated prior to completion.

The (contractor), (subcontractor), (bidder), (vendor) agrees, as part consideration hereof, that this (order) (contract) is subject to the Guidelines and Rules issued by the state labor commissioner to implement Executive Order No. Three, and that he will not discriminate in his employment practices or policies, will file all reports as required, and will fully cooperate with the State of Connecticut and the state labor commissioner.

These provisions are in addition to and not in lieu of other clauses required by law.*

* N.B. The above paragraphs contain requirements additional to those set forth in July 16, 1971 directive to state agencies.

b. Every purchase order or like form submitted by a vendor or bidder, as applicable shall contain the following clause verbatim:

Vendor agrees, as part of the consideration hereof, that this order is subject to the provisions of Executive Order No. Three and the Guidelines and Rules issued by the Labor Commissioner implementing said Order as to nondiscrimination, and vendor agrees to comply therewith.

c. Where preprinted contract forms have been prescribed by federal authority and the rules of the federal agency prohibit the alteration thereof, the compliance officer of the State agency concerned shall submit to the Labor Commissioner a suggested short form or addendum acceptable to the federal agency, and in such cases, after approval by the Labor Commissioner, said clause may be substituted.

SEC. 6. COOPERATION OF STATE AGENCIES, BOARDS AND COMMISSIONS.

Every agency, board, commission and department of the State of Connecticut shall cooperate with the Labor Commissioner in the implementation of Executive Order No. Three and shall furnish such information and assistance as the Labor Commissioner may from time to time request.

SEC. 7. INVESTIGATIONS, COMPLAINTS.

The Labor Commissioner may initiate an investigation upon receipt of a complaint alleging discrimination. The Labor Commissioner may request that an investigation be conducted by the State agency which is the party to the contract in question. Investigations shall be conducted in accordance with acceptable legal standards, safeguarding the rights of all parties involved, and obtaining all of the relevant facts necessary for a complete determination of the issues. If the Labor Commissioner is not satisfied with the investigation or any part thereof he may order it to continue or to proceed further.

SEC. 8. HEARINGS.

The Labor Commissioner or officers designated by the heads of the State agencies, boards and commissions may conduct hearings on complaints filed. Hearings shall be held only after a report of the complaint has been filed with the Labor Commissioner and after a hearing on the complaint has been authorized or directed by the Labor Commissioner. Hearings shall be conducted in accordance with the accepted principles of administrative law. All parties shall be afforded the opportunity to a full, fair, impartial and complete hearing, the opportunity to examine and cross examine witnesses and to be present at all sessions of the hearing. If any party is vulnerable to a charge of a violation of the law, he shall be afforded the opportunity to procure counsel who may be present at the hearing.

SEC. 9. EQUAL EMPLOYMENT OPPORTUNITIES.

All State contracting agencies, employers, and labor unions shall use their best efforts to provide equal employment opportunities to all apprentices and to provide training, employment and upgrading opportunities for disadvantaged workers in accordance with section 31-51(d) of the General Statutes.

SEC. 10. DUTIES OF CONTRACTING AGENCIES.

All State contracting agencies shall be responsible for compliance with said Executive Order and with all state and federal laws relating to equal employment opportunities. All contracting agencies conducting investigations for the Labor Commissioner pursuant to Executive Order No. Three and these Guidelines and Rules shall report to the Labor Commissioner the action taken or recommended with regard to each complaint filed. Each officer of the executive department, every commissioner, and each executive head of each State agency, board and commission in the executive branch of the State government is expected to assume the responsibility of seeing to complete compliance with the Governor's Executive Order No. Three and shall forthwith take steps to assure and guarantee that there shall be no discrimination within their departments, agencies, boards or commissions in the performance of any state contract or subcontract on the basis of race, creed, color, sex, age, national origin or national ancestry, or in any way in violation of any state or federal law relating thereto.

BY VIRTUE OF THE AUTHORITY VESTED IN ME PURSUANT TO EXECUTIVE ORDER NO THREE EFFECTIVE JULY 16, 1971, AND THE GENERAL STATUTES OF CONNECTICUT

Dated at Wethersfield, Connecticut this 19th day of Nov., 1971.

Jack A. Fusari
JACK A. FUSARI
LABOR COMMISSIONER

STATE OF CONNECTICUT

BY HIS EXCELLENCY
THOMAS J. MESKILL

GOVERNOR

EXECUTIVE ORDER NO. SEVENTEEN

WHEREAS, Section 31-237 of the General Statutes of Connecticut as amended requires the maintaining of the established free services of the Connecticut State Employment Service to both employers and prospective employees and

WHEREAS, Section 31-5 of the General Statutes of Connecticut requires that no compensation or fee shall be charged or received directly or indirectly for the services of the Connecticut State Employment Service and

WHEREAS, large numbers of our citizens who have served in the Armed Forces of our nation are returning to civilian life in our state and seeking employment in civilian occupations and

WHEREAS, we owe a duty as well as gratitude to these returning veterans including the duty to find suitable employment for them and

WHEREAS, many of our handicapped citizens are fully capable of employment and are entitled to be placed in suitable employment and

WHEREAS, many of the citizens of our state who are unemployed are unaware of the job openings and employment opportunities which do in fact exist in our state and

WHEREAS, notwithstanding the free services of the Connecticut State Employment Service, many of our Connecticut employers do not use its free services or do not avail themselves fully of all of the services offered.

NOW, THEREFORE, I, THOMAS J. MESKILL, Governor of the State of Connecticut, acting by virtue of the authority vested in me under the fourth article of the Constitution of the State and in accordance with Section 3-1 of the General Statutes, do hereby ORDER and DIRECT, as follows, by this Executive Order:

I

The Labor Commissioner shall be responsible for the administration of this Order and shall do all acts necessary and appropriate to achieve its purpose. Upon promulgation of this Order, the Commissioner of Finance and Control shall issue a directive forthwith to all state agencies that henceforth all state contracts and subcontracts for construction on public buildings, other public works and goods and services shall contain a provision rendering such contract or subcontract subject to this Order, and that such contract or subcontract may be cancelled, terminated or suspended by the Labor Commissioner for violation of or noncompliance with this Order, notwithstanding that the Labor Commissioner is not a party to such contract or subcontract.

II

Every contractor and subcontractor having a contract with the state or any of its agencies, boards, commissions, or departments, every individual partnership, corporation, or business entity having business with the state or who or which seeks to do business with the state, and every bidder or prospective bidder who submits a bid or replies to an invitation to bid on any state contract shall list all employment openings with the office of the Connecticut State Employment Service in the area where the work is to be performed or where the services are to be rendered.

III

All state contracts shall contain a clause which shall be a condition of the contract that the contractor and any subcontractor holding a contract directly under the contractor shall list all employment openings with the Connecticut State Employment Service. The Labor Commissioner may allow exceptions to listings of employment openings which the contractor proposes to fill from within its organization from employees on the rolls of the contractor on the date of publication of the invitation to bid or the date on which the public announcement was published or promulgated advising of the program concerned.

IV

Each contracting agency of the state shall be primarily responsible for obtaining compliance with this Executive Order. Each contracting agency shall appoint or designate from among its personnel one or more persons who shall be responsible for compliance with the objectives of this Order.

V

The Labor Commissioner shall be and is hereby empowered to inspect the books, records, payroll and personnel data of each individual or business entity subject to this Executive Order and may hold hearings or conferences, formal or informal, in pursuance of the duties and responsibilities hereunto delegated to the Labor Commissioner.

VI

The Labor Commissioner or any agency officer or employee in the executive branch designated by regulation of the Labor Commissioner may hold such hearings, public or private, as the Labor Commissioner may deem advisable for compliance, enforcement or educational purposes under this Order.

VII

(a) The Labor Commissioner may hold or cause to be held hearings, prior to imposing, ordering, or recommending the imposition of penalties and sanctions under this Order. In accordance herewith, the Commissioner or the appropriate contracting agency may suspend, cancel, terminate, or cause to be suspended, cancelled, or terminated in accordance with law any contract or any portion or portions thereof for failure of the contractor or subcontractor to comply with the listing provisions of the contract. Contracts may be cancelled, terminated, suspended absolutely or their continuance conditioned upon a program for future compliance approved by the contracting agency.

(b) Any contracting agency taking any action authorized by this Order, whether on its own motion or as directed by the Labor Commissioner, shall promptly notify him of such action. Whenever the Labor Commissioner makes a determination under this Order, he shall promptly notify the appropriate contracting agency of the action recommended. The agency shall report the results to the Labor Commissioner promptly.

VIII

If the Labor Commissioner shall so direct, contracting agencies shall not enter into contracts with any bidder or prospective contractor unless he has satisfactorily complied with the provisions of this Order.

This Order shall become effective sixty days after the date of this Order.

Dated at Hartford, Connecticut, this 15th day of February, 1973.


GOVERNOR

CONNECTICUT REQUIRED CONTRACT/AGREEMENT PROVISIONS
March 6, 1998

Specific Equal Employment Opportunity Responsibilities

1. General

- A. Equal Employment Opportunity Requirements not to discriminate and to take affirmative action to assure equal employment opportunity as required by Executive Order 11246, Executive Order 11375, the Railroad Revitalization and Regulatory Reform Act of 1976 and other U.S. Department of Transportation nondiscrimination legislation are set forth in this Required Contract/Agreement Provision. The requirements set forth in these special provisions shall constitute the specific affirmative action requirements for project activities under this contract (or agreement) and supplement the equal employment opportunity requirements set forth in other related contract provisions.
- B. "Company" refers to any entity doing business with the Connecticut Department of Transportation and includes but is not limited to the following:
- | | |
|----------------|-------------------------------------------|
| Contractors | Vendors (where applicable) |
| Subcontractors | Suppliers of Materials (where applicable) |
| Consultants | Municipalities (where applicable) |
| Subconsultants | Utilities (where applicable) |
- C. The Company will work with the Connecticut Department of Transportation and the federal government in carrying out equal employment opportunity obligations and in their review of his/her activities under the contract or agreement.
- D. The Company and all their subcontractors or subconsultants holding subcontracts or subagreements of \$10,000 or more on federally-assisted projects and \$5,000 or more on state funded projects, will comply with the following minimum specific requirement activities of equal employment opportunity. The Company will physically include these requirements in every subcontract or subagreement meeting the monetary criteria above with such modification of language as is necessary to make them binding on the subcontractor or subconsultant.
- E. These Required Contract Provisions apply to all state funded and/or federally-assisted projects, activities and programs in all facets of the Connecticut Department of Transportation operations resulting in contracts or agreements.

2. Equal Employment Opportunity Policy

The Company will develop, accept and adopt as its operating policy an Affirmative Action Plan utilizing as a guide the Connecticut Department of Transportation Affirmative Action Plan Guideline.

3. Equal Employment Opportunity Officer

The Company will designate and make known to the State Department of Transportation contracting officers an equal employment opportunity officer (hereinafter referred to as the EEO Officer) who will have the responsibility for and must be capable of effectively administering and promoting an active program of equal employment opportunity and who must be assigned adequate authority and responsibility to do so.

4. Dissemination of Policy

- A. All members of the Company's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the Company's equal employment opportunity policy and contractual responsibilities to provide equal employment opportunity in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:
- (1) Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less than once every six (6) months thereafter, at which time the Company's equal employment opportunity policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable Company official.

- (2) All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer or other knowledgeable Company official covering all major aspects of the Company's equal employment opportunity obligations within thirty (30) days following their reporting for duty with the Company.
 - (3) All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer or appropriate Company official in the Company's procedures for locating and hiring protected class group employee.
- B. In order to make the Company's equal employment opportunity policy known to all employees, prospective employees and potential sources of employees, i.e., schools, employment agencies, labor unions (where appropriate), college placement officers, etc., the Company will take the following actions:
- (1) Notices and posters setting forth the Company's equal employment opportunity policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
 - (2) The Company's equal employment opportunity policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

5. Recruitment

- A. When advertising for employees, the Company will include in all advertisements for employees the notation: "An Equal Opportunity Employees." All such advertisements will be published in newspapers or other publications having a large circulation among minority groups in the area from which the project work force would normally be derived.
- B. The Company will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minority group applicants, including, but not limited to, State employment agencies, schools, colleges and minority group organizations. To meet this requirement, the Company will, through its EEO Officer, identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group applicants may be referred to the Company for employment consideration.
- In the event the Company has a valid bargaining agreement providing for exclusive hiring hall referrals, the Company is expected to observe the provisions of that agreement to the extent that the system permits the Company's compliance with equal employment opportunity contract provisions. (The U.S. Department of Labor has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the Company to do the same, such implementation violates Executive Order 11246, as amended.)
- C. The Company will encourage its present employees to refer minority group applicants for employment by posting appropriate notices or bulletins in the areas accessible to all such employees. In addition, information and procedures with regard to referring minority group applicants will be discussed with employees.

6. Personnel Actions

Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoffs, and termination, shall be taken without regard to race, color, religion, sex, or national origin, etc. The following procedures shall be followed:

- A. The Company will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.
- B. The Company will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

- C. The Company will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the Company will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.
- D. The Company will promptly investigate all complaints of alleged discrimination made to the Company in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the Company will inform every complainant of all of his avenues of appeal.
- E. The general contract provision entitled A(76) Affirmative Action Requirements is made part of this document by reference. In conjunction with this contract provision, only the job categories will change in order to be comparable with the job categories utilized by the Company proposing to do business with the Connecticut Department of Transportation. The goals and time tables will remain the same throughout the contract provision.

7. Training and Promotion

- A. The Company will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.
- B. Consistent with the Company's work force requirements and as permissible under Federal and State regulations, the Company shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event the Training Special Provision is provided under this contract, this subparagraph will be superseded.
- C. The Company will advise employees and applicants for employment of available training programs and entrance requirements for each.
- D. The Company will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.

8. Unions

If the Company relies in whole or in part upon unions as a source of employees, it will use its best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the Company either directly or through an association acting as agent will include the procedures set forth below:

- A. The Company will use its best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.
- B. The Company will use its best efforts to incorporate an equal employment opportunity clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, or national origin, etc.
- C. The Company is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the Company, the Company shall so certify to the Connecticut Department of Transportation and shall set forth what efforts have been made to obtain such information
- D. In the event the union is unable to provide the Company with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the Company will, through independent recruitment efforts, fill

the employment vacancies without regard to race, color, religion, sex or national origin, etc. making full efforts to obtain qualified and/or qualifiable minority group persons and women. (The U.S. Department of Labor has held that it shall be no excuse that the union with which the Company has a collective bargaining agreement providing for exclusive referral failed to refer minority employees). In the event the union referral practice prevents the Company from meeting the obligations pursuant to Executive Order 11246, as amended, these provisions, such Company shall immediately notify the Connecticut Department of Transportation.

9. Subcontracting

- A. The Company will use its best efforts to solicit bids from and to utilize minority group subcontractors, or subcontractors with meaningful minority group and female representation among their employees. Companies shall obtain a list of applicable Disadvantaged Business Enterprises firms from the Division of Contract Compliance.
- B. The Company will use its best efforts to ensure subcontractor compliance with their equal employment opportunity obligations.
- C. The General Contract Provisions entitled "Minority Business Enterprises as Subcontractors" is made part of this document by reference and its requirements are applicable to all entities proposing to do business with the Connecticut Department of Transportation.

10. Records and Reports

For the duration of the project, the company will maintain records as are necessary to determine compliance with the Company's equal employment opportunity obligations and Affirmative Action requirements. Additionally, the company will submit all requested reports in the manner required by the contracting agency.

- A. The number of minority and nonminority group members and women employed in each work classification on the project.
- B. The progress and efforts being made in cooperation with unions to increase employment opportunities for minorities and women (applicable only to Companies which rely on whole or in part on unions as a source of their work force).
- C. The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees, and
- D. The progress and efforts being made in securing the services of minority and female owned businesses.
 - (1) All such records must be retained for a period of three (3) years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the State Department of Transportation and the U.S. Department of Transportation including consultant firms.
 - (2) If on-the-job training is being required by the "Training Special Provision," the Company will be required to furnish a Monthly Training Report and Supplement Report (1409) for each trainee.

11. Affirmative Action Plan

- A. Contractors, subcontractors, vendors, suppliers, and all other Companies with contracts, agreements or purchase orders completely state funded will submit an Affirmative Action Plan if the contract value is \$5,000 or over.
- B. Contractors, subcontractors, vendors, suppliers, and all other Companies with federally-assisted contracts, agreements, or purchase orders valued at \$10,000 or more will submit an Affirmative Action Plan.
- C. Companies with contracts, agreements, or purchase orders with total dollar value under that which is stipulated in A and B above shall be exempt from the required submission of an Affirmative Action Plan unless otherwise directed by the Division of Contract Compliance.



CONNECTICUT DEPARTMENT OF TRANSPORTATION

POLICY STATEMENT

Policy No. ADMIN.-10

March 25, 1999

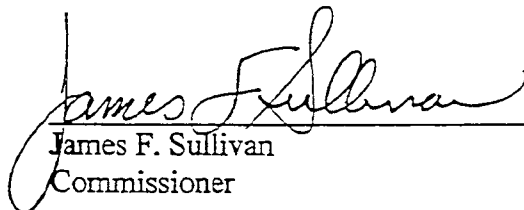
SUBJECT: Code of Ethics Policy

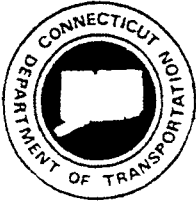
It is the policy of the Department that all employees are to comply with Sections 1-79 through 1-89 of the Connecticut General Statutes, as amended, entitled Code of Ethics for Public Officials.

Any questions concerning the application of the Code of Ethics for specific situations should be directed to the State Ethics Commission.

The Personnel Administrator shall be responsible for issuing periodic updates and/or clarifications of previously released Personnel Memorandums concerning this Code of Ethics Policy as is deemed appropriate.

(This statement supersedes the Commissioner's Policy Statement No. ADMIN.-10 dated November 28, 1994.)


James F. Sullivan
Commissioner



CONNECTICUT DEPARTMENT OF TRANSPORTATION

POLICY STATEMENT

Policy No. ADMIN.-19

May 12, 2003

SUBJECT: Policy on Disadvantaged Business Enterprise Program

The Department of Transportation (DOT) is committed to an effective implementation of a Disadvantaged Business Enterprise (D.B.E.) Program as defined in Title 49, Code of Federal Regulations, Part 26, and includes the following objectives:

- (a) To ensure nondiscrimination in the award and administration of DOT-assisted contracts in the Department's highway, transit, and airport financial assistance programs;
- (b) To create a level playing field in which D.B.E.s can compete fairly for DOT-assisted contracts;
- (c) To ensure that the Department's D.B.E. Program is narrowly tailored in accordance with applicable law;
- (d) To ensure only firms that fully meet this part's eligibility standards are permitted to participate as D.B.E.s;
- (e) To help remove barriers to the participation of D.B.E.s in DOT-assisted contracts; and
- (f) To assist the development of firms that can compete successfully in the marketplace outside the D.B.E. Program.

The Director of Equal Opportunity Assurance has been designated as the D.B.E. Liaison Officer. In that capacity, the Director of Equal Opportunity Assurance is responsible for implementing all aspects of the D.B.E. Program. Implementation of the D.B.E. Program is accorded the same priority as compliance with all other legal obligations incurred by the Connecticut Department of Transportation in its financial assistance agreements with the U.S. Department of Transportation.

As part of the requirements for Title 49, Code of Federal Regulations, Part 26, effective immediately, I am directing the following be included in all federal-aid contracts, all financial assistance agreements, and in all subcontracts.

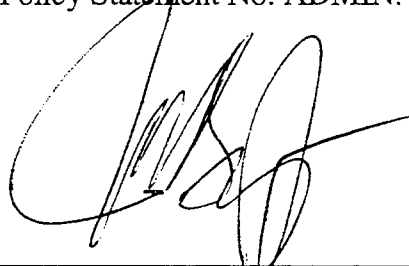
For all agreements with contractors, subcontractors, consultants, cities, towns, and all recipients of State or federal-assistance funds:

- 1) The contractor, subrecipient, or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate.

In addition to the above, all financial agreements shall also contain the following statement:

- 2) The recipient shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of any DOT-assisted contract or in the administration of its D.B.E. Program or the requirements of 49 CFR Part 26. The recipient shall take all necessary and reasonable steps under 49 CFR Part 26 to ensure nondiscrimination in the award and administration of DOT-assisted contracts. The recipient's D.B.E. Program, as required by 49 CFR Part 26 and as approved by DOT, is incorporated by reference in this agreement. Implementation of this program is a legal obligation and failure to carry out its terms shall be treated as a violation of this agreement. Upon notification to the recipient of its failure to carry out its approved program, the Department may impose sanctions as provided for under Part 26 and may, in appropriate cases, refer the matter for enforcement under 18 U.S.C. 1001 and/or the Program Fraud Civil Remedies Act of 1986 (31 U.S.C. 3801 et seq).

(This statement supersedes the Commissioner's Policy Statement No. ADMIN.-19, dated March 14, 2003.)



James F. Byrnes, Jr.
Commissioner

AGREEMENTS WITH GOALS
SPECIAL PROVISIONS
DISADVANTAGED BUSINESS ENTERPRISES
AS SUBCONTRACTORS AND MATERIAL SUPPLIERS OR MANUFACTURERS
FOR FEDERAL FUNDED PROJECTS

Revised – October 16, 2000

NOTE: Certain of the requirements and procedures stated in this special provision are applicable prior to the execution of the Contract document.

I. **ABBREVIATIONS AND DEFINITIONS AS USED IN THIS SPECIAL PROVISION**

- A. “CDOT” means the Connecticut Department of Transportation.
- B. “DOT” means the U.S. Department of Transportation, including the Office of the Secretary, the Federal Highway Administration (“FHWA”), the Federal Transit Administration (“FTA”), and the Federal Aviation Administration (“FAA”).
- C. “Broker” means a party acting as an agent for others in negotiating contracts, agreements, purchases, sales, etc., in return for a fee or commission.
- D. “Contract,” “agreement” or “subcontract” means a legally binding relationship obligating a seller to furnish supplies or services (including, but not limited to, construction and professional services) and the buyer to pay for them. For the purposes of this provision a lease for equipment or products is also considered to be a Contract.
- E. “Contractor,” means a consultant, second party or any other entity doing business with CDOT or, as the context may require, with another Contractor.
- F. “Disadvantaged Business Enterprise” (“DBE”) means a small business concern:
 - 1. That is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which 51 percent of the stock of which is owned by one or more such individuals; and
 - 2. Whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.
- G. “DOT-assisted Contract” means any Contract between a recipient and a Contractor (at any tier) funded in whole or in part with DOT financial assistance, including letters of credit or loan guarantees.
- H. “Good Faith Efforts” means efforts to achieve a DBE goal or other requirement of this part which, by their scope, intensity, and appropriateness to the objective, can reasonably be expected to fulfill the program requirement. Refer to Appendix A of 49 Code of Federal Regulation (“CFR”) Part 26 – “Guidance Concerning Good Faith Efforts,” a copy of which is attached to this provision, for guidance as to what constitutes good faith efforts.

- I. “Small Business Concern” means, with respect to firms seeking to participate as DBEs in DOT-assisted Contracts, a small business concern as defined pursuant to Section 3 of the Small Business Act and Small Business Administration (“SBA”) regulations implementing it (13 CFR Part 121) that also does not exceed the cap on average annual gross receipts specified in 49 CFR Part 26, Section 26.65(b).
- J. “Socially and Economically Disadvantaged Individuals” means any individual who is a citizen (or lawfully admitted permanent resident) of the United States and who is –
 - 1. Any individual who CDOT finds on a case-by-case basis to be socially and economically disadvantaged individual.
 - 2. Any individuals in the following groups, members of which are rebuttably presumed to be socially and economically disadvantaged:
 - i. “Black Americans,” which includes persons having origins in any of the Black racial groups of Africa;
 - ii. “Hispanic Americans,” which includes persons of Mexican, Puerto Rican, Cuban, Dominican, Central or South American, or other Spanish or Portuguese culture or origin, regardless of race;
 - iii. “Native Americans,” which includes persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;
 - iv. “Asian-Pacific Americans,” which includes persons whose origins are from Japan, China, Taiwan, Korea, Burma (Myanmar), Vietnam, Laos, Cambodia (Kampuchea), Thailand, Malaysia, Indonesia, the Philippines, Burnei, Samoa, Guam, The U.S. Trust Territories of the Pacific Islands (Republic of Palau), the Commonwealth of the Northern Marianas Islands, Macao, Fiji, Tonga, Kirbati, Juvalu, Nauru, Federated States of Micronesia, or Hong Kong;
 - v. “Subcontinent Asian Americans,” which includes persons whose origins are from India, Pakistan, Bangladesh, Bhutan, the Maldives Islands, Nepal or Sri Lanka;
 - vi. Women;
 - vii. Any additional groups whose members are designated as socially and economically disadvantaged by the SBA, at such time as the SBA designation becomes effective.

II. GENERAL REQUIREMENTS

- A. The Contractor, sub-recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted Contracts. Failure by the Contractor to carry out these requirements is a material breach of this Contract, which may result in the termination of the Contract or such other remedy, as the DOT deems appropriate.

- B. The Contractor shall cooperate with CDOT and DOT in implementing the requirements concerning DBE utilization on this Contract in accordance with Title 49 of the Code of Federal Regulations, Part 26 entitled "Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs" ("49 CFR Part 26"), as revised. The Contractor shall also cooperate with CDOT and DOT in reviewing the Contractor's activities relating to this Special Provision. This Special Provision is in addition to all other equal opportunity employment requirements of this Contract.
- C. The Contractor shall designate a liaison officer who will administer the Contractor's DBE program. Upon execution of this Contract, the name of the liaison officer shall be furnished in writing to CDOT's Division of Contract Compliance.
- D. For the purpose of this Special Provision, DBEs to be used to satisfy the DBE goal must be certified by CDOT's Division of Contract Compliance for the type(s) of work they will perform.
- E. If the Contractor allows work designated for DBE participation required under the terms of this Contract and required under III-B to be performed by other than the named DBE organization without concurrence from CDOT's unit administering the Contract, CDOT will not pay the Contractor for the value of the work performed by organizations other than the designated DBE.
- F. At the completion of all Contract work, the Contractor shall submit a final report to CDOT's unit administering the Contract indicating the work done by, and the dollars paid to DBEs. If the Contractor does not achieve the specified Contract goals for DBE participation, the Contractor shall also submit written documentation to the CDOT unit administering the Contract detailing its good faith efforts to satisfy the goal that were made during the performance of the Contract. Documentation is to include but not be limited to the following:
 - 1. A detailed statement of the efforts made to select additional subcontracting opportunities to be performed by DBEs in order to increase the likelihood of achieving the stated goal.
 - 2. A detailed statement, including documentation of the efforts made to contact and solicit bids/proposals with CDOT certified DBEs, including the names, addresses, dates and telephone numbers of each DBE contacted, and a description of the information provided to each DBE regarding the scope of services and anticipated time schedule of work items proposed to be subcontracted and nature of response from firms contacted.
 - 3. Provide a detailed statement for each DBE that submitted a subcontract proposal, which the Contractor considered not to be acceptable stating the reasons for this conclusion.
 - 4. Provide documents to support contacts made with CDOT requesting assistance in satisfying the Contract specified goal.
 - 5. Provide documentation of all other efforts undertaken by the Contractor to meet the defined goal.

- G. Failure of the Contractor at the completion of all Contract work to have at least the specified percentage of this Contract performed by DBEs as required in III-B will result in the reduction in Contract payments to the Contractor by an amount determined by multiplying the total Contract value by the specified percentage required in III-B and subtracting from that result, the dollar payments for the work actually performed by DBEs. However, in instances where the Contractor can adequately document or substantiate its good faith efforts made to meet the specified percentage to the satisfaction of CDOT, no reduction in payments will be imposed.
- H. All records must be retained for a period of three (3) years following acceptance by CDOT of the Contract and shall be available at reasonable times and places for inspection by authorized representatives of CDOT and Federal agencies. If any litigation, claim, or audit is started before the expiration of the three (3) year period, the records shall be retained until all litigation, claims, or audits findings involving the records are resolved.
- I. Nothing contained herein, is intended to relieve any Contractor or subcontractor or material supplier or manufacturer from compliance with all applicable Federal and State legislation or provisions concerning equal employment opportunity, affirmative action, nondiscrimination and related subjects during the term of this Contract.

III. SPECIFIC REQUIREMENTS:

- A. The Contractor shall assure that certified DBEs will have an opportunity to compete for subcontract work on this Contract, particularly by arranging solicitations and time for the preparation of proposals for services to be provided so as to facilitate the participation of DBEs regardless if a Contract goal is specified or not.
- B. Contract goal for DBE participation equaling 0 percent of the total Contract value has been established for this Contract. Compliance with this provision may be fulfilled when a DBE or any combination of DBEs perform work under Contract in accordance with 49 CFR Part 26, Subpart C, Section 26.55, as revised. **Only work actually performed by and/or services provided by DBEs which are certified for such work and/or services can be counted toward the DBE goal. Supplies and equipment a DBE purchases or leases from the prime Contractor or its affiliate cannot be counted toward the goal.**

If the Contractor does not document commitments, by subcontracting and/or procurement of material and/or services that at least equal the goal stipulated in III-B, or document a plan which indicates how the Contractor intends to meet the goal in the future phase(s) of the work, the Contractor must document the good faith efforts that outline the steps it took to meet the goal in accordance with VII.

- C. Prior to execution of the Contract the Contractor shall indicate, in writing on the forms provided by CDOT to the Director of Contract Administration or CDOT's unit administering the Contract, the DBE(s) it will use to achieve the goal indicated in III-B. The submission shall include the name and address of each DBE that will participate in this Contract, a description of the work each will perform and the dollar amount of participation. This information shall be signed by the named DBE and the Contractor. The named DBE shall be from a list of certified DBEs available from CDOT. **In addition, the named DBE(s) shall be certified to perform the type of work they will be contracted to do.**

- D. The prime Contractor shall provide a fully executed copy of each agreement with each DBE named to achieve the goal indicated in III-B to CDOT's unit administering the Contract.
- E. The Contractor is required, should there be a change in a DBE they submitted in III-C, to submit documentation to CDOT's unit administering the Contract which will substantiate and justify the change, (i.e., documentation to provide a basis for the change for review and approval by CDOT's unit administering the Contract) prior to the implementation of the change. The Contractor must demonstrate that the originally named DBE is unable to perform in conformity to the scope of service or is unwilling to perform, or is in default of its Contract, or is overextended on other jobs. **The Contractor's ability to negotiate a more advantageous agreement with another subcontractor is not a valid basis for change.** Documentation shall include a letter of release from the originally named DBE indicating the reason(s) for the release.
- F. Contractors subcontracting with DBEs to perform work or services as required by this Special Provision shall not terminate such firms without advising CDOT's unit administering the Contract in writing, and providing adequate documentation to substantiate the reasons for termination if the DBE has not started or completed the work or the services for which it has been contracted to perform.
- G. When a DBE is unable or unwilling to perform or is terminated for just cause the Contractor shall make good faith efforts to find other DBE opportunities to increase DBE participation to the extent necessary to at least satisfy the goal required by III-B.
- H. In instances where an alternate DBE is proposed, a revised submission to CDOT's unit administering the Contract together with the documentation required in III-C, III-D, and III-E, must be made for its review and approval.
- I. Each quarter after execution of the Contract, the Contractor shall submit a report to CDOT's unit administering the Contract indicating the work done by, and the dollars paid to the DBE for the current quarter and to date.

IV. MATERIAL SUPPLIERS OR MANUFACTURERS

- A. If the Contractor elects to utilize a DBE supplier or manufacturer to satisfy a portion or all of the specified DBE goal, the Contractor must provide the CDOT with:
 - 1. An executed "Connecticut Department of Transportation DBE Supplier/Manufacturer Affidavit" (sample attached), and
 - 2. Substantiation of payments made to the supplier or manufacturer for materials used on the project.
- B. Credit for DBE suppliers is limited to 60% of the value of the material to be supplied, provided such material is obtained from a regular DBE dealer. A regular dealer is a firm that owns, operates, or maintains a store, warehouse or other establishment in which the materials or supplies required for the performance of the Contract are bought, kept in stock and regularly sold or leased to the public in the usual course of business. To be a regular dealer, the firm must engage in, as its principal business, and in its own name, the purchase and sale of the products in question. A regular dealer in such bulk items as steel, cement, gravel, stone and petroleum products, need not keep such products in stock if it owns or operates distribution equipment. Brokers and packagers shall not be regarded as material suppliers or manufacturers.

- C. Credit for DBE manufacturers is 100% of the value of the manufactured product. A manufacturer is a firm that operates or maintains a factory or establishment that produces on the premises the materials or supplies obtained by the Department of Transportation or Contractor.

V. NON-MANUFACTURING OR NON-SUPPLIER DBE CREDIT:

- A. Contractors may count towards their DBE goals the following expenditures with DBEs that are not manufacturers or suppliers:
 - 1. Reasonable fees or commissions charged for providing a bona fide service such as professional, technical, consultant or managerial services and assistance in the procurement of essential personnel, facilities, equipment materials or supplies necessary for the performance of the Contract provided that the fee or commission is determined by the CDOT to be reasonable and consistent with fees customarily allowed for similar services.
 - 2. The fees charged for delivery of materials and supplies required on a job site (but not the cost of the materials and supplies themselves) when the hauler, trucker, or delivery service is a DBE but is not also the manufacturer of or a regular dealer in the materials and supplies, provided that the fees are determined by the CDOT to be reasonable and not excessive as compared with fees customarily allowed for similar services.
 - 3. The fees or commissions charged for providing bonds or insurance specifically required for the performance of the Contract, provided that the fees or commissions are determined by the CDOT to be reasonable and not excessive as compared with fees customarily allowed for similar services.

VI. BROKERING

- A. Brokering of work by DBEs who have been approved to perform subcontract work with their own workforce and equipment is not allowed, and is a Contract violation.
- B. DBEs involved in the brokering of subcontract work that they were approved to perform may be decertified.
- C. Firms involved in the brokering of work, whether they are DBEs and/or majority firms who engage in willful falsification, distortion or misrepresentation with respect to any facts related to the project shall be referred to the U.S. Department of Transportation's Office of the Inspector General for prosecution under Title 18, U.S. Code, Section 10.20.

VII. REVIEW OF PRE-AWARD GOOD FAITH EFFORTS

- A. If the Contractor does not document commitments by subcontracting and/or procurement of material and/or services that at least equal the goal stipulated in III-B before execution of the Contract, or document a plan which indicates how the Contractor intends to meet the goal in future phase(s) of the work, the Contractor must document the good faith efforts that outline the specific steps it took to meet the goal. Execution of the Contract will proceed if the Contractor's good faith efforts are deemed satisfactory and approved by CDOT. To obtain such an exception, the Contractor must submit an application to CDOT's Director of Contract Administration or CDOT's unit administering the Contract, which documents the specific good faith efforts that were made to meet the DBE goal. **Application forms for Review of Pre-Award Good Faith Efforts are available from CDOT's Division of Contract Administration.**

The application must include the following documentation:

1. a statement setting forth in detail which parts, if any, of the Contract were reserved by the Contractor and not available for subcontracting;
 2. a statement setting forth all parts of the Contract that are likely to be sublet;
 3. a statement setting forth in detail the efforts made to select subcontracting work in order to likely achieve the stated goal;
 4. copies of all letters sent to DBEs;
 5. a statement listing the dates and DBEs that were contacted by telephone and the result of each contact;
 6. a statement listing the dates and DBEs that were contacted by means other than telephone and the result of each contact;
 7. copies of letters received from DBEs in which they declined to bid or submit proposals;
 8. a statement setting forth the facts with respect to each DBE bid/proposal received and the reason(s) any such bid/proposal was declined;
 9. a statement setting forth the dates that calls were made to CDOT's Division of Contract Compliance seeking DBE referrals and the result of each such call; and
 10. Any information of a similar nature relevant to the application.
- B. All applications shall be submitted to the Director of Contract Administration or CDOT's unit administering the Contract. Upon receipt of the submission of an application for review of pre-award good faith efforts, CDOT's Director of Contract Administration or CDOT's unit administering the Contract shall submit the documentation to the Division of Contract Compliance who will review the documents and determine if the package is complete and accurate and adequately documents the Contractor's good faith efforts. Within fourteen (14) days of receipt of the documentation the Division of Contract Compliance shall notify the Contractor by certified mail of the approval or denial of its good faith efforts.

- C. If the Contractor's application is denied, the Contractor shall have seven (7) days upon receipt of written notification of denial to request administrative reconsideration. The Contractor's request for administrative reconsideration should be sent in writing to: Director of Contract Administration or CDOT's unit administering the Contract, P.O. Box 317546, Newington, CT 06131-7546. The Director of Contract Administration or CDOT's unit administering the Contract will forward the Contractor's reconsideration request to the DBE Screening Committee. The DBE Screening Committee will schedule a meeting within fourteen (14) days from receipt of the Contractors request for administrative reconsideration and advise the Contractor of the date, time and location of the meeting. At this meeting the Contractor will be provided with the opportunity to present written documentation and/or argument concerning the issue of whether it made adequate good faith efforts to meet the goal. Within seven (7) days following the reconsideration meeting, the chairperson of the DBE Screening Committee will send the contractor via certified mail a written decision on its reconsideration request, explaining the basis of finding either for or against the request. The DBE Screening Committee's decision is final. **If the reconsideration is denied, the Contractor shall indicate in writing to the Director of Contract Administration or CDOT's unit administering the Contract within fourteen (14) days of receipt of written notification of denial, the DBEs it will use to achieve the goal indicated in III-B.**
- D. Approval of pre-execution good faith efforts does not relieve the Contractor from its obligation to make additional good faith efforts to achieve the DBE goal should contracting opportunities arise during actual performance of the Contract work.

APPENDIX A TO 49 CFR PART 26 – GUIDANCE CONCERNING GOOD FAITH EFFORTS

- I. When, as a recipient, you establish a Contract goal on a DOT-assisted Contract, a Bidder/Contractor must, in order to be responsible and/or responsive, make good faith efforts to meet the goal. The Bidder/Contractor can meet this requirement in either of two ways. First, the Bidder/Contractor can meet the goal, documenting commitments for participation by DBE firms sufficient for this purpose. Second, even if it doesn't meet the goal, the Bidder/Contractor can document adequate good faith efforts. This means that the Bidder/Contractor must show that it took all necessary and reasonable steps to achieve a DBE goal or other requirement of this part which, by their scope, intensity, and appropriateness to the objective, could reasonably be expected to obtain sufficient DBE participation, even if they were not fully successful.
- II. In any situation in which you have established a Contract goal, Part 26 requires you to use the good faith efforts mechanism of this part. As a recipient, it is up to you to make a fair and reasonable judgment whether a Bidder/Contractor that did not meet the goal made adequate good faith efforts. It is important for you to consider the quality, quantity, and intensity of the different kinds of efforts that the Bidder/Contractor has made. The efforts employed by the Bidder/Contractor should be those that one could reasonably expect a Bidder/Contractor to take if the Bidder/Contractor were actively and aggressively trying to obtain DBE participation sufficient to meet the DBE Contract goal. Mere pro forma efforts are not good faith efforts to meet the DBE Contract requirements. We emphasize, however, that your determination concerning the sufficiency of the firm's good faith efforts is a judgment call: meeting quantitative formulas is not required.
- III. The Department also strongly cautions you against requiring that a Bidder/Contractor meet a Contract goal (i.e., obtain a specified amount of DBE participation) in order to be awarded a Contract, even though the Bidder/Contractor makes an adequate good faith efforts showing. This rule specifically prohibits you from ignoring bona fide good faith efforts.
- IV. The following is a list of types of actions which you should consider as part of the Bidder/Contractor's good faith efforts to obtain DBE participation. It is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Other factors or types of efforts may be relevant in appropriate cases.
 - A. Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBEs who have the capability to perform the work of the Contract. The Bidder/Contractor must solicit this interest within sufficient time to allow the DBEs to respond to the solicitation. The Bidder/Contractor must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.
 - B. Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out Contract work items into economically feasible units to facilitate DBE participation, even when the prime Contractor might otherwise prefer to perform these work items with its own forces.

- C. Providing interested DBEs with adequate information about the plans, specifications, and requirements of the Contract in a timely manner to assist them in responding to a solicitation.
- D. (1) Negotiating in good faith with interested DBEs. It is the Bidder/Contractor's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.

(2) A Bidder/Contractor using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as Contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBEs is not in itself sufficient reason for a Bidder/Contractor's failure to meet the Contract DBE goal, as long as such costs are reasonable. Also, the ability or desire of a prime Contractor to perform the work of a Contract with its own organization does not relieve the Bidder/Contractor of the responsibility to make good faith efforts. Prime Contractors are not, however, required to accept higher quotes from DBEs if the price difference is excessive or unreasonable.
- E. Not rejecting DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The Contractor's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids/proposals in the Contractor's efforts to meet the project goal.
- F. Making efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or Contractor.
- G. Making efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.
- H. Effectively using the services of available minority/women community organizations; minority/women Contractors' groups; local, state, and Federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBEs.

- V. In determining whether a Bidder/Contractor has make good faith efforts, you may take into account the performance of other bidder/Contractors in meeting the Contract. For example, when the apparent successful Bidder/Contractor fails to meet the Contract goal, but others meet it, you may reasonably raise the question of whether, with additional reasonable efforts, the apparent successful Bidder/Contractor could have met the goal. If the apparent successful Bidder/Contractor fails to meet the goal, but meets or exceeds the average DBE participation obtained by other Bidder/Contractors, you may view this, in conjunction with other factors, as evidence of the apparent successful Bidder/Contractor having made good faith efforts.

CONNECTICUT DEPARTMENT OF TRANSPORTATION
DBE SUPPLIER/MANUFACTURER AFFIDAVIT

This affidavit must be completed by the State Contractor's DBE notarized and attached to the Contractor's request to utilize a DBE supplier or manufacturer as a credit towards its DBE Contract requirements; failure to do so will result in not receiving credit towards the Contract DBE requirement.

State Project No. _____

Federal Aid Project No. _____

Description of Project _____

I, _____, acting in behalf of _____
(Name of person signing Affidavit) (DBE person, firm, association or organization)
of which I am the _____ certify and affirm that _____
(Title of Person) (DBE person, firm, association or organization)

is certified Connecticut Department of Transportation DBE. I further certify and affirm that I have read and understand 49 CFR, Sec. 26.55(e)(2), as the same may be revised.

I further certify and affirm that _____ will assume the actual and
(DBE person, firm, association or organization)

contractual responsibility for the provision of the materials and/or supplies sought by _____.
(State Contractor)

If a manufacturer, I produce goods from raw materials or substantially alter them before resale, or if a supplier, I perform a commercially useful function in the supply process.

I understand that false statements made herein are punishable by Law (Sec. 53a-157), CGS, as revised).

(Name of Organization or Firm)

(Signature & Title of Official making the Affidavit)

Subscribed and sworn to before me, this ____ day of _____ 20____.

Notary Public (Commissioner of the Superior Court)

My Commission Expires

CERTIFICATE OF CORPORATION

I, _____, certify that I am the _____ (Official)
of the Organization named in the foregoing instrument; that I have been duly authorized to affix the seal of the Organization to such papers as require the seal; that _____, who signed said instrument on behalf of the Organization, was then
_____ of said Organization; that said instrument was duly signed for and in behalf of said Organization by
authority of its governing body and is within the scope of its organizational powers.

(Signature of Person Certifying) (Date)

State of Connecticut by His Excellency

John G. Rowland

Executive Order No. 16

WHEREAS, the State of Connecticut recognizes that workplace violence is a growing problem that must be addressed; and

WHEREAS, the State is committed to providing its employees a reasonably safe and healthy working environment, free from intimidation, harassment, threats, and /or violent acts; and

WHEREAS, violence or the threat of violence by or against any employee of the State of Connecticut or member of the public in the workplace is unacceptable and will subject the perpetrator to serious disciplinary action up to and including discharge and criminal penalties.

NOW, THEREFORE, I, John G. Rowland, Governor of the State of Connecticut, acting by virtue of the authority vested in me by the Constitution and by the statutes of this state, do hereby ORDER and DIRECT:

1. That all state agency personnel, contractors, subcontractors, and vendors comply with the following **Violence in the Workplace Prevention Policy**:

The State of Connecticut adopts a statewide zero tolerance policy for workplace violence.

Therefore, except as may be required as a condition of employment —

- No employee shall bring into any state worksite any weapon or dangerous instrument as defined herein.
- No employee shall use, attempt to use, or threaten to use any such weapon or dangerous instrument in a state worksite.
- No employee shall cause or threaten to cause death or physical injury to any individual in a state worksite.

Weapon means any firearm, including a BB gun, whether loaded or unloaded, any knife (excluding a small pen or pocket knife), including a switchblade or other knife having an automatic spring release device, a stiletto, any police baton or nightstick or any martial arts weapon or electronic defense weapon.

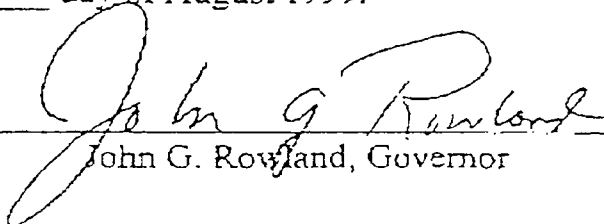
Dangerous instrument means any instrument, article, or substance that, under the circumstances, is capable of causing death or serious physical injury.

Violation of the above reasonable work rules shall subject the employee to disciplinary action up to and including discharge.

2. That each agency must prominently post this policy and that all managers and supervisors must clearly communicate this policy to all state employees.

3. That all managers and supervisors are expected to enforce this policy fairly and uniformly.
4. That any employee who feels subjected to or witnesses violent, threatening, harassing, or intimidating behavior in the workplace immediately report the incident or statement to their supervisor, manager, or human resources office.
5. That any employee who believes that there is a serious threat to their safety or the safety of others that requires immediate attention notify proper law enforcement authorities and his or her manager or supervisor.
6. That any manager or supervisor receiving such a report shall immediately contact their human resources office to evaluate, investigate and take appropriate action.
7. That all parties must cooperate fully when questioned regarding violations of this policy.
8. That all parties be advised that any weapon or dangerous instrument at the worksite will be confiscated and that there is no reasonable expectation of privacy with respect to such items in the workplace.
9. That this order applies to all state employees in the executive branch.
10. That each agency will monitor the effective implementation of this policy.
11. That this order shall take effect immediately.

Dated in Hartford, Connecticut this 4th day of August 1999.



John G. Rowland, Governor

Filed this 4th day of August 1999





Susan Bysiewicz, Secretary of the State



STATE OF CONNECTICUT

DEPARTMENT OF REVENUE SERVICES

92 FARMINGTON AVENUE

HARTFORD, CONNECTICUT, 06105

Agreement No. 6.06-04(03)

GOVERNMENTAL AGENCY EXEMPTION CERTIFICATE

"I HEREBY CERTIFY: that this agency is exempt pursuant to §12-412(1) of the Connecticut General Statutes, that the tangible personal property described herein which I shall purchase or lease or the service(s) which I shall purchase from:

University of Massachusetts Dartmouth

Office of Grants and Contracts, 285 Old Westport Road, North Dartmouth,

MA 02747-2300

will be used exclusively by this governmental agency for the purposes for which it is organized and will not be resold. If a sale of meals to this agency is involved, I certify that this agency neither has been nor will be reimbursed in any manner, by donations, sales of tickets or otherwise, by the consumers of the meals for the price of such meals.

Description of property or service(s):

Conduct a research study for NETC Project No. 02-1 entitled, "Relating Hot Mix Asphalt Pavement Density to Performance."

Purchaser State of Connecticut, Department of Transportation
Name of Agency

By *James M. Lane* Title Manager of Research

Address 2800 Berlin Turnpike, P.O. Box 317546
Newington, Connecticut 06131-7546

Dated August 18, 2003

at Newington, Connecticut

Proposal for NETC Project No. 02-1,
"Relating Hot Mix Asphalt Pavement
Density to Performance"

1. Project Identification:

Project Number: NETC 02-1
Project Title: Relating Hot Mix Asphalt Pavement Density to Performance

Principal Investigators:
Walaa S. Mogawer, PI
Civil and Environmental Engineering Department
University of Massachusetts at Dartmouth
285 Old Westport Road
North Dartmouth, MA 02747-2300
Phone: (508) 999 8468
Fax: (508) 999 8964
E-mail: walaa@umassd.edu

Rajib B. Mallick, Co-PI
Civil and Environmental Engineering Department
Worcester Polytechnic Institute
100 Institute Road
Worcester, MA 01609
Phone: (508) 831 5289
Fax: (508) 831 5808
E-mail: rajib@wpi.edu

Jo Sias Daniel, Co-PI
Department of Civil Engineering
University of New Hampshire
33 College Road
Durham, NH 03824
Phone: (603) 862-3277
Fax: (603) 862-2364
E-mail: jo.daniel@unh.edu

Prof. Fred Hugo DEng, PhD, PrEng, Consultant
Director: Institute for Transport Technology
Department of Civil Engineering
University of Stellenbosch
Private Bag X1
MATIELAND
South Africa
7602
Tel. +27 (0)21 808-4364
Fax.+27 (0)21 808-4361
Cell +27 (0)82 652 5824

2. Significance of the Problem:

Density is one of the most important properties of hot mix asphalt (HMA). Most of the currently used mix design systems rely primarily on achieving optimum densities, and most of the Quality Control/Assurance specifications used by state departments of transportation use density as a critical parameter. For example, in the currently used Superpave system, a mix is designed to have 96 percent density, and the pavement is assumed to reach an in-place density of 96 percent (or close to 96 percent) after sufficient amount of traffic compaction. However, the key factor in deciding whether the pavement would end up with an optimum (as designed) density or not is the in-place density at the end of construction (henceforth referred to as construction density). (In this proposal the term density refers to density expressed as percentage of theoretical maximum density, TMD, or commonly expressed as G_{mm} . Air voids refer to voids in total mix, calculated as: $Voids = 100 * (1 - G_{mb} / G_{mm})$, where G_{mb} is bulk specific gravity of the compacted mix). If the construction density is too low/high, the pavement would end up with lower/higher than optimum density, and consequently be susceptible to durability/rutting problems. Therefore, one of the most crucial tasks during construction of HMA pavements is to make sure that an optimum construction density is achieved. If optimum construction density is not achieved, the task is to make sure that the department of transportation (DOT) is able to recoup the losses expected from a pavement with less than designed life, through a penalty. (Or, to make sure that the contractor is rewarded with a bonus for constructing a pavement with a life greater than the design life). However, the difficult task is to determine the penalty or bonus (henceforth referred to as pay factors).

Currently, many state DOTs in New England are using QC/QA techniques in performance related specifications (PRS) for assuring quality construction, and most of them use statistical techniques such as percent within/outside limits for enforcing specifications, as well as for determining pay factors. However, the most rational way of determination of pay factors in PRS is through the determination of actual pavement life loss or gain, and/or through determination of funds needed in future for rectifying problems of reduced life, or, funds saved in future due to gained additional life. To follow this rational approach one needs a vital piece of information - the relationship between construction properties (such as density) and performance (rutting and fatigue). While statistical QC/QA techniques provide tools for a realistic and practical PRS, construction property versus performance models would provide the basis for a

rational PRS. Since density is one of the most important properties of HMA, proper models relating construction density and performance are needed.

3. Objectives of Research:

The objective of the proposed study are to determine relationship between pavement density and performance through testing of pavements at different levels of in-place density with accelerated pavement loading equipment and environmental simulation, and to use the obtained relationship to determine pay adjustments for different densities.

4. Study Approach:

Literature Review

The performance of HMA pavements can be characterized primarily in terms of two distress conditions – rutting and cracking. The resistance of a HMA pavement against rutting and cracking depends strongly on material properties, traffic, and environmental conditions. Assuming a good mix design, the single most important property that affects mix resistance against both rutting and cracking is construction density – the literature is replete with results of laboratory and field studies showing this. Examples of findings related to density versus performance are as follows:

1. Each one percent increase in air voids above 7 percent results in about a 10 percent or about 1 year, loss in pavement life (Linden et al, 1988).
2. Significant rutting is not expected as long as voids stay above 2.5 percent (Ford, 1988).
3. Significant rutting was likely to occur once the in-place voids reached approximately 3 percent (Huber, 1987, Brown and Cross, 1989).
4. The main requirement of HMA to perform satisfactorily is that, it should have initial in-place air void content not more than 8% for avoiding durability problems and not less than 3% for avoiding rutting problems. (Brown, 1990).
5. The most important factor controlling the fatigue life is the degree of compaction; as the degree of compaction was increased the fatigue life also increased significantly (Epps et al, 1999).
6. Air void content (as measured by voids in total mix) of dense graded HMA has a significant effect on in place permeability of pavements (Zube, 1962, Brown and Brownfield, 1989, Mallick et al, 2001).

7. Loss in asphalt penetration is greatly increased for air voids significantly greater than eight percent (Santucci, 1985).

One important conclusion from all of the studies conducted in the past is that construction density should not be too low or too high – however, what is missing in all the studies except the one conducted at Westrack (Epps et al, 1999) is a rational model relating density and cracking/rutting potential. The studies are either based on laboratory or field data, with a wide range in environmental and traffic conditions. Also, in many cases, only one form of distress such as rutting or cracking (and not both) has been considered. Lately, an attempt at building fatigue and rutting performance versus density models based on Long term Pavement Performance (LTPP) data has been largely unsuccessful, primarily because of lack of a sufficient amount of meaningful data (NCHRP, 2002). The results from the Westrack experiment, as outlined in NCHRP Report 455 (Epps et al, 2002) provide very valuable performance – density models. However, the purely statistical models (which are most likely to be adopted by the new England state DOTs, due to the lack of sophisticated equipment required for adopting the mechanistic-empirical models) developed under Nevada desert conditions are not applicable for New England conditions. Nevertheless, these models provide valuable guidelines, which can be followed by current and future researchers.

Suggested Approach

It seems that sufficient amount of reliable and relevant data, obtained from testing under close controlled conditions, should be used for developing performance-density relationships. Since data acquired from a survey of field studies are not obtained from close controlled experiments and are bound to have significant effects of variations in a number of uncontrollable factors (such as traffic load, tire pressure, traffic wander, temperature, moisture conditions), it is desirable to conduct a laboratory study. The problem with most laboratory studies is the effect of scale and often unrealistic mode of loading – something that can only be negated with the help of accelerated loading and testing. However, such testing must be conducted with due attention to scale factors and real-world conditions. It is proposed that with due consideration to scale effects, accelerated loading and testing of slabs with different levels of density be conducted in the laboratory, to evaluate the effect of density on fatigue and rutting life, and hence to develop models relating fatigue and rutting life to construction density.

5. Methodology

It is noted that in the scope of work, the New England Transportation Consortium (NETC) committee has laid out the plan and details of work quite explicitly. Specific details have been added, and/or comments regarding any extra scope of work have been made in the following paragraphs.

Task 1: Choose one 9.5 mm and one 12.5 mm Superpave mix design typically used in New England. Traffic levels for N_{design} will be 3-10 million ESAL (using 75 gyrations).

In view of the fact that NCHRP Report 455 (Epps et al, 2002) indicated that coarse graded Superpave mixes were found to be more sensitive to in-place air voids than fine graded Superpave mixes, it is proposed that both the specified 9.5 and 12.5 mm nominal maximum aggregate size (NMAS) mixes be selected with coarse gradation. However, the selected gradations must be representative of gradations used by the New England states.

Task 2: Define pavement failure criteria that will be used in the data analysis

In view of the work done in the past, appropriate failure criteria will be developed – such as 10 percent of wheel path area cracking for fatigue failure and 12.5 mm permanent deformation as rutting failure. The percent cracked area will be based on the AASHTO definition for a Type II failure, which is when the cracks on the surface of a pavement start to meet each other and form blocks. Cumulative crack length could be determined by crack mapping using a clear sheet of mylar. The mapped cracks will be vectorized and processed with software to obtain accurate estimate of length of cracks. These failure criteria will be translated into scaled criteria such that the effect of scaling can be taken into consideration during the analysis of data.

Task 3: Construct pavement samples or slabs using these mixes (at design gradation, asphalt content and volumetric properties) at the following in-place density levels (percent of TMD): 88, 91, 94 and 97 percent. Use a typical binder grade and source used in New England to construct the mixes.

It is proposed that a PG 64-28 asphalt binder, from a widely used source (such as Hudson Companies, 89 Ship Street, Providence, RI 02903) be used for making the mixes. Careful consideration will be made before selecting thickness of slabs. The following general steps are envisaged at this time:

1. Use of a standard (such as Asphalt Institute, 1981) expression relating tensile strain at the bottom of HMA layer to number of loading applications to determine desirable levels of strains in order to achieve fatigue cracking in a reasonable amount of time.
2. Use layered elastic analysis for determination of thickness for obtaining the desirable strain, using the mix property (namely, modulus) at the highest density. Two layers are planned under the HMA layer – compacted sand with a modulus of 39 Mpa at the bottom and neoprene, D60, rubber, with a modulus of 350 Mpa, just under the HMA layer.
3. Use of a sufficiently thick HMA layer (more than 100 mm) for obtaining significant amount of rutting.
4. Use of strain gauges underneath HMA layers for continuous monitoring of tensile strain induced due to trafficking.
5. Use of thermocouples for monitoring temperature inside the HMA slabs.
6. Proper care will be taken to achieve desired densities. The compaction process will be facilitated with the use of heaters (for keeping mix and roller at a sufficiently high temperature) and desired density will be ensured with the use of nuclear gauge (if available) or with the use of Pavement Quality indicator (PQI, which will be calibrated prior to the construction of test slabs).

The slabs will be compacted in the Model Mobile Load Simulator (MMLS) 3 mold and roller (Figure 1). The mold is 2.8 m long, 0.9 m wide and 0.16 m deep (9.1 feet by 2.9 feet by 0.5 feet). The roller assembly contains a 0.45 m (1.4 feet) diameter by 0.9 m (2.9 feet) steel drum with an 8.9 kN (1826 lb) 50/60Hz electric vibrator mounted inside it.

Task 4: Use accelerated loading equipment to apply simulated traffic to the pavement slabs. Determine the number of loadings to reach pre-determined failure levels. During application of wheel loading, use environmental conditioning to simulate varying weather conditions (including heat and wet-freeze conditions).



Figure 1. Mold and roller for constructing slabs

The Model Mobile Load Simulator (MMLS) 3 (Figure 2) is proposed to be used for accelerated loading. Unlike small scale wheel tracking devices, the MMLS 3 is a scaled loading device that applies a load up to 2.7 kN at a maximum rate of 7,200 load applications per hour with 300 mm diameter and 80 mm wide pressurized tires (at maximum tire pressure of 700kPa). The entire system will be enclosed within an environmental chamber (Figure 3) for controlling temperature (with an available air conditioning unit) during testing. Relevant information about the MMLS 3

is shown in Table 1. The test setup used for loading with the MMLS represents an actual pavement in one-third scale under realistic contact stress (700kPa and 2.7kN load for this project) and therefore the results of these tests can be translated to results in real world field conditions by considering scale effects. The pavement slabs are proposed to be tested at 15°C and 60°C for fatigue and rutting, respectively. However, the NETC committee will be consulted before the selection of the test temperatures. As outlined in this proposal, the use of strain gauges underneath the layers for monitoring strain for fatigue failure and the use of profilometer for monitoring rutting, at different number of cycles, will result in actual material characterization and not simply comparison of performances. Therefore, in addition to comparative results and pure statistical modeling, the researchers will be able to obtain material/mix properties required for development of mechanistic models. Such models can be used in future for development of more refined performance related models

In addition to the two sets of tests performed at 15°C and 60°C for fatigue and rutting tests, a third set of tests will be conducted on a selected number of density levels at wet-rut and freeze-fatigue conditions. The proposed matrix is shown in Table 2.

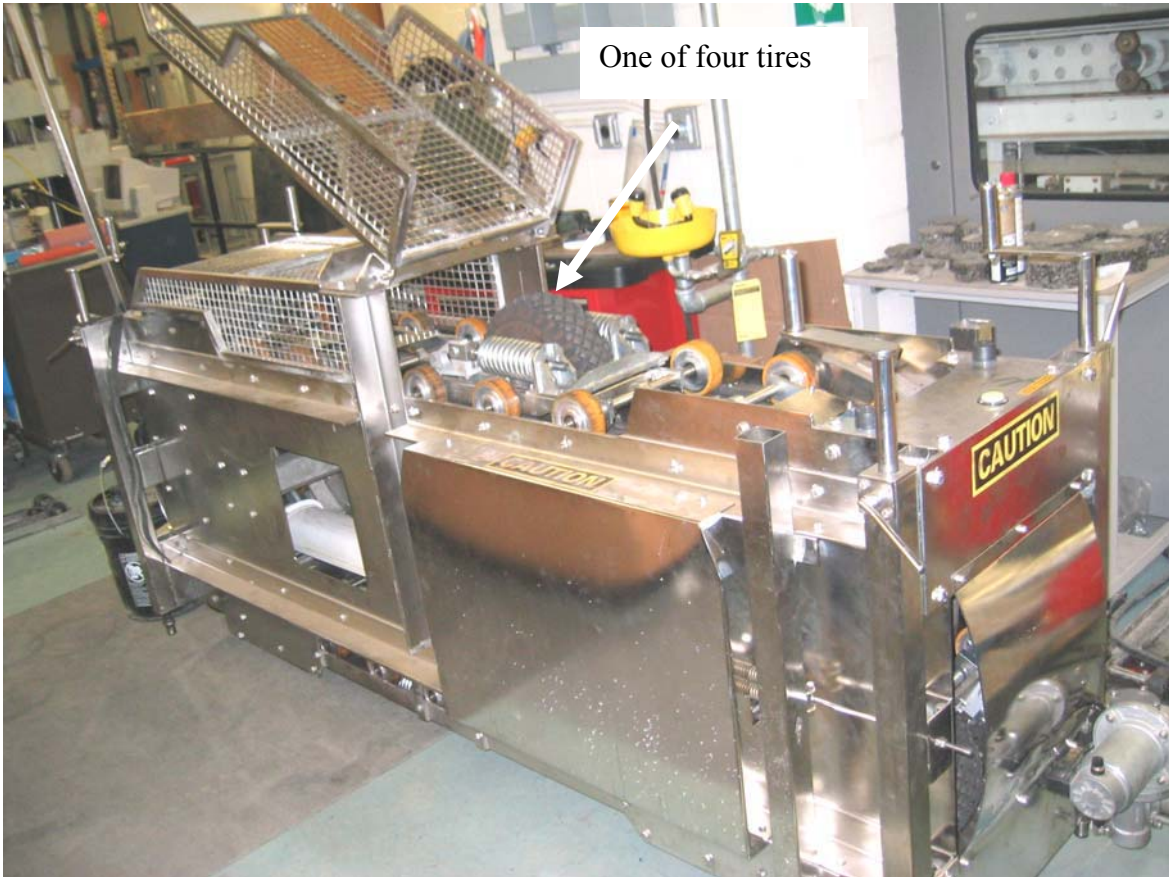


Figure 2. Model Mobile Load Simulator 3



Duct from air conditioning unit

Table 1. Location of environmental chamber in the factory
Figure 3. Environmental chamber being lowered

No. of bogies 4 No. of axles per bogie 1 Wheels per axle 1 Wheel diameter 300 mm Tire width 80 mm Lateral spread of tracks from centerline 0 to 80 mm Maximum tracking width 240 mm Nominal load per wheel 1900 N (560 kPa) 2700 N (800 kPa) Load setting Load cell calibration Load control Automatic Tire footprint area 34 cm ² Tire contact pressure 560 - 800 kPa Nominal speed 2.5 m/s Nominal wheel load applications per hour 7 200 Nominal motor supply voltage 220 V AC single phase Power consumption 1 500 Watt max.	Dimensions: length 2 400 mm Width 600 mm Height 1 150 mm Weight 800 kg
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Table 2. Proposed test matrix

Condition	Fatigue								Rutting							
	Mix								Mix							
	9.5 mm NMAS				12.5 NMAS				9.5 mm NMAS				12.5 NMAS			
	Density, % of TMD				Density, % of TMD				Density, % of TMD				Density, % of TMD			
	88	91	94	97	88	91	94	97	88	91	94	97	88	91	94	97
Dry, 60°C									X	X	X	X	X	X	X	X
Dry, 20°C	X	X	X	X	X	X	X	X								
Wet, 60°C									Selected Mixes							
Frozen	Selected Mixes															

Note: X denotes one slab

Supplemental Laboratory Testing

In addition to the accelerated loading tests to be performed in Task 4, the PIs are proposing that limited laboratory testing be performed on the mixtures using the Simple Performance Tests developed as part of NCHRP Project 9-19. These tests will provide additional information on the predicted performance of the mixtures and its relationship to density.

Specimen Fabrication

The asphalt mixture specimens to be tested in this research will be fabricated in the laboratory. The asphalt binder and aggregate will be heated and mixed together in the appropriate proportions for each mixture type. The loose mixture will be compacted into cylindrical specimens 150 mm in diameter and approximately 180 mm tall using a Superpave Gyratory Compactor (SGC). The final test specimens will be cut and cored from the gyratory cylinders thus producing specimens with the most consistent air void distribution in both the vertical and radial directions based on the study by Chehab et al. (2000).

Standard Mixture Tests

The specimens for this project will be fabricated with final air void contents of $9 \pm 0.5\%$, $6 \pm 0.5\%$, and $3 \pm 0.5\%$. The air void content of a compacted specimen is calculated from measurements taken while performing the following standard tests:

- ASTM D 3549 – Method for Determining Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
- AASHTO T 166 – Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens.
- AASHTO T 209 – Maximum Specific Gravity of Bituminous Paving Mixtures.

Complex Modulus Test

The complex modulus test measures the response of the material to cyclic loading at different frequencies (usually ranging from 1-30 Hz) in the undamaged state. Asphalt concrete is a viscoelastic material, meaning that its response to a particular load depends on the magnitude of the load, the rate of application, and the duration of the load. Therefore, it is important to evaluate how the material responds to different frequencies or rates of loading, which correspond to the different traffic speeds a pavement could experience in the field. The complex modulus test consists of applying a haversine load history to the specimen at different frequencies. The

load amplitude is adjusted based on the material stiffness, temperature, and frequency to keep the strain response within the linear viscoelastic range (Daniel 2001, Chehab 2002).

The dynamic modulus, $|E^*|$, at each frequency is calculated by dividing the steady state stress amplitude (σ_{amp}) by the strain amplitude (ε_{amp}) as follows:

$$|E^*| = \frac{\sigma_{amp}}{\varepsilon_{amp}} \quad (1)$$

The phase angle, ϕ , is related to the time lag, Δt , between the stress input and strain response and the frequency of testing:

$$\phi = 2\pi f \Delta t \quad (2)$$

where f is the loading frequency. As the testing temperature decreases or the rate (frequency) increases, the dynamic modulus increases and the phase angle decreases due to the time dependence or viscoelasticity of the material. The dynamic modulus is a measure of the stiffness of the material at a particular frequency and temperature whereas the phase angle indicates the relative amount of viscous or elastic response. A material with a phase angle of zero is purely elastic (instantaneous strain response to load) and a phase angle of 90° indicates a purely viscous material. The dynamic modulus and phase angle will be used to describe the linear viscoelastic material properties under various loading and environmental conditions.

Static Creep Compliance

The creep compliance test applies a constant load for a period of time and measures the strain response. The asphalt concrete will continue to deform under the constant load. The deformation or strain response can be divided into three zones:

1. Primary zone – where the strain rate decreases with loading time;
2. Secondary zone – where the strain rate remains constant with loading time; and
3. Tertiary zone – where the strain rate increases with loading time.

The creep compliance is calculated using the quasi-elastic method to approximate the linear viscoelastic convolution integral (Kim et al., 1995):

$$D(t) = \frac{\varepsilon(t)}{\sigma(t)} \quad (3)$$

Creep compliance is one of the basic linear viscoelastic material properties used to describe the behavior of the material. Additionally, the time at which the tertiary zone begins (flow time) is

one of the parameters needed for the Simple Performance Test (Witczak et al. 2002, Kaloush and Witczak 2002, Pellinen and Witczak 2002).

Repeated Load Permanent Deformation

In this test, a load cycle consisting of a 0.1s haversine pulse followed by a 0.9s rest is repeatedly applied to the specimen. The cumulative permanent deformation of the test specimen is measured as a function of loading cycles. The permanent deformation response under cyclic loading displays the same three zones as the static creep compliance test. The number of cycles at which the tertiary zone begins (flow number) is a parameter used in the Simple Performance Test.

Master Curve Construction

Due to the temperature and rate dependent nature of asphalt concrete, it is necessary to describe the material behavior over a wide range of temperatures and loading rates, or time. Practical constraints on testing time and equipment constraints associated with collecting data at very short times (10^{-4} seconds) restrict the range of behavior that can be measured from a single test. Asphalt concrete is a thermorheologically simple material, thus the time-temperature superposition principle applies. Using the time-temperature superposition principle, the time and temperature dependent material properties can be represented using reduced time, ξ . For a constant temperature, the reduced time is defined as:

$$\xi \equiv \frac{t}{a_T} \quad (4)$$

where a_T is the time-temperature shift factor. Complex modulus is described as a function of frequency, so in this case reduced frequency, γ , is used:

$$\gamma = f * a_T \quad (5)$$

The same value of a_T at a particular temperature applies to any of the viscoelastic material properties. The data obtained from testing at several individual temperatures are shifted along the time or frequency axis to construct a master curve, from which the material properties at any temperature or rate of loading can be determined by simply shifting the master curve to the desired range using the time-temperature shift factors. The complex modulus and static creep tests will be performed over a range of temperatures for master curve construction.

Task 5: Determine the relationship between pavement density and performance. During this phase researchers shall refer to the findings of NCHRP 9-20, “Performance Related specifications for Hot Mix Asphalt Construction” in an attempt to validate the relationship developed between in-place density and pavement life seen at Westrack and compare it to New England pavements. Based on this relationship, recommend appropriate pay adjustments to be applied to HMA pavements based on in-place density test results.

From Task 4, number of load applications to cause failure will be determined for pavements with different densities. The data can be analyzed in two ways – one can either determine load applications to failure for a certain density, after defining failure (such as 10 percent of wheel path area cracked) or one can estimate the extent of cracking (what percentage of wheel path area?) for a specific number of load applications, for a certain density. Note that the former method is applicable in this case (since Task 2 consists of defining pavement failure), although, the latter approach needs to be adopted in order to compare the general form of the models with those obtained from the Westrack study. Next, the “loss” in pavement life will be determined for pavements with low or high densities, relative to pavements with optimum density. This “loss” in life will provide the basis for determination of appropriate pay adjustments. However, note that the final pay adjustment should also depend on the decision tree used by individual state DOTs for rehabilitation of fixed pavements and costs of rehabilitation techniques selected from the tree. Since the scope of work in this project does not include development of life cycle cost, the performance density relationships will have to be treated as the foundation for the pay adjustments. However, one can easily use these models with any established life cycle cost determination procedure, along with a decision tree and rehabilitation costs, to determine the final pay adjustments.

The relationships between predicted performance (from the SPT) and density will also be determined using the supplementary laboratory test data. This data can be used to support the results obtained from the accelerated load testing using the MMLS. This will also allow the research team to compare the performance of the New England mixtures with the WesTrack mixtures that were used to develop the Simple Performance Tests. The applicability of the WesTrack models to New England mixtures can then be evaluated.

6. Significance of Work

The results from the proposed study will provide New England state DOTs with hard reliable data for developing a rational performance related specification, which, along with the currently used statistical QC/QA techniques, will result in superior, long lasting and better performing HMA pavements. This step will ensure the proper implementation of Superpave mix design system and pave the way for gaining confidence in the quality of construction. The performance and financial benefits of quality construction will ultimately be passed on to the tax payers.

7. Equipment Available

All equipment mentioned in this proposal for fabricating and testing slabs is available at the Worcester Polytechnic Institute (WPI) Pavement Engineering laboratory. The researchers and crew are very familiar with the accelerated loading equipment. Sufficient amount of shakedown and trial work have been conducted in past and ongoing projects to ensure smooth construction of test slabs and loading. The equipment required to fabricate test specimens and run the Simple Performance Tests is available at the University of New Hampshire. The researchers have extensive experience running these tests and performing the necessary analysis.

8. Implementation

The final report will contain performance-density relationships and appropriate recommendations for pay adjustments on the basis of actual versus design life of pavements. Recommended mix design criteria and steps for implementation of the new mix design system. The implementation plan will be developed in conjunction with all state DOTs involved in this project to outline the actions that need to be taken to ensure that the results of this research are put into practice.

9. Benefits

The conclusions and recommendations from this study will facilitate the use of a proper specification and quality control procedure, which will ensure that the mixes for HMA pavements are compacted to proper density levels and that end users are assured of proper utilization of funds. A rational basis will enable the DOTs to implement their quality control/assurance process more effectively.

10. Results Dissemination

The project results will be disseminated through an implementation report, and presentations and publications at regional and national level meetings. These include meetings for the North Eastern State Materials Engineers Agency (NESMEA), Region 1 pavement management conference, Asphalt Recycling and Reclaiming Association (ARRA) meetings, Transportation Research Board (TRB) meetings, and Local Technical Assistance Program (LTAP) conferences.

11. References

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Brown, E.R., Collins, R., and Brownfield, J.R. Investigation of Segregation of Asphalt Mixtures in State of Georgia. Presented at the 68th Annual Meeting of the Transportation Research Board, Washington, DC, 1989.

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Witczak, M.W., K. Kaloush, T. Pellinen, M. El-Basyouny, H. VonQuintus (2002). "Simple Performance Test for Superpave Mix Design". NCHRP Report 465, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C.

Zube, Ernest. Compaction Studies of Asphalt Concrete Pavement as Related to the Water Permeability Test. Presented at the 41st Annual Meeting of the Highway Research Board, Washington, DC, 1962.

12. Proposed Team:

The proposed team will consist of Walaa Mogawer (PI) from University of Massachusetts at Dartmouth, Jo Sias Daniel (Co-PI) from University of New Hampshire and Rajib Mallick (Co-PI) from WPI, and Professor Frederick Hugo (consultant).

Professor Mogawer will provide overall supervision and guidance in the execution of the tasks and preparation of reports. He will also conduct laboratory tests at the pavement materials lab of UMASS Dartmouth. Jo Sias Daniel and Rajib Mallick will conduct laboratory tests,

including accelerated pavement loading and testing, with graduate and undergraduate students, and analyze results. Professor Hugo (who developed the MMLS 3) will provide expert advice regarding instrumentation, testing and interpretation of test results, and analysis of data.

13. Schedule of Major Activities:

A schedule of major activities is given in Figure 2. Note that in Task 3 in Phase 1, slabs will be fabricated and stored for future use.

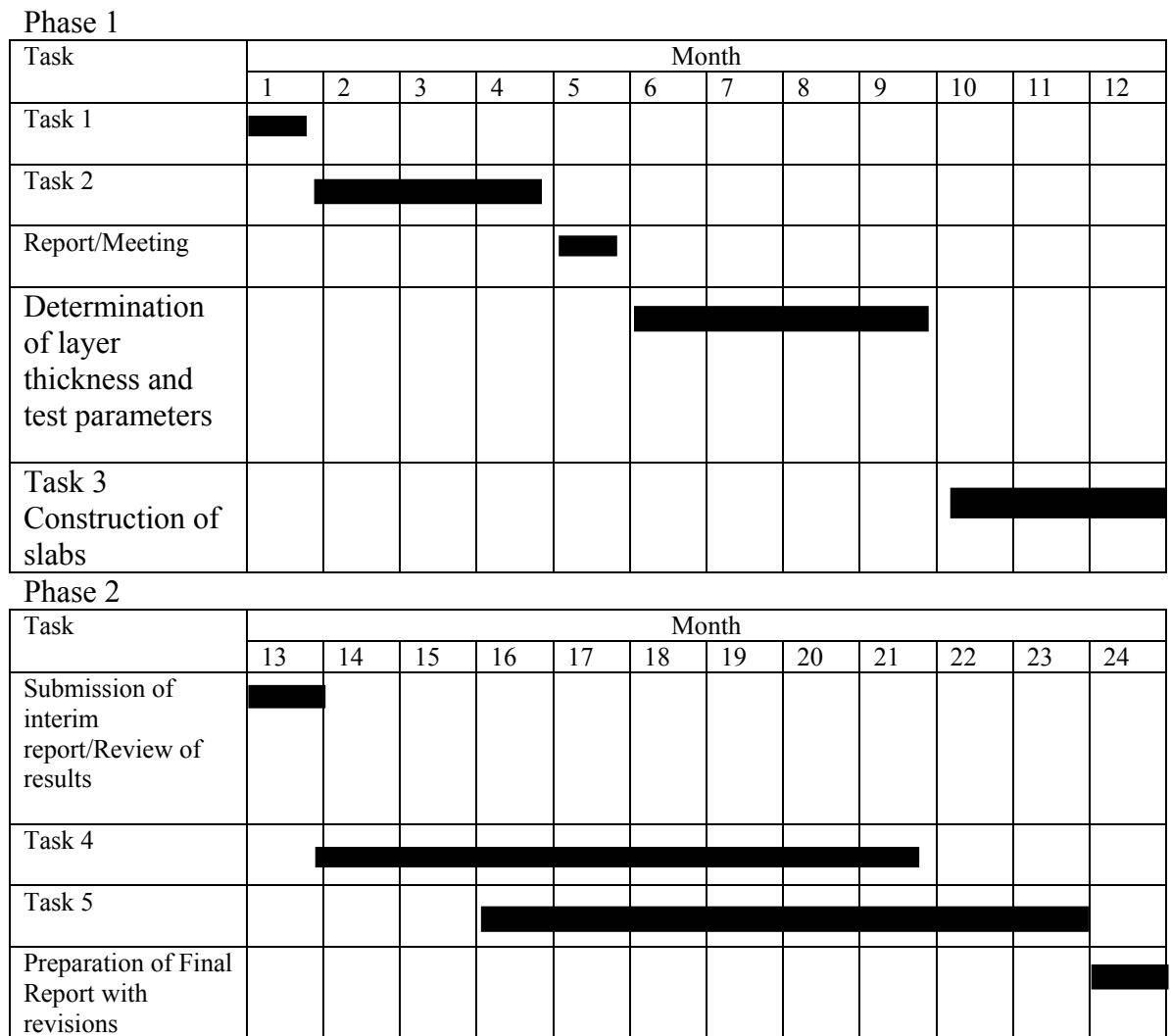


Figure 2. Work Schedule

14. BUDGET AND TOTAL COST:

The budget for the work to be done at UMass Dartmouth, UNH, and WPI is illustrated below:

Budget for UMass Dartmouth

Salaries

Principal Investigator (six summer weeks)	\$ 12,000
Research Assistant (Graduate Student at \$1,200/mo)	14,400
Total Salaries	26,400
Fringe Benefits for @ 1.75 % of salaries	273
Travel- Domestic	500
Other Direct Costs	
Consultant, Prof. Fred Hugo DEng, PhD, PrEng	5,000
Publications	500
Copying and Communications	
Total Direct Costs	32,673
Indirect Costs @ 55.3 % of salaries	<u>14,599</u>
Total	47,272

Subcontract with UNH

Salaries

Co Principal Investigator	3,700
graduate students	2,600
Total Salaries	6,300
Fringe Benefits @ 8.2 % of salaries	517
Other Direct Costs	
Materials and Supplies	500
Total Direct Costs	7,317
Indirect Costs @ 46% of Salaries	<u>3,366</u>
Total Amount Requested	10,683

Subcontract with WPI

Salaries

Co Principal Investigator (one summer month)	9,317
graduate students	14,400
Total Salaries	23,717
Fringe Benefits @ 24.7 % of salaries	2,301
Travel- Domestic	1,000
Other Direct Costs	
Materials and Supplies	1,000
Publications	
Copying and Communications	
Total Direct Costs	28,018
Indirect Costs @ 74.0 % of Salaries	<u>17,551</u>
Total Amount Requested	45,569

TOTAL 103,524

15. Contact Person Within the Principal Investigator's Institution for Establishing an Agreement between NETC and University of Massachusetts Dartmouth

Name	Michelle Plaud
Position or Title	Assistant Director
Department	Grants and Contracts
Address	UMass Dartmouth 285 Old Westport Rd. North Dartmouth, MA 02747-2300
Telephone	508 999 9112
Fax	508
Email	Mplaud@umassd.edu

16. APPENDIX: Relevant Experience and Resume of the Principal Investigators and Consultant

Dr. Walaa S. Mogawer, PI, has extensive experience in the design of different types of asphalt mixtures, Superpave technology, and asphalt mixtures modifiers. Currently, he is working to develop a moisture damage test that is compatible with the weather conditions of Massachusetts. Also, he is working on assisting the State of Massachusetts in its efforts to implement Superpave – this includes preparing Superpave mixtures, verifying plant produced mixtures, and train state and industry engineers on the Superpave. Dr. Mogawer is working with the six states of New England to evaluate the permeability of HMA, in particular, Superpave mixtures. In the past several years he has served as a consultant to the Federal Highway Administration (FHWA) on several studies. The most recent study determines the benefits of adding polymers to asphalt binders and validates asphalt binder tests and asphalt mixture tests that provide the relative performance of these materials. Other studies involved the use of the FHWA's Accelerated Loading Facility (ALF) to validate Superpave binder and mixture tests and other mixture tests that have been developed to predict rutting and fatigue of HMA, the evaluation of the effect of coarse aggregate content and mineral fillers on stone matrix asphalt and the evaluation of test methods that are used to quantify sand shape and texture.

Dr. Rajib B. Mallick, Co- PI, has extensive experience in design of asphalt mixtures, Superpave technology, and recycling of asphalt mixtures. He received a Ph.D. in Civil Engineering from Auburn University and joined the faculty at Worcester Polytechnic Institute (WPI) in 1998. Before coming to WPI, Dr. Mallick worked as a Senior Research Associate at the National Center for Asphalt Technology (NCAT). While at NCAT he worked in numerous research projects on pavement material mix design and construction for the National Asphalt Pavement Association (NAPA), the Federal Highway Administration (FHWA), the National Cooperative Highway Research Program (NCHRP), and different state transportation departments (DOT). He has developed training materials, and co-authored a textbook for a FHWA training course on recycling of asphalt pavements. Dr. Mallick has been working on permeability, moisture damage, mix design, QC/QA and design of foamed asphalt mixes specifically for the New England state DOTs for the last four and half years. He is a member of the Transportation Research Board (TRB) Committee A2D02 and Association of Asphalt Paving Technologists.

Dr. Jo Sias Daniel, Co-PI, has extensive experience in the constitutive modeling and characterization of asphalt mixtures. She received a Ph.D. in civil engineering from North Carolina State University in May of 2001 before joining the faculty at the University of New Hampshire (UNH) in August of that year. Currently, she is working on a project funded by the Recycled Materials Resource Center (RMRC) at UNH on characterizing the material properties of mixtures containing various percentages of RAP. Dr. Daniel has authored and co-authored several papers that have been published in the Transportation Research Record, ASCE Journal of Materials in Civil Engineering, and Journal of the Association of Asphalt Paving Technologists. She is a member of TRB Committee A2D04, AAPT, International Society for Asphalt Pavements (ISAP), and ASCE.

Dr Fred Hugo, consultant, has specialized in pavement engineering and works internationally in that field. During his career he worked as a contractor for three years, following this as a resident engineer on construction sites for four years, before becoming founding partner of a consulting engineering company in 1965. He remained in that capacity for 13 years before becoming professor in Civil Engineering at the University of Stellenbosch in 1978. Since 1987 he has also been working part-time at the University of Texas at Austin as a research fellow. In 1995 he retired from formal teaching, concentrating on research and specialist consultancy. During his career Dr. Hugo has been actively involved with APT for more than 30 years. He has visited and studied accelerated pavement testing devices in The Netherlands, Spain, Switzerland, Japan, England, and France as well as South Africa and United States. In March 1998 he was awarded a DEng-degree by the University of Stellenbosch for a submission on his work in this field. He is also co-patent holder of the MLS. His PhD research dealt with the development of premature surface cracking in asphalt pavements. Dr. Hugo is recognized as a leading authority on accelerated pavement testing (APT) and he was the first to report on the effects of low temperature and artificially induced aging on APT. His particular interest in pavement engineering has also led him to develop several innovative solutions to problems particularly in diagnostic investigations and construction engineering. The most recent of these is the use of Surface Wave Spectral Analysis Techniques (SASW) to monitor the development of micro fracturing and fatigue damage during APT. He has also been pioneering the use of the one-third-scale model mobile load simulator (MMLS3) as a performance prediction tool to supplement full-scale APT devices.

RESUME

WALAA S. MOGAWER, Ph.D., P.E.
Department of Civil & Environmental Engineering
285 Old Westport Rd.
University of Massachusetts Dartmouth
North Dartmouth, MA 02747

Phone: (508) 999-8464 (*office*)
(508) 999-8964 (*fax*)
E-Mail: wmogawer@umassd.edu

PRESENT POSITION:

Associate Professor of Civil Engineering

EDUCATION:

- Ph.D. Civil Engineering: Studying the effects of deicing additives on the properties of asphaltic materials in terms of their resistance to permanent deformation, moisture damage and low temperature cracking.
University of Rhode Island, Kingston, RI, May 1989.
- M.Sc. Civil Engineering
University of Rhode Island, Kingston, RI, May 1984.
- B.Sc. Civil Engineering
Kuwait University, Kuwait, May 1981.

ADDITIONAL EDUCATION:

SUPERPAVE Mixture Test Equipment, The Asphalt Institute, Lexington, Kentucky,
March 6-10, 1995.

SUPERPAVE Binder Test Equipment, The Asphalt Institute, Lexington, Kentucky,
November 7-11, 1994.

AutoCAD Level One - Operating Systems and Applications, New England Institute of
Technology, Warwick, Rhode Island, August 11-18, 1992.

NHI course 13114 - Highway Pavements, Michigan State University, East Lansing,
Michigan, March 4-29, 1991.

Professor Training Program in Asphalt Technology, National Center for Asphalt
Technology, Auburn University, Auburn, Alabama, June 11-22, 1990.

Instron's Operator Training Course, No. 2150 OP-0121, Canton, Massachusetts,

December 12-16, 1988.

PROFESSIONAL EXPERIENCE

RESEARCH EXPERIENCE:

Sponsored Research:

Research Project: "Evaluation of Permeability of Superpave Mixes"

Sponsored by: New England Transportation Consortium.

Duration: 2000-2001

Role in Project: Principle Investigator

Research Project: "Evaluation of Use of Manufactured Waste Shingles in Hot Mix Asphalt"

Sponsored by: Chelsea Center for Recycling and Economic Development, UMASS.

Duration: 2000-2001

Role in Project: Co-Principle Investigator

Research Project: "Updating Mass Highway Distress Manual"

Sponsored by: Massachusetts State Highway Department.

Duration: 2000-2001

Role in Project: Principle Investigator

Research Project: "Implementation of SuperpaveTM Technology"

Sponsored by: Massachusetts State Highway Department.

Duration: 1997-2000

Role in Project: Principle Investigator

Research Project: "A Procedure for Correlating Distress/Ride Indices"

Sponsored by: Massachusetts State Highway Department.

Duration: 1995-1997

Role in Project: Principle Investigator

Research Project: "Freeze and Thaw Study"

Sponsored by: Massachusetts State Highway Department

Duration: 1996-1997

Role in Project: Principle Investigator

Research Project: "Evaluation of the Road System in Massachusetts"

Sponsored by: Massachusetts State Highway Department

Duration: 1996-1997

Role in Project: Principle Investigator

Research Project: "Phase Two: ADA Compatible Soft-Surface Multi-Use Trail"

Sponsored by: Massachusetts State Highway Department

Duration: 1996-1997

Role in Project: Principle Investigator

Research Project: "ADA-Compatible and Environmentally Sensitive Soft-Surface Trail Materials for Construction of Multi-Use Trails"

Sponsored by: Massachusetts State Highway Department

Duration: 1994-1995

Role in Project: Principle Investigator

Research Project: "Structural Numbers for Reclaimed Base Course Mix"

Sponsored by: Massachusetts State Highway Department

Duration: 1994-1995

Role in Project: Co-Principle Investigator

Research Project: "Enhancing the Materials Testing Laboratory at UMass Dartmouth"

Sponsored by: National Science Foundation

Duration: 1993-1994

Role in Project: Principle Investigator

Consulting:

Research Project: "Evaluation of Complex Polymer-Modified Asphalt Binders"

Project sponsored by: Federal Highway Administration

Duration: 5/2000 to 3/2001

Research Project: "Preparing Superpave Specimens using Different SGC Angles"

Project sponsored by: The Asphalt Institute

Duration: 8/2000 – 11/2000

Research Project: "Validation of Superpave Binder and Mixture Tests and Other Mixture Tests Using the FHWA's Accelerated Loading Facility"

Project sponsored by: Federal Highway Administration

Duration: 5/1995 to 9/1995, 5/1996 to 3/1997, 5/1997 to 3/1998, and 5/1998 to 3/1999

Research Project: "Effects of Different Mineral Fillers on Stone Matrix Asphalt Properties"

Project sponsored by: Federal Highway Administration

Duration: 5/1994 to 9/1994.

Research Project: "Study of Stone Mastic Asphalt Gradations"

Project sponsored by: Federal Highway Administration

Duration: 05/1993 to 09/1993.

Research Project: "Evaluation of Stone Mastic Asphalt Mixtures versus Dense Graded Mixtures"

Project sponsored by: Federal Highway Administration

Duration: 05/1992 to 09/1992.

Research Project: "**Evaluation of Test Methods Used to Quantify Sand Shape and Texture**"

Project sponsored by: Federal Highway Administration

Duration: 05/1991 to 09/1991.

Publications:

Refereed Publications

Pedro R. and Mogawer, W.S., Evaluation of the Superpave Shear Tester Using 19 mm Mixtures From the Federal Highway Administration's Accelerated Loading Facility. Association of Asphalt Paving Technologists Journal, 1998.

Pedro R. and Mogawer, W.S., Evaluation of the Superpave Shear Tester's Ability to Discern Two Mixtures with Different Size Aggregates Using the Federal Highway Administration's Accelerated Loading Facility. Transportation Research Board, 1998.

Stuart, K.D. and Mogawer, W.S., Validation of Asphalt Binder and Mixture Tests that Predict Rutting Susceptibility Using the Federal Highway Administration's Accelerated Loading Facility. Association of Asphalt Paving Technologists Journal, 1997.

Bonaquist, R. and Mogawer, W.S., Analysis of Pavement Rutting Data from the FHWA Pavement Testing Facility Superpave Validation Study. Transportation Research Board, 1997.

Mogawer, W.S., and Stuart, K.D., "Effect of Mineral Fillers on the Properties of Stone Matrix Asphalt." Transportation Research Board, 1996, pp. 86-94.

Mogawer, W.S., and Stuart, K.D., "Effect of Coarse Aggregate Content on Stone Matrix Asphalt (SMA) Rutting and Draindown." Transportation Research Record, 1995, pp.1-11.

Stuart, K.D., and Mogawer, W.S., "Effect of Coarse Aggregate Content on Stone Matrix Asphalt (SMA) Durability and Low-Temperature Cracking." Transportation Research Board, 1995, pp. 26-35.

Mogawer, W.S., and Stuart, K.D., "Evaluation of Stone Mastic Asphalt Mixtures versus Dense-Graded Mixtures." Transportation Research Record, No. 1454, Transportation Research Board, 1994, pp. 58-65.

Stuart, K.D., and Mogawer, W.S., "Evaluation of Natural Sands Used in Asphalt Mixtures." Transportation Research Record, No. 1362, Transportation Research Board, 1992, pp. 28-37.

Mogawer, W.S., and Stuart, K.D., "Evaluation of Test Methods Used to Quantify Sand Shape and Texture," Transportation Research Board, 1992.

Stuart, K.D., and Mogawer, W.S., "Laboratory Evaluation of Verglimit and PlusRide", Public Roads, December 1991.

Lee, K.W., Mogawer, W.S., and Veyera, G.E., "Application of Waterjet Cutting for Pothole Repair", Proceedings of the First Materials Engineering Congress, Materials Engineering Division/ASCE, August 1990, pp. 1256-1265.

Mogawer, W.S., Stuart, K.D., and Lee, K.W., "An Evaluation of Deicing Additives on Properties of Asphalt Mixtures", Transportation Research Record, No. 1228, Transportation Research Board, 1989, pp. 41-53.

Bonaquest, R., Roger, S., and Mogawer, W.S., "Effect of Tire Pressure on Flexible Pavement and Performance", Transportation Research Record, No. 1227, Transportation Research Board, 1989, pp. 97-106.

Lee, K.W., and Mogawer, W.S., "Utilization of Oil Spill Cleanup Debris into Bituminous Concrete Mixtures", Australian Road Research Board, 1988, pp. 54-64.

Technical Reports

Stuart K. D, Mogawer, W.S. and Romero, P., "Validation of Asphalt Binder and Mixture Tests that Measure Rutting Susceptibility Using the Accelerated Loading Facility." FHWA, September 1999.

Mogawer, W.S., "Freeze and Thaw Study." UMTC-97-17, December 1997.

Mogawer, W.S., "Evaluation of the Road System in Massachusetts." UMTC-97-11, December 1997.

Mogawer, W.S., "Phase Two: ADA Compatible Soft-Surface Multi-Use Trail." UMTC-97-19, December 1997.

Mogawer, W.S., "Correlation of Pavement Distress/Ride Indices." UMTC-96-7, December 1997.

Stuart, K.D., and Mogawer, W.S., "Evaluation of Natural Sands Used in Asphalt Mixtures." FHWA/RD/93/070, March 1993.

Mogawer, W.S., and Stuart K.D., "Laboratory Evaluation of Verglimit and PlusRide", FHWA/RD-91/013.

Kim, T.J., Lee, K.W., Veyera, G.E., Mogawer, W.S. and J. Zheng, "Utilization of a Waterjet Cutting Unit for Infrastructure Management." Final Report to the Region One University Transportation Center, Department of Civil and Environmental Engineering, University of Rhode Island, Kingston, RI, January, 1990.

Invited Papers:

“Validation of Asphalt Binder and Mixture Tests that Predict Rutting Susceptibility Using the Federal Highway Administration’s Accelerated Loading Facility.” Association of Asphalt Paving Technologists Journal, 1997.

"Effect of Coarse Aggregate Content on Stone Matrix Asphalt (SMA) Rutting and Draindown." The 74th Annual Meeting of Transportation Research Board, Washington, DC, January 1995.

"Evaluation of Stone Matrix Asphalt Mixtures versus Dense-Graded Mixtures." The 73rd Annual Meeting of Transportation Research Board, Washington, DC, January 1994.

"Evaluation of Test Methods Used to Quantify Sand Shape and Texture," the 71st Annual Meeting of Transportation Research Board, Washington, DC, January 1992.

"An Evaluation of Deicing Additives on Properties of Asphalt Mixtures," The 68th Annual Meeting of the Transportation Research Board, Washington, DC, January 1989.

Professional registration:

Registered Professional Engineer in the State of Rhode Island.

Honor society:

Member of Tau Beta Bi Engineering Honor Society.

Member of Tau Alpha Pi National Honor Society.

Professional awards:

The Eisenhower Faculty Fellowship, U.S. Department of Transportation, 1994 & 1995.

The FHWA 1989 Outstanding Technical Accomplishment Award, Federal Highway Administration.

Graduate Research Fellowship, National Highway Institute 9/87 - 7/88:

Conducted and directed research projects to examine the effects of higher tire pressures on flexible pavement using the Accelerated Loading Facility (ALF), and to study the effects of PlusRide and Verglimit deicing additives on asphalt pavement performance.

Technical society memberships:

Asphalt Association of Pavement Technology (AAPT), Member.

American Association for Testing Materials (ASTM).

American Society of Civil Engineers (ASCE), Member. **Member, Bituminous Materials Committee**

ACADEMIC EXPERIENCE:

1989 - Present University of Massachusetts Dartmouth, North Dartmouth, MA.

Associate Professor of Civil & Environmental Engineering – Responsibilities include teaching the following courses: Pavement Design, Highway Engineering, Traffic Engineering, Introduction to Transportation Engineering, Soil Mechanics Laboratory, Engineering Economics, and Statics, and established a Civil Engineering Materials Laboratory to test asphalt, asphalt mixtures, and concrete.

1991 - Present University of Rhode Island, Kingston, RI.

Adjunct Associate Professor - Involved in teaching graduate courses and conducting research program in Transportation Engineering.

1983 - 1989 University of Rhode Island, Kingston, RI.

Graduate Teaching Assistant - Lectured, prepared experiments, and graded homework assignments and laboratory reports for Highway Engineering, Traffic Engineering, Surveying, Steel, and Concrete laboratories.

Instructor - Instructed the senior level courses, Traffic Engineering and Highway Engineering.

Revised 2/3/2003

Rajib B. Mallick, PE, Ph.D.

Assistant Professor

Civil and Environmental Engineering Department

Worcester Polytechnic Institute

Worcester, MA 01609

Phone: (508) 831-5289

Fax: (508) 831-5808

E-mail: rajib@wpi.edu

Personal

1. Education, in chronological order, recent first:

<u>Institution</u>	<u>Date</u>	<u>Degree</u>	<u>Major</u>
Auburn University, AL	1997	Ph.D.	Civil Engineering Advisor: Dr. E. R. Brown
Auburn University, AL	1993	M.S.	Civil Engineering Advisor: Dr. E. R. Brown
Jadavpur University, India	1989	B.C.E (Hons)	Civil Engineering

2. A chronological listing of work experience:

August 1998-Present	Assistant Professor, Civil and Environmental Engineering, Worcester Polytechnic Institute (WPI), Massachusetts
January 1996-July, 1998	Senior Research Associate, National Center for Asphalt Technology (NCAT), Auburn University, Alabama
January 1992-December 1995	Graduate Research Assistant, National Center for Asphalt Technology, Auburn University, Alabama.
August 1989 – December 1992	Assistant Engineer, Ghosh, Bose and Associates, India

Teaching

3. Teaching Experience:

August 1998 to Present	Assistant Professor, Civil and Environmental Engineering, Worcester Polytechnic Institute (WPI), Massachusetts
January 1996 to July, 1998	Senior Research Associate, National Center for Asphalt Technology, Auburn University, Alabama

Taught courses in NCAT Professor's training course and other professional training courses offered by NCAT on Superpave and asphalt technology
Instructed and guided graduate students in research work

4. Teaching innovations at WPI:

Development of a field and laboratory based coursework on asphalt technology with National Science Foundation (NSF) Grant.

Working on pavement course based on Kolb's experiential learning approach, by combining concrete experience, reflective observation, abstract conceptualization and active experimentation

5. Courses taught at WPI:

Undergraduate course: CE 3051: Introduction to Pavement Materials, Design, Construction and Management (Includes Drainage and Soils)

Laboratory course – CE 3054: Asphalt Technology

Pavements part of CE 1030: Introduction to Fundamental of Civil Engineering

Graduate course: CE 538-Advanced Pavement Design

CE 590-Highway Material Characterization

Scholarship

6. Publications:

Refereed:

1. Five Year Evaluation of HMA Properties at the AAMAS Test Projects, Transportation Research Record No. 1454, Transportation Research Board, National Research Council, Washington, D. C., 1994.
2. An Evaluation of Stone-on-Stone Contact in Stone Matrix Asphalt, Transportation Research Record No. 1492, Transportation Research Board, National Research Council, Washington, D. C., 1995.
3. A Laboratory Study on Draindown of Asphalt Cement in Stone Matrix Asphalt (SMA), Transportation Research Record No. 1513, Transportation Research Board, National Research Council, Washington, D. C., 1995.
4. SHRP Properties of Asphalt Cement, Transportation Research Record No. 1488, Transportation Research Board, National Research Council, Washington, D. C., 1995.
5. Potential of Dynamic Creep to Predict Rutting, ASTM STP 1265, American Society for Testing and Materials, 1996.
6. A Study of Longitudinal Joint Construction Techniques in HMA Pavements, Transportation Research Record No. 1543, Transportation Research Board, National Research Council, Washington, D. C., 1996.
7. An Evaluation of SHRP Gyrotory Compaction of HMA, Transportation Research Record No. 1543, Transportation Research Board, National Research Council, Washington, D. C., 1996.

8. Development of a Mix Design Procedure for Stone Matrix (SMA) Asphalt Mixture, Journal of the Association of Asphalt Paving Technologists, Volume 66, 1997.
9. Performance of Stone Matrix Asphalt (SMA) in the United States, Journal of the Association of Asphalt Paving Technologists, Volume 66, 1997.
10. Longitudinal Joint Construction Techniques for Asphalt Pavements, Presented and Published at the Eighth International Conference on Asphalt Pavements in Seattle, Washington August, 1997.
11. Aggregate Tests for Asphalt Paving Mixtures: State of the Practice in North America, Journal of the Canadian Technical Asphalt Association, 1997.
12. An Evaluation of Superpave Gyrotory Compactor, Transportation Research Record No. 1638, Transportation Research Board, National Research Council, Washington, D. C., 1998.
13. A Critical Review of VMA Requirements for Hot Mix Asphalt (HMA), Transportation Research Record No. 1609, Transportation Research Board, National Research Council, Washington, D. C., 1998.
14. An Initial Evaluation of N_{design} for Superpave Gyrotory Compaction of Hot Mix Asphalt, Journal of the Association of Asphalt Paving Technologists, Volume 66, 1998.
15. Development of a Method for Early Prediction of the Asphalt Content of Hot Mix Asphalt (HMA) by Ignition Test, Transportation Research Record No. 1654, Transportation Research Board, National Research Council, Washington, D. C., 1999.
16. Use of Superpave Gyrotory Compactor to Characterize Hot Mix Asphalt (HMA), Transportation Research Record No. 1681, Transportation Research Board, National Research Council, Washington, D. C., 1999.
17. Superpave Construction Issues and Early Performance Evaluations, Journal of the Association of Asphalt Paving Technologists, Volume 67, 1999.
18. Measuring Bulk-Specific Gravity of Fine Aggregates: Development of New Test Method, Transportation Research Record No 1721, Transportation Research Board, National Research Council, Washington, D. C., 2000.
19. Design, Construction and Performance of New-Generation Open-Graded Friction Courses, Journal of the Association of Asphalt Paving Technologists, Volume 68, 2000.
20. Development of A Simple Test for Evaluation of In-Place Permeability of Asphalt Mixes, International Journal of Pavement Engineering, July, 2001.
21. Effect of Mix Gradation on Rutting Potential of Dense Graded Asphalt Mixtures, Transportation Research Record No: 1767, Transportation Research Board, National Research Council, Washington, D. C., 2001.
22. Evaluation of Permeability of Superpave designed Mixes, Presented at the 80th Annual Meeting of the Transportation Research Board, Paper published in Catalog of Practical Papers, Transportation Research Board, National Research Council, Washington, D. C., 2001.
23. Development of a Rational and Practical Mix Design System for Full Depth Reclamation Mixes, Journal of Association of Asphalt Paving Technologists, Volume 69, 2001.
24. Use of the Concept of Pore Pressure in Unsaturated Soils for Evaluation of Rutting Potential of Asphalt Paving Mixes, Presented and published at the 2002 International Conference on Asphalt Pavements in Copenhagen, August 2002.
25. A Laboratory Study of Full Depth Reclamation (FDR) Mixes, accepted for publication in Journal of Transportation Research Board, 2002.
26. Evaluation of Performance of Full Depth Reclamation (FDR) Mixes. Accepted for publication in Journal of Transportation Research Board, 2002.

27. An Alternative Approach for the Determination of Bulk Specific Gravity and Permeability of Hot Mix Asphalt (HMA) in the International Journal of Pavement Engineering, Volume 3, Number 3, September 2002.

Report submitted to TRB Committee A2B04 for publication as a Transportation Research Circular:

Use of Foamed Asphalt in Recycling of Asphalt Pavements

Papers submitted for presentation and publication, Transportation Research Board Meeting 2003, Washington, DC

1. Development of a Rational Procedure for Evaluation of Moisture Susceptibility of Asphalt Paving Mixes.
2. Design, Construction and Early Performance of Foamed Asphalt Full Depth Reclaimed (FDR) Pavement in Maine.
3. Determination of N_{design} for Low Volume Road Hot Mix Asphalt (HMA) Mixes.
4. An Evaluation of Use of Rapid Triaxial Test in Quality Control of Hot Mix Asphalt (HMA).

Refereed conference proceedings, magazine papers and reports:

1. Stone Matrix Asphalt - Properties Related to Mix Design, NCAT Publication No. 94-2, Auburn University, Alabama, 1994.
2. An Evaluation of Change in Aggregate Properties after Ignition Test for Asphalt Content Determination, Presented at the 77th Annual Meeting of the Transportation Research Board held in Washington, D. C. (January, 1998). Published in the Stone Review, June, 1998.
3. Design and Construction of Hot Mix Asphalt Pavement Intersections in Hot Climate, Presented and Published at the 1st International Conference on Performance of Roads, Bridges and Airport Pavements in Arid and Hot Climates, in Dubai U.A.E., March 24-25, 1998.
4. Aggregate Tests for Hot Mix Asphalt: State of the Practice, Transportation Research Circular, Number 479, Transportation Research Board, National Research Council, Washington, D. C., 1999.
5. Open Graded Asphalt Friction Courses: State of the Practice, Transportation Research Circular, E-C005 -- Open-Graded Friction Course: Transportation Research Board, National Research Council, Washington, D. C., 1999.
6. Effect of Aggregate Gradation on Permanent Deformation Potential of Dense Graded Hot Mix Asphalt, Presented and Published at the Seventh Conference on Asphalt Pavements for Southern Africa, 1999.
7. Binder Selection for Asphalt Pavement Recycling, Published in the Proceedings of the 5th ASCE Materials Engineering Conference in Cincinnati, 1999.
8. Testing of Hot Mix Asphalt (HMA) with the Asphalt Pavement Analyzer, Presented and published at the International Conference on Accelerated Pavement Testing in Reno, 1999.
9. Evaluation of Asphalt Pavement Analyzer for HMA Mix Design, NCAT Report # 99-4, Auburn University, June 1999.
10. An Evaluation of Permeability of Superpave Mixes used in Maine, Maine Department of Transportation, Augusta, ME 1999.
11. Use of recycled shingles in hot mix asphalt, Presented and published at the International Conference on Environmentally Conscious Manufacturing, Boston, November, 2000.

12. Evaluation of Permeability of Superpave Mixes. Final Report, Project NETC 00-2. New England Transportation Consortium., University of Connecticut, 2002.
13. Relationship of Superpave Gyrotory Compaction Properties to HMA Rutting Behavior. NCHRP Report 478, TRB, National Research Council, Washington DC, 2002.

Education Related Papers

1. Development of A Field And Laboratory Based Coursework in Asphalt Technology. Published as Proceeding of the ASEE Annual conference in Albuquerque, NM, June, 2001.
2. Opening the Window of Sustainable Development to Future Civil Engineers, paper accepted for publication in the ASCE Journal of Professional Issues in Engineering Education and Practice, 2002.

Book:

1. Recycling of Asphalt Pavements, for State and Local Government, Participant's Reference Book, Publication for the Federal Highway Administration, FHWA-SA-98-042, Washington, D. C, 1998.
2. Chapter on Emerging Materials in Asphalt, in *Emerging Materials in Construction Materials*, ASCE, 2000.

7. Funded Projects (at National Center for Asphalt Technology, NCAT, 1992-1997)

Capacity: Project Manager

Title	Funding Agency
Development of ignition testing method for asphalt content	National Asphalt Pavement Association (NAPA)
Design and Construction of Open Graded Friction Course (OGFC) Mixes	National Asphalt Pavement Association (NAPA)
Development of an improved method for determination of specific gravity of aggregate	National Asphalt Pavement Association (NAPA)
Development of a training manual for recycling, for state DOT and local governments.	Federal Highway Administration (FHWA)
Evaluation of different types of longitudinal joint	National Asphalt Pavement Association (NAPA)
Design, construction and performance of Stone Matrix Asphalt (SMA)	National Asphalt Pavement Association (NAPA)

(Continued)

Funded Projects: At WPI, 1998 – present (Total amount of funds generated in 4 years: \$680,000)

Title	Funding Agency
Development of Pavement Recycling Training Course	Federal Highway Administration
Evaluation of Permeability of Superpave Mixes	Maine Department of Transportation
Evaluation of Use of Manufactured Waste Shingles in Hot Mix Asphalt	Chelsea Center for Recycling and Economic Development, University of Massachusetts
Development of a Rational and Practical Mix Design System for Full Depth Reclamation (FDR)	Federal Highway Administration / Maine Department of Transportation
Development of a Laboratory and Field Based Coursework for Asphalt Technology	National Science Foundation (NSF)
Development of a New Generation of Energy Saving, Economic and Environment Friendly Asphalt Paving Mixes	Research Development Council (RDC)
Evaluation of Permeability of Superpave Mixes	New England Transportation Consortium
Evaluation of subgrade soils in Maine and verification of full depth reclamation mix design system	Federal Highway Administration / Maine Department of Transportation
Development of a non-destructive testing system for determination of pavement thickness	Infrasense/California department of transportation
Testing and Evaluation of Recycled Mixes with Accelerated Pavement Loading and Testing Equipment	Palmer Paving Corporation
Design of Superpave HMA for Low Volume Roads	New England Transportation Consortium
Field Evaluation of a New Compaction Device	New England Transportation Consortium
Development of a Testing Protocol for Quality Control/Quality Assurance of Hot Mix Asphalt	New England Transportation Consortium
Evaluation of Effect of Thickness of Hot Mix Asphalt Layer on Pavement Performance Through Accelerated Loading and Testing	Maine Department of Transportation
Research on Transportation Projects – Selected as one of the three universities for conducting research	Vermont Agency of Transportation
Determination of Structural layer Coefficient for Roadway Recycling Using Foamed Asphalt	Maine Department of Transportation

8. List of collaborating industries and agencies in funded and in-house WPI projects:

InstroTeck, Inc.
Palmer Paving Corporation
Pine Instruments
Aggregate Industries
Maine, Nevada, New York, Connecticut, Massachusetts, Vermont, Rhode Island and New Hampshire DOTs
Massachusetts Port Authority
Advanced Testing Company
All States Asphalt
Edward and Kelcey
Bimasco

9. Presentations at professional meetings:

Invited presentations for:

Southeastern User Producer Group Meeting, Williamsburg, VA, 1997.
Alabama DOT Conference at Montgomery, AL, 1998.
Massachusetts Research Showcase, in Boston, MA, 1998.
Maine Department of Transportation, at Bangor, ME, 1998.
Northeast State Materials Engineers Agency (NESMEA) Conference at Waterbury, CT, 1998.
Region 1 Pavement Managers Conference, Providence, RI, 1998.
District 3 Office, Massachusetts Highway Department, Worcester, MA, 1999.
TransTech Industries, Schenectady, New York, 1999.
Advanced Asphalt Testing, Campbell Hall, NY, 1999
New York Department of Transportation, Albany, NY, 1999
Massachusetts Port Authority, Logan International Airport, Boston, MA, 1999
Bardon Trimount Inc., Saugus, MA, 1999
Pike Industries, Belmont, NH, 1999
Massachusetts Aggregate and Asphalt Pavement Association (MAAPA) Board Meeting, Marlboro, MA, 1999
New Hampshire Department of Transportation, Concord, NH, 1999
Maine Department of Transportation, Augusta, ME, 1999.
National Center for Asphalt Technology, Auburn, Alabama, 1999.
Maine Department of Transportation, Augusta, ME, 2000.
Transportation Research Board Meeting, 2000
Worcester Department of Public Works, 2000.
Worcester Department of Public Works, 2000.
Expert Task Group, Federal Highway Administration, 2000.
Chelsea Center for Recycling and Economic Development, 2000
NCHRP Panel on Project 61 "Development of a Pavement Thickness/Density Meter", 2000
Rhode Island Department of Transportation, 2000.
Northeast State Materials Engineers Agency (NESMEA) Conference in Portland, ME, 2000. (2 presentations)
Northeast Asphalt User producer Group Meeting, Portland, ME, 2000.
Transportation Research Board Meeting, Washington, D.C., 2001 (2 presentations)
Northeast Asphalt User producer Group, Albany, NY, 2001

International Conference on Beneficial Use of Recycled Materials, Washington, D.C., 2001.
Research in Highway Infrastructure Program. Invited lecture at University of Rhode
Island Transportation Center, URI, 2001
Results of research on full depth reclamation. Maine Department of Transportation, Augusta,
ME, 2001
Permeability of Hot Mix Asphalt. Northeast State Materials Engineers Agency (NESMEA)
Conference in Albany, NY, 2001
Design of Low Volume Roads. Expert Task Group Meeting, WPI Hot Mix Asphalt Research at
WPI, 2001
Massachusetts Aggregate and Asphalt Pavement Association, Marlboro, MA. 2001
Laboratory Study of Full Depth Reclamation Mixes. Transportation Research Board,
Washington, DC., 2002
Porosity of Hot Mix Asphalt. Presentation at Transportation Research Board committee
meeting., 2002.
Full Depth Reclamation, Maine Department of transportation (DOT), Augusta, 2002.

10. Patents:

“Lateral Pressure Indicator for Evaluation of Rutting Potential of Asphalt Paving Mixes” –
Patent pending.

11. Involvement in graduate and undergraduate research programs:

Thesis Advising:

Hla Ki, MS (May, 2000)

David Bonner, MS (May, 2002)

Shelly Friedman, Ph.D.(Interdisciplinary studies, Social science and Civil Engineering)
(scheduled to graduate in December, 2002)

Sudip Bhattacharjee, Ph.D.

Yamini Nanagiri, Ph.D.

12. Consulting:

Consultant to the Asphalt Institute in the NCHRP (9-16) Project: Relationship between
Superpave Gyrotory Compaction Properties and Permanent Deformation of Pavements in
Service (completed)

Consultant to ATC: Design and testing of high performance Hot Mix Asphalt (HMA) for air port
alleyway in Logan International Airport, Boston, MA (completed and ongoing)

Consultant to University of Massachusetts at Dartmouth on NETC Project “Study of Asphalt
Joints in New England Bridges” (ongoing).

Consultant to Geotesting Express in project on evaluation of synthetic aggregates

13. Registration: Professional Engineer (PE), Massachusetts, License No. 45231

Service, Awards:

14. Memberships and offices held in professional society:

- Member of American Society for Testing and Materials, Committee D04, Road and Paving Materials
- Member of Transportation Research Board Committee A2D02
- Member of Association of Asphalt Paving Technologists
- Member of ASCE Highway Construction and Maintenance Technical Committee

15. Presentations and professional meeting:

Conducted workshop on Recycling of asphalt pavement (for FHWA) for state and local engineers at:

Gainesville, FL
 Waterbury, CT
 Columbus, OH
 Salt Lake City, UT
 Las Vegas, NV

16. Editorial and referee service:

1. Session chair for: Recycling of Asphalt Pavement at the 5th ASCE Materials Engineering Conference in Cincinnati, OH, 1999.
2. Civil Engineering education – the role of practitioner in the class room. Civil Engineering Annual Conference & Exposition 2000, Seattle, October 2000.
3. Session chair for 2000 Conference on Environmentally Conscious Manufacturing, Boston, November 2000.

Pavement Quality Reviewer: Connecticut Department of Transportation

Peer Reviewer for:

Transportation Research Board Committee A2D02, A2D03
 ASCE Journal of Construction Engineering and Management
 ASCE Journal of Materials in Civil Engineering
 Association of Asphalt Paving Technologists (AAPT)
 Connecticut Cooperative Highway Research Program
 International Journal of Pavement Engineering,
 University of Rhode Island Transportation Center

Member of Review Panel for NCHRP Idea Project 61 "Development of a Pavement Thickness/Density Meter"

Member of Committee on Web Page Development: Association of Asphalt Paving Technologists (AAPT)

17. WPI committee and administrative assignments, departmental and college-wide:

(a) Service to departments and programs

- Worked with Academic Technology Center on improvement of departmental web pages
- Served in a committee to update course catalogs and develop course requirement

flowchart

- Served as champion for three outcomes (Probability and Statistics, Apply the Data to Practical Engineering Problems and An Ability To Learn Independently) for ABET accreditation preparation

(b) Service to Institute

- Working as facilitator of the Pavement Materials area under the Materials Engineering and Technology thrust area
- Developed presentation and advertisement materials for the Pavement Materials thrust area for WPI campaign
- Worked with the WPI communications group in development of brochure for graduate program at WPI (arranged photo shoots and provided interview)
- Worked with Palmer Paving Corporation in securing a gift of 50K for the asphalt laboratory

18. Honors, awards and recognition:

Runner-up for W.J. Emmons Award for Best Technical Paper, Association of Asphalt Paving Technologists (1997)

Recipient of President's Teaching Development Award, Worcester Polytechnic Institute (1998)

Teaching Technology Fellowship (2002)

RESUME

Jo Sias Daniel, Co-PI

Department of Civil Engineering
University of New Hampshire
33 College Road
Durham, NH 03824
Phone: (603) 862-3277
Fax: (603) 862-2364
E-mail: jo.daniel@unh.edu

EDUCATION

Ph.D., Civil Engineering, North Carolina State University, *May 2001*
M.S., Civil Engineering, North Carolina State University, *August 1996*
B.S., Civil Engineering, University of New Hampshire, *May 1994*

PROFESSIONAL EXPERIENCE

Assistant Professor, UNH, *August 2001-present*
Post-Doctoral Research Associate, NCSU, *Summer 2001*
Graduate Research Assistant, NCSU, *1998-2001*
Graduate Teaching Assistant, NCSU, lab instructor, *1997-8*
Graduate Research Assistant, NCSU, *1994-7*
Undergraduate Research Assistant, NCSU NSF REU Program, *Summer 1993*
Undergraduate Research Assistant, UNH, *1992-3*

PROFESSIONAL DEVELOPMENT

ASCE ExCEED Teaching Workshop, *July 2002*
Engineering Education Scholars Program, *Summer 2001*
New Faculty Workshop, NCSU College Of Engineering, *August 2000*
Graduate Teaching Workshop, NCSU Graduate School, *April 1998*

HONORS

Dwight D. Eisenhower Transportation Graduate Fellowship, National Highway Institute, *2000-1*
GE Faculty for the Future Teaching Fellowship, NCSU College of Engineering, *2000-1*
Mentored Teaching Assistant Program, NCSU College of Engineering, *Fall 2000*
Preparing the Professoriate Program, NCSU Graduate School, *1998-9*
Ward K. Parr Scholarship, Association of Asphalt Paving Technologists, *1995*
NSF Graduate Fellowship Honorable Mention, *1995*
Russell Stearns Scholarship Award, ASCE New Hampshire Chapter, *1993-4*
Civil Engineering Alumni Achievement Award, University of New Hampshire, *1993-4*

HONOR SOCIETIES

Chi Epsilon
Tau Beta Pi
Phi Kappa Phi
Golden Key

ENGINEERING REGISTRATION

Engineer-In-Training Certification, State of New Hampshire

PROFESSIONAL SOCIETY MEMBERSHIPS

Transportation Research Board
Member of Committee A2D04: Characteristics of Bituminous Paving Mixtures to Meet Structural Requirements
Chair of A2D04 Subcommittee on Advanced Models to Understand Behavior and Performance of Asphalt Mixtures
Association of Asphalt Paving Technologists
American Society of Civil Engineers
UNH Student Chapter Adviser
NH Section Newsletter Editor
International Society for Asphalt Pavements
National Society of Professional Engineers
American Society for Engineering Education
New England Transportation Technician Certification Program – Board Member
Northeast Asphalt User/Producer Group
Society of Women Engineers
Order of the Engineer

AWARDS

“ExCEED 2002 Fellow”, ASCE ExCEED Teaching Workshop, United States Military Academy at West Point, 7/28/02-8/02/02, \$2250.

“Petersen Asphalt Research Conference 2002”, Faculty Development Grant, UNH 2002, \$500.

“Mechanistic Properties of Asphalt Mixtures Containing Recycled Asphalt Pavement”, Graduate School Summer Faculty Fellowship, UNH 2002, \$4625.

“Changes in Asphalt Mixture Properties with the Addition of Recycled Asphalt Pavement Material”, Vice President for Research and Public Service Discretionary Research Fund, UNH 2002, \$6850.

“Properties of Asphalt Mixtures Containing RAP”, UNH Recycled Materials Resource Center, 7/01/02-12/31/03, \$68,764.

PUBLICATIONS

Journal Papers

1. Daniel, J.S., and Y.R. Kim, “Development of a Simplified Fatigue Test and Analysis Procedure using a Viscoelastic Continuum Damage Model”, accepted for publication in the Journal of the Association of Asphalt Pavement Technologists, 2002.
2. Daniel, J.S., and Y.R. Kim, “Laboratory Evaluation of Fatigue Damage Growth and Healing of Asphalt Concrete Mixtures Using the Impact Resonance Method”, ASCE Journal of Materials in Civil Engineering, Vol. 13, No.6, Nov/Dec 2001, pp. 434-440.
3. Lee, H.J., J.S. Daniel, and Y.R. Kim, “Laboratory Performance Evaluation of Modified Asphalt Mixtures for Incheon Airport Pavements,” International Journal of Pavement Engineering, Vol. 1, No. 2, April 2000
4. Lee, H.J., J.S. Daniel, and Y.R. Kim, "Continuum Damage Mechanics-Based Fatigue Model of Asphalt Concrete," ASCE Journal of Materials in Civil Engineering, Vol. 12, No. 2, May 2000, pp. 105-112.
5. Daniel, J.S., Y.R. Kim, and H.J. Lee, “Effects of Aging on Viscoelastic Properties of Asphalt-Aggregate Mixtures”, Transportation Research Record 1630, TRB, National Research Council, Washington, D.C., 1998, pp. 21-27.
6. Daniel, J.S., and Y.R. Kim, “Relationships Among Rate-Dependent Stiffnesses of Asphalt Concrete Using Laboratory and Field Test Methods”, Transportation Research Record 1630, TRB, National Research Council, Washington, D.C., 1998, pp. 3-9.

Papers/Abstracts Currently Under Review

1. Daniel, J.S., G.R. Chehab, and Y.R. Kim, “Issues Affecting Measurement of Fundamental Asphalt Mixture Properties”, submitted for publication in ASCE Journal of Materials in Civil Engineering, March 2002.
2. Daniel, J.S., E.O. McGraw, and Y.R. Kim, “Effects of Asphalt Mixture Variables on Laboratory Evaluation of Field Constructed Mixtures”, submitted for publication in the International Journal on Road Materials and Pavement Design, March 2002.

3. Chehab, G.R., J.S. Daniel, and Y.R. Kim, "Development of a Constitutive Model for Fatigue Cracking in Asphalt Concrete", abstract submitted to EM 2003 Conference, November 2002.
4. Daniel, J.S, and Y.R. Kim, "A Simplified Test and Analysis Procedure for Fatigue Characterization of Asphalt Mixtures", abstract submitted to Fifth RILEM International Conference, February 2003.

Major Research Reports

1. Kim, Y.R., J.S. Daniel, H.Wen, "Fatigue Performance Evaluation of WesTrack Asphalt Mixtures Using Viscoelastic Continuum Damage Approach", Final Report to North Carolina Department of Transportation/FHWA, July 2001.
2. Kim, Y.R., and J.S. Daniel, "Development of a Mechanistic Fatigue Prediction Model for Aging Asphalt-Aggregate Mixtures", Final Report to Western Research Institute/FHWA, January 1998.
3. Kim, Y.R., Y. Kim, J.S. Daniel, and E. Katzke, "Laboratory and Field Evaluation of Fatigue Damage and Microdamage Healing", Final Report to Texas A&M Research Foundation/Western Research Institute/FHWA, January 1998.

TECHNICAL PRESENTATIONS

"Laboratory Evaluation of the Effects of Aggregate Gradation and Binder Type on Performance of Asphalt Mixtures", International Society for Asphalt Pavements Conference, Copenhagen, Denmark, 2002.

"Application of the Bailey Method to NH Mixtures", NH DOT Research Advisory Council, April 2002.

"Development of a Simplified Fatigue Test and Analysis Procedure using a Viscoelastic Continuum Damage Model", Association of Asphalt Paving Technologists Annual Meeting, Colorado Springs, CO, 2002.

"Relationships Among Rate-Dependent Stiffnesses of Asphalt Concrete Using Laboratory and Field Test Methods", Transportation Research Board Meeting, Washington, D.C., 1998.

"Effects of Aging on Viscoelastic Properties of Asphalt-Aggregate Mixtures", Transportation Research Board Meeting, Washington, D.C., 1998.

ABBREVIATED CURRICULUM VITAE
FREDERICK HUGO,
October 2000

Dr Fred Hugo has specialized in pavement engineering and works internationally in that field. During his career he worked as a contractor for three years, following this as a resident engineer on construction sites for four years, before becoming founding partner of a consulting engineering company in 1965. He remained in that capacity for 13 years before becoming professor in Civil Engineering at the University of Stellenbosch in 1978. Since 1987 he has also been working part-time at the University of Texas at Austin as a research fellow. In 1995 he retired from formal teaching, concentrating on research and specialist consultancy. Appendix A provides an overview of his career and experience.

RELEVANT BACKGROUND INFORMATION

For the past nine years Dr Hugo has been principal investigator on a number of completed and ongoing projects in Texas apart from his South African research efforts. He was the Project Manager for the manufacturing of the Texas Mobile Load Simulator (TxMLS) for the Texas Department of Transportation. He was also responsible for managing the subsequent TxMLS research program. This involved staff from three Universities (University of Texas at Austin, University of Texas at El Paso and the Texas A&M University). The value of the research was ~\$250 000 per annum. In South Africa Dr Hugo received a series of government research grants from the National Research Foundation for developing a *Competitive Industry* in the field of pavement engineering and more specifically, asphalt technology.

Because of his commitments in South Africa and the USA, he commutes between the two research entities managing research teams and postgraduate students at both universities. He has also presented courses on pavement engineering at the Technical University of Delft in the Netherlands. He acts as specialist consultant on all aspects of pavement engineering and management and has worked in a number of African states, Europe, Israel, the United States and Canada.

Accelerated Pavement testing

During his career Dr. Hugo has been actively involved with APT for more than 30 years. He has visited and studied accelerated pavement testing devices in The Netherlands, Spain, Switzerland, Japan, England, and France as well as South Africa and United States. In March 1998 he was awarded a DEng-degree by the University of Stellenbosch for a submission on his work in this field. He is also co-patent holder of the MLS. His PhD research dealt with the development of premature surface cracking in asphalt pavements.

Dr. Hugo is recognized as a leading authority on accelerated pavement testing (APT) and he was the first to report on the effects of low temperature and artificially induced aging on APT. His particular interest in pavement engineering has also led him to develop several innovative solutions to problems particularly in diagnostic investigations and construction engineering. The

most recent of these is the use of Surface Wave Spectral Analysis Techniques (SASW) to monitor the development of micro fracturing and fatigue damage during APT. He has also been pioneering the use of the one-third-scale model mobile load simulator (MMLS3) as a performance prediction tool to supplement full-scale APT devices.

He has published extensively (more than one hundred peer reviewed papers) in Journals and Technical Proceedings and has won several awards (some with co-authors). He is also the recipient of a wide variety of awards for outstanding achievements in the field of pavement engineering.

In the light of his experience Dr Hugo's activities cover a number of related topics:

- Material Characterization and Behavior
- Environmental Impact on Pavement Performance and Remaining Life
- Accelerated Pavement Testing
- Pavement Construction
- Information Systems
- Pavement Management

Dr Hugo is a member of the educational committee of TRB and also the task force, A2B52, on accelerated pavement testing (APT). In 1996 he was keynote speaker at an international symposium on APT at the Technical University of Delft. He was also the principal author of a Report on APT Data Survey, a task that he undertook on behalf of task force A2B52 to pioneer a system for reporting APT data. He presented the Closing Address at the recent International Conference on APT Reno in October 1999 as invited speaker, giving a synthesis of the papers and a view ahead.

Summary of Qualifications

BSc (Eng.) Civil, University of the Witwatersrand, 1958
Post Graduate course in Soil Mechanics, University of the Witwatersrand, 1965
MSc (Eng.) Civil - Cum Laude, University of Natal, 1970
Ph.D. Civil Engineering (Transportation) University of Texas at Austin, 1984
DEng, University of Stellenbosch, 1998
Professional Engineer, South Africa - Certificate No. 691597
Texas - Certificate No. 67246

PROFESSIONAL ORGANIZATIONS AND HONORS

Professional Organizations

Life Member (1999), Association of Asphalt Paving Technologists, United States of America
Honorary Fellow (1999) and Past-President (1993), South African Institution of Civil Engineering

Member (1981), South African Academy of Science and Arts
Member (1990) American Society of Civil Engineers
Member (1993) Academy of Engineering, South Africa

Honors and Awards

- Award for the best short paper presented during the 1966 session of the South African Institution of Civil Engineering (SAICE) (jointly with TG Alant)
- Award of merit to the firm Bruinette, Kruger, Stoffberg and Hugo for innovative techniques and ingenious solutions to problems encountered with the design and construction of the Rand Afrikaans University by SAICE, 1976.
- Award for the paper presented at the Annual Transportation Convention displaying the greatest innovation in transportation, 1986 (jointly with D Shear and AT Visser).
- The 1990 award by SAICE/CAPSA for outstanding achievements in the field of Asphalt Technology.
- In 1993 a research team under his guidance received an award for their contribution on Constructability.
- In 1994 he received the SAICE President's Award for Meritorious Service in presenting the Construction Management Program.
- He is also recipient of the Award for Meritorious Research by the South African Institution of Civil Engineering in 1995.

OVERVIEW OF CAREER AND EXPERIENCE OF FREDERICK HUGO

University Career:

Period 1978 - Present:

Emeritus Professor at the University of Stellenbosch and Specialist Consultant in Geotechnics, Technology Management and Transportation Engineering. Served as Chairman of the Department of Civil Engineering from 1984-1986. Presently *Director of the Institute for Transport Technology (ITT)* and *Manager of the Southern Transportation Center of Development (STCD)*. Also the director of TRAC South Africa, a \$200,000 initiative to enhance previously disadvantaged school children's ability to follow careers in engineering and technology. In Texas he is a *Graduate Professor and Research Fellow* at the *Center for Transportation Research (CTR)*, The University of Texas at Austin. Personal research and consulting currently focused on accelerated pavement testing, diagnostic studies of premature failure of pavements, constructability issues and management of engineering disputes. Specialist advisor to the Airports Company of South Africa on airside infrastructure and to the Texas Department of Transportation on APT.

Accelerated Pavement Testing Activities:

Period 1966 - 2000

A brief overview of specifically APT related research activities over more than thirty years is provided below. Most has been reported in the technical literature. The work generally involved collaborative team efforts of either internal staff or other research organizations:

- 1966: Full-scale testing of new gravel asphalt mix using an aircraft undercarriage.
- 1972: HVS testing of a cement-treated base course pavement for developing a methodology for bridging reflection cracks. Done in collaboration with Dr Danie van Vuuren from the National Institute for Road Research of the Council for Industrial and Scientific Research (CSIR), South Africa (NITRR-currently Transportek).
- 1974: HVS testing of a bituminous-treated base (BTB) pavement for designing rehabilitation in collaboration with Mr Tom Scullion formerly from the NITRR and now at the Texas A&M University.
- 1967-1974: Testing of airport pavements using a simulated Boeing 727 undercarriage for performance prediction of national airport pavements in SA.
- 1966-1990: Various terms as member of the Research Committee on Materials of the NITRR including guidance of HVS work. Also participated in several HVS seminars.
- 1986: Low temperature HVS testing of artificially aged asphalt with co-researchers.
- 1991/92: High temperature HVS and MMLS testing of artificially aged bituminous bases (BTB) on a rehabilitated operational highway in collaboration with NITRR.
- 1991/96: Temperature controlled MMLS testing of scaled materials.

- 1994/95: Dimensional Analysis Study of the MMLS with co-researchers.
- 1995/96: MLS testing on US59 Frontage Road in Victoria in the Yoakum District, Texas as Project Manager and Principal Investigator of the first Phase of the Texas Department of Transportation's MLS Test Plan with co-researchers.
- 1997: MLS and MMLS testing on an active Highway (US281) in Jacksboro, Fort Worth District as Project Manager and Principal Investigator, Phase Two, the Texas Department of Transportation's MLS Test Plan with co-researchers.
- 1997-2000: MMLS3 testing of full-scale asphalt pavements under dry and wet conditions in an environmentally controlled chamber at different temperatures.

Full-time Practicing Engineer:

Period 1965 – 1977

Founding partner and director Bruinette, Kruger, Stoffberg & Hugo Consultants (now BKS Inc.,) a large South African international practice. Responsible for the geotechnics, pavement engineering and airports. Selected projects (with related technical papers*):

- Rehabilitation of a cement stabilized base course on a major freeway using full depth asphalt structure.*
- Maintenance of a major freeway using a new technique for the prevention of reflection cracking in the asphalt pavement.*
- Diagnostic evaluation of the runways and taxiways of twelve state owned airports in SA.*
- Design and construction of overlays for the pavements at six airports including three international airports for Boeing 747's
- Design and construction of low volume roads and airfields*.
- Preliminary design of a new international airport for Durban, SA and construction of its preparatory earthworks.* (18 Mil m3).
- Design and construction of residential streets using low cost, full depth asphalt.
- Design and construction of a 120km rural highway using a bitumen stabilized calcareous sand base course.*

Period 1961 - 1965

Design and supervision work with Africon Inc., International Consultants (formerly Messrs. Van Wyk & Louw Inc). Responsible for runway and ancillary works of a regional airport as resident engineer. Designed two regional airports and supervised extensions to Johannesburg international airport thereafter.

Period 1958 - 1961

Engineer-in-Training and Construction Engineer with Rand Earthworks Construction Company in association with Swiss construction companies. Assistant engineer on construction projects in Switzerland. Work included construction of runway and taxiways of Kloten International Airport. Continued as site agent on two major industrial plants in South Africa