

**PERSONAL SERVICE AGREEMENT**

CO-802A REV. 2/2000 (Electronic Version)

STATE OF CONNECTICUT  
OFFICE OF THE STATE COMPTROLLER  
ACCOUNTS PAYABLE DIVISION

- PREPARE 5 COPIES.
- 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 HERETO AND SUBJECT TO THE PROVISIONS OF SECTION 4-98 OF THE CONNECTICUT GENERAL STATUTES AS APPLICABLE.
- ACCEPTANCE OF THIS CONTRACT IMPLIES CONFORMANCE WITH TERMS AND CONDITIONS SET FORTH AT SHEET 2 OF THIS FILE, AS ATTACHED HERETO AND INCORPORATED BY REFERENCE.

(1) <input checked="" type="checkbox"/> ORIGINAL <input type="checkbox"/> AMENDMENT	(2) IDENTIFICATION NO. P.S. #5690
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CONTRACTOR	(3) CONTRACTOR NAME <b>University of New Hampshire</b>	(4) ARE YOU PRESENTLY A STATE EMPLOYEE? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	CONTRACTOR ADDRESS <b>Office of Sponsored Research Service Building, 51 College Road, Durham NH 03824</b>	CONTRACTOR FEIN / SSN - SUFFIX <b>026000937</b>

STATE AGENCY	(5) AGENCY NAME AND ADDRESS <b>CT Department of Transportation, 2800 Berlin Tmpk., Newington, CT 06131-7546</b>	(6) AGENCY NO. <b>5000</b>
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CONTRACT PERIOD	(7) DATE (FROM) <b>10/1/04</b> THROUGH (TO) <b>3/31/07</b>	(8) INDICATE <input type="checkbox"/> MASTER AGREEMENT <input type="checkbox"/> CONTRACT AWARD <input checked="" type="checkbox"/> NEITHER
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CANCELLATION CLAUSE	THIS AGREEMENT SHALL REMAIN IN FULL FORCE AND EFFECT FOR THE ENTIRE TERM OF THE CONTRACT PERIOD STATED ABOVE UNLESS CANCELLED BY THE STATE AGENCY, BY GIVING THE CONTRACTOR WRITTEN NOTICE OF SUCH INTENTION (REQUIRED DAYS NOTICE SPECIFIED AT RIGHT).	(9) REQUIRED NO. OF DAYS WRITTEN NOTICE: <b>60</b>
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COMPLETE DESCRIPTION OF SERVICE	(10) CONTRACTOR AGREES TO: (Include special provisions - Attach additional blank sheets if necessary.)  <b>Conduct a research study for NETC Project No. 04-3, entitled "Estimating the Magnitude of Peak Flows for Steep Gradient Streams in New England."</b>  <b>(See Attached Proposal.)</b>	
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COST AND SCHEDULE OF PAYMENTS	(11) PAYMENT TO BE MADE UNDER THE FOLLOWING SCHEDULE UPON RECEIPT OF PROPERLY EXECUTED AND APPROVED INVOICES.  <b>Maximum payment not to exceed \$120,000 for contract period. Payment shall be in accordance with the provisions of Sections 2.(C), 3.(B), 3.(C) and 3.(D).</b>	
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(12) ACT. CD.	(13) DOC. TYPE	(14) COMM. TYPE	(15) LSE. TYPE	(16) ORIG. AGCY. <b>5400</b>	(17) DOCUMENT NO.	(18) COMM. AGCY.	(19) COMM. NO.	(20) VENDOR FEIN / SSN - SUFFIX
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(21) COMMITTED AMOUNT <b>\$120,000</b>	(22) OBLIGATED AMOUNT <b>\$120,000</b>	(23) CONTRACT PERIOD (FROM/TO) <b>10/1/04 to 3/31/07</b>
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(24) ACT. CD.	(25) COMM. LINE NO.	(26) COMMITTED AMOUNT	(27) COMM. AGENCY	(28) COST CENTER		(29) OBJECT	AGENCY TAIL			(33) F.Y.
				FUND	SID		(30) FUNCTION	(31) ACTIVITY	(32) EXTENSION	

An 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) (2). 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 <b>ConnDOT 13b-4 and 13b-23</b>
	(35) CONTRACTOR (OWNER OR AUTHORIZED SIGNATURE) <i>Andrew W. Shepard</i>
	(36) AGENCY (AUTHORIZED OFFICIAL) <i>James M. Sime</i>
	(38) ATTORNEY GENERAL (APPROVED AS TO FORM) <i>Assoc. Atty. General</i>

DISTRIBUTION: ORIGINAL-CONTRACTOR    PHOTOCOPY-COMPTROLLER    PHOTOCOPY-OPM/DAS    PHOTOCOPY-ATTORNEY GENERAL    PHOTOCOPY-AGENCY

**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 party 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 agrees, 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. This contract is also subject to provisions of Executive Order No. Sixteen of Governor John G. Rowland promulgated August 4, 1999, and, as such, this contract may be cancelled, terminated or suspended by the contracting agency of the State Labor Commissioner for violation of or noncompliance with said Executive Order No. Sixteen, 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. Sixteen 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 percent 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. subsection 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 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; (4) the Contractor agrees to comply with each provision of this section and Conn. Gen. Stat. subsections 46a-68e and 46a-68f and with each regulation or relevant order issued by said Commission pursuant to Conn. Gen. Stat. subsections 46a-56, 46a-68e and 46a-68f; (b) 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. subsection 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 follow the 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 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.

# University System of New Hampshire

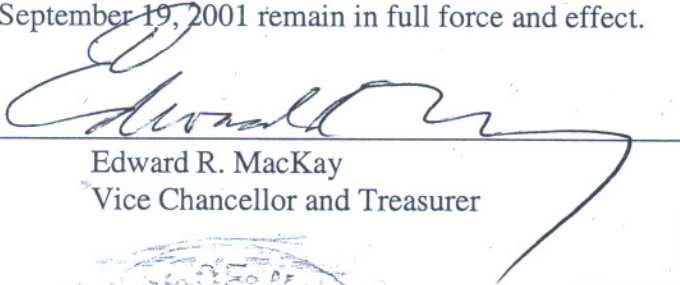


VICE CHANCELLOR AND TREASURER'S OFFICE

Myers Center  
27 Concord Road  
Durham, NH 03824-3546  
Phone: (603) 862-0954  
Fax: (603) 862-0909  
www.usnh.unh.edu

To Whom It May Concern:

All provisions of the "Delegation of Signature Authority" dated October 1, 2001 and the "Certificate" dated September 19, 2001 remain in full force and effect.



Edward R. MacKay  
Vice Chancellor and Treasurer

12/2/04

Date



Delegation of Signature Authority

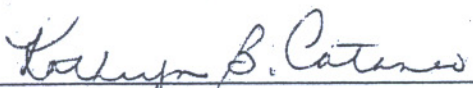
I, Kathryn B. Cataneo, Executive Director of Sponsored Research of the University of New Hampshire (UNH), acting pursuant to Delegation of Signature Authority dated August 25, 2003 and given by Edward R. MacKay, Vice Chancellor and Treasurer of the University System of New Hampshire (USNH), do hereby re-delegate to the following UNH officer:

Andrew Shepard, Senior Grant & Contract Administrator and Co-Manager, Research Administration, Office of Sponsored Research

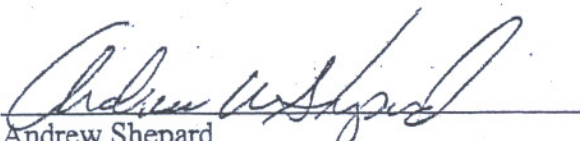
the authority to execute on behalf of UNH certain contracts, agreements, and other legal documents related to the provision of research or consulting services, or other sponsored programs within the limitations on the attached pages, provided that such authority shall be exercised in compliance with applicable USNH and UNH policies, including those related to conflict of interest, insurance, additional pay, and competitive bidding.

This delegation shall take effect upon the signed, dated acknowledgement below by the officer of acceptance of the responsibilities associated with this delegation and shall remain in effect until revoked.

The named officer may not re-delegate this authority.

  
\_\_\_\_\_  
Kathryn B. Cataneo  
UNH Executive Director of Sponsored Research

7/13/04  
Date


  
\_\_\_\_\_  
Andrew Shepard  
Senior Grant & Contract Administrator and Co-Manager,  
Research Administration,  
UNH Office of Sponsored Research

7/13/04  
Date

att: UNH Office of Sponsored Research Institutional Signature Authorities – September 19, 2001  
Signature Authority Limitations for Sponsored Agreements for Senior GCAs

cc: John Aber, UNH Vice President for Research & Public Service

This delegation of signature authority to Andrew Shepard is still effective as of the date of my signature below.

  
Kathryn B. Cataneo  
UNH Executive Director Sponsored Research



Office of the Secretary  
University System of New Hampshire  
Dunlap Center  
Durham, New Hampshire 03824-3545  
(603) 862-0970  
FAX (603) 868-3021  
<http://www.usnh.unh.edu>

### CERTIFICATE

I, Ronald F. Rodgers, do hereby certify that:

- (1) I am the duly appointed Secretary and General Counsel of the University System of New Hampshire (USNH);
- (2) I am familiar with the minute books, policies, and by-laws of the USNH. I am duly authorized to issue certificates with respect to the contents of such books, policies, and by-laws;
- (3) The policies and bylaws of the USNH Board of Trustees authorize the USNH Treasurer to sign all contracts, agreements, and other legal documents on behalf of the USNH and to re-delegate in writing that authority;
- (4) The USNH Treasurer has delegated to the University's Vice President for Research and Public Service, the Executive Director of Sponsored Research, and the Associate Director, Office of Sponsored Research, the authority to sign any contract, agreement or other legal document between the USNH or one of its component institutions and any New Hampshire state government agency concerning the provision of research, consulting services, or other sponsored programs;
- (5) The component institutions of the USNH are the University of New Hampshire, the College for Lifelong Learning, Keene State College, and Plymouth State College; and
- (6) The following individuals have been appointed to and now occupy the indicated offices and the signatures set forth below are their true signatures as executed in the performance of their official duties:

Donald C. Sundberg,  
Vice President for Research and Public Service:

Kathryn B. Cataneo,  
Executive Director of Sponsored Research:

Steven Bernstein,  
Associate Director, Office of Sponsored Research:

IN WITNESS WHEREOF, I have hereunto set my hand as the Secretary and General Counsel of the University System of New Hampshire, this 19th day of September, 2001.



Ronald F. Rodgers  
USNH Secretary and General Counsel

**UNIVERSITY SYSTEM OF NEW HAMPSHIRE**

University of New Hampshire • Keene State College • Plymouth State College • College for Lifelong Learning

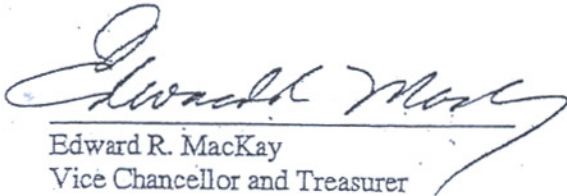
Delegation of Signature Authority

I, Edward R. MacKay, Vice Chancellor and Treasurer of the University System of New Hampshire (USNH), acting pursuant to the by-laws of USNH as amended by the Board of Trustees on March 8, 2000, do hereby delegate to the following officers of the University of New Hampshire (UNH):

1. The Vice President for Research and Public Service
2. The Executive Director of Sponsored Research
3. The Associate Director, Office of Sponsored Research

the authority to execute on behalf of USNH, or any component institution, contracts, agreements and other legal documents related to the provision of research or consulting services, or other sponsored programs, provided that such authority shall be exercised in compliance with applicable USNH and UNH policies, including those related to conflict of interest, insurance, additional pay, and competitive bidding.

The named officers may re-delegate this authority only as specifically noted on the "University of New Hampshire Office of Sponsored Research Institutional Signature Authority Form" dated September 19, 2001. This delegation shall take effect immediately and shall remain in effect until revoked.

  
Edward R. MacKay  
Vice Chancellor and Treasurer

October 1, 2001  
Date  
UNH01-02  
Delegation Number

cc: Controller, USNH  
Director of Purchasing, USNH

President, UNH  
General Counsel, USNH

NETC Agreement No. 9.14-01(04)

Research Agreement for NETC Project No. 04-3,

"Estimating the Magnitude of Peak Flows for Steep Gradient Streams in New England"

THIS AGREEMENT, concluded at Newington, Connecticut, by and between the State of Connecticut, Department of Transportation, Stephen E. Korta, II, 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 New Hampshire, acting herein by Andrew W Shepard, Co - Mgr Res Admin, Office of Sponsored Research, hereunto duly authorized hereinafter referred to as the University.

*gr 4/18/05*

Initial Here  
*Acus 1/5/05*

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 October 1, 2004, to March 31, 2007.
- (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, and 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-debugging 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 New Hampshire 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 -

(1) For contractual matters:

Ms. Diane Hardy  
Grant and Contract Administrator  
University of New Hampshire  
Office of Sponsored Research  
Service Building, 51 College Road  
Durham, NH 03824,

(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. F&A-10 Subject: Code of Ethics Policy", July 30, 2004, a copy of which is attached hereto and made a part thereof.
- (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 Universities 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.

(K) This Agreement shall be governed, interpreted and construed under and in accordance with the laws of the State of Connecticut, whether or not its conflict of laws principles would dictate otherwise. This Agreement shall be deemed to have been made in Hartford, Connecticut.

The University irrevocably consents with respect to any claims or remedies at law or in equity, arising out of or in connection with this Agreement to the jurisdiction of the Connecticut Superior Court (except as otherwise required by law or that Agreement), and, with respect to any claim between the Parties, to venue in Judicial District of Hartford-New Britain at Hartford or the United States Federal Court, District of Connecticut, and irrevocably waives any objections that it may have to such jurisdiction on the grounds of lack of personal jurisdiction of such court or the laying of venue of such court or on the basis of forum non conveniens or otherwise. Nothing herein shall be construed to waive any of the State's immunities.

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 nondiscrimination 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

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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 19<sup>th</sup> day of Nov., 1971.

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.

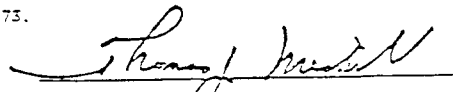
(b) Any contracting agency taking any action authorized by this Order, whether on its own motion or as directed by the Labor Commissioner, shall promptly notify him of such action. Whenever the Labor Commissioner makes a determination under this Order, he shall promptly notify the appropriate contracting 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. F&A-10  
July 30, 2004

SUBJECT: Code of Ethics Policy

No employee of the Connecticut Department of Transportation shall, either individually (or as a member of a group), directly or indirectly, solicit or accept any gift or gratuity from any person or organization with whom the Department has, has had, or may expect to have, a business relationship which could cause, or create the appearance of, a conflict with or influence the performance of the employee's duties with the Department. Anything of value that any person or organization attempts to give to an employee of this Department shall be immediately returned. If such thing of value is received by other than personal delivery from the subject person or organization, it shall be taken to the Office of Personnel along with the name and address of the person or firm who gave the item. The Office of Personnel along with the recipient of the item of value will arrange for the donation of the item to a local charity (e.g., Foodshare, local soup kitchens, etc.). The Office of Personnel will then send a letter to the gift giver advising them of this donation.

No employee of this Department shall, either individually (or as a member of a group), directly or indirectly, solicit the sale of tickets for a charitable event or accept any gift for the benefit of a charitable organization from any person or organization with whom the Department has, has had, or may expect to have, a business relationship which would cause, or create the appearance of, a conflict with or influence the performance of the Department.

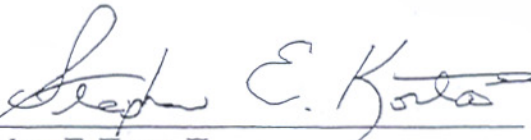
No employee of this Department shall use or distribute State information or use State equipment or materials for other than State business purposes.

No employee of this Department shall allow any private obligation of employment or enterprise to take precedence over his/her responsibility to the Department.

No employee of this Department shall accept employment with any consultant, contractor, appraiser, or any other organization or individual which is under contract or agreement with the State of Connecticut, nor shall any employee of this Department have, directly or indirectly, a financial interest in any business, firm, or enterprise doing business with the State of Connecticut, which could cause, or create the appearance of, a conflict with or influence the performance of the employee's duties with the Department.

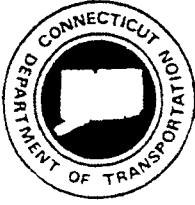
In addition to the above, all employees of this Department are to comply with Sections 1-79 through 1-89 of the Connecticut General Statutes, as amended, entitled Code of Ethics for Public Officials.

(This Policy Statement supersedes Policy Statement No. F&A-10 dated March 25, 1999)

  
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Stephen E. Korta, II  
Commissioner

List 1 and List 3

(Managers and supervisors are requested to distribute a copy of this Policy Statement to all employees under their supervision.)



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.

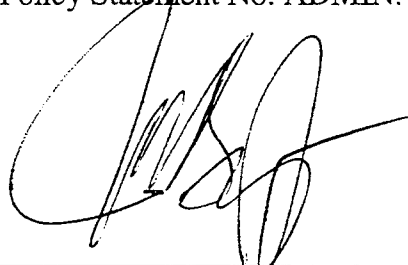
For all agreements with contractors, subcontractors, consultants, cities, towns, and all recipients of State or federal-assistance funds:

- 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.)



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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.

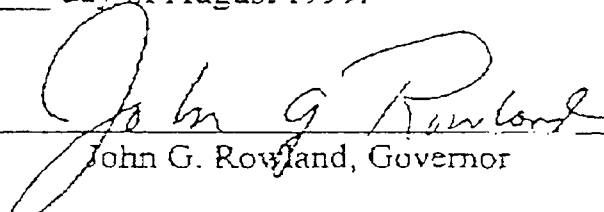
Dangerous instrument means any instrument, article, or substance that, under the circumstances, is capable of causing death or serious physical injury.

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 4<sup>th</sup> day of August 1999.

  
\_\_\_\_\_  
John G. Rowland, Governor

Filed this 4<sup>th</sup> day of August 1999



  
\_\_\_\_\_  
Susan Byskiewicz, Secretary of the State



Proposal for NETC Project No. 04-3,  
"Estimating the Magnitude of Peak Flows  
for Steep Gradient Streams  
in New England"

# **ESTIMATING THE MAGNITUDE OF PEAK FLOWS FOR STEEP GRADIENT STREAMS IN NEW ENGLAND**

A Research Proposal Submitted to:  
**New England Transportation Consortium**  
**Project No. NETC 04-3**

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April 2004



## 1.0 Introduction

Flood event impacts range from interrupting routines to catastrophic effects including loss of life and property. Spring snowmelt, summer convective systems, ice jams, tropical storms and combinations of those events cause floods in New England. As recently as December 2003 and April 2004, New Englanders were reminded of their rivers' powers. A three week freeze followed by a thaw and rain found New Englanders under water on December 18, 2003 due to ice jams and floods on the Pemigewasset River downstream of Plymouth, NH, the Sandy River at Farmington, ME, and the Androscoggin at the Canton, Rumford Center, and Bethel, ME. Design of hydraulic structures (e.g., bridges, dams, culverts, and storm water drains) and assessment of floodplains are based on the likelihood that such extreme events will occur. As limited records of flood flows exist, statistical techniques are used to provide best estimates of the risk of an extreme event.

Federal and state agencies have developed various techniques to estimate flood flows in the New England region. For gaged stations, flood frequency analysis follows the guidelines developed in Bulletin 17B (1982) by the U.S. Interagency Advisory Committee on Water Data. The Bulletin 17B method provides a federal standard that is used by the water resources engineering community to predict flood flows. The method assumes that flood peaks are well described by the log-Pearson type III probability distribution and uses the method of moments to fit the distribution's parameters from observations.

For ungaged stations, regression equations are frequently used to predict flood discharges. Regression relationships are developed on a regional basis and use basin and climatic characteristics to predict peak flows. The United States Geological Survey (USGS) has conducted several studies and published regression relationships for predicting flood peaks for New England states in the northeastern United States (Benson, 1963; Johnson and Tasker, 1974; Johnson and Laraway, 1976; Le Blanc, 1978; Wandle, 1983; Weiss, 1983; Hodgkins, 1999)

Application of the existing regression relationships is not always appropriate in steep slope watersheds. Hodgkins (1999) found that several steep watersheds, three in New Hampshire and one in Maine, were outliers in their regression analysis of Maine flood flows. The best-fit regression relationship developed for Maine under predicted observed flood flows in these basins. This result suggests that streams with steep slopes are not well described by the existing regression relationships. Hence, there is a need to develop regression relationships for steep watersheds. Establishing these relationships will improve the characterization of design storms and the design of hydraulic structures in steep watersheds.

## 2.0 Research Objectives

The main objective of this research is to develop a set of regional regression relationships to predict flood flows for steep slope watersheds from basin characteristics. The regression relationships will be developed using standard USGS regional hydrologic methods. We propose to identify target watersheds in the New England region and to develop a database of physical basin parameters and historical streamflow necessary for the statistical analysis. Regression analyses will be conducted to identify explanatory variables and to develop regression relationships for average daily flow and 2-, 10-, 25-, 50-, and 100-year

peak flow recurrence interval events. As appropriate, the New England states will be divided into subregions. If the flood flows from ice jams or tropical storms are statistically different from ordinary flood flows, a mixed-population flood-frequency approach will be developed to address the different flood generation mechanisms.

### **3.0 Methodology**

This section describes in detail the principal tasks that will be performed to accomplish the research objectives of this project.

#### **Task 1: Literature Review**

The research team will conduct a thorough literature review related to regression analyses. Papers published by the USGS will be reviewed and a search will be performed using ISI Web of Science (available at UNH and Tufts) to access additional information. The research team will contact the USGS offices in the New England states to obtain information on their current practices for the development of regression relationships. The research team will contact the state Department of Transportation (DOT) offices located in the New England states to get information on their current practices and to identify requirements necessary to transfer project results to practice.

A preliminary review indicates that USGS Water Resource Investigations Reports and Summary Fact Sheets detailing the regional regression equation for flood flow prediction at ungaged sites exist for each of the New England states (Johnson and Tasker, 1974; Johnson and Laraway, 1976; Le Blanc, 1978; Wandle, 1983; Weiss, 1983; Hodgkins, 1999; Olson, 2002). These reports clearly present the methods used to develop regional regression equations and identify all supporting documents. These reports will be used as the starting point for the literature review. The review will also include Federal Highway Administration documents (e.g., Trent, 1978). In addition, comparative studies that evaluated alternative approaches to the regionalization of floods, such as the study by Pandey and Nguyen (1999) for basins in nearby Quebec, Canada, will be surveyed. The materials will be reviewed prior to the completion of the remaining tasks; it is anticipated that the literature review will have a significant impact on Tasks 2 - 5. A summary of the findings from the literature review will be included in the final report.

#### **Task 2: Selection of Watersheds to be Analyzed**

The objective of Task 2 is to select watersheds to be analyzed by developing and applying clear and consistent selection criteria. The desired outcome is a database of approximately 50 gaged watersheds in or near the New England states. The watersheds will be selected based on their slope and streamflow data requirements at the gauging station.

First, steep watersheds will be identified. Potential metrics to characterize watershed steepness will be examined. For example, watershed slope is typically defined as the *main-channel slope*, the slope of the main channel between points that are 10 and 85 percent of the main-channel length from the gauging station. A preliminary threshold of slopes greater than 100 feet/mile (18.9 m/km) will be used. Slopes will be determined using national topographic datasets including the National Hydrography Dataset (NHD), National Elevation Dataset (NED), and Elevation Derivatives for National Applications Dataset (EDNA), and, when available, local datasets having higher accuracy.

Second, the steep watersheds will be reviewed to assure that they meet Bulletin 17B guidelines. In summary, the peak-flow data should be reliable and representative samples of random, homogeneous events. The Mann-Kendall trend test will be used to test for streamflow trends in the watershed over time. Watersheds having significant modifications to its hydrologic flow regime (e.g., land use changes, impoundments, etc.) will be eliminated from consideration.

### Task 3: Mixed Population Flood Frequency Analysis

In New England, most floods occur in the springtime during snowmelt or the summer time due to thunderstorms. However, some of the largest floods in New England may be associated with tropical cyclones or result from ice jams (Figure 1). In the summer and early fall, tropical cyclones can produce sustained period of intense precipitation and generate substantial runoff (Figure 2). From 1936 to 1997, about 40 tropical cyclones affected southern New England (Vallee and Dion, 1998) with the September 1938 and August 1955 (Diane) hurricanes causing significant loss of life. Ice jams routinely form during New England winters and are often accompanied by flooding upstream.



Figure 1. Breakup ice jams can cause rapid increases in stage resulting in ice damage as well as flood damage (Tunbridge, VT, March 1999). <http://www.crrel.usace.army.mil/ierd/icejam/icejam.htm#intro>

Ballestero et al. (1984) demonstrated that select storm types cause the largest observed floods in Pennsylvania streams, and that probability distribution parameters differ by flood size. Murphy (2001) and Ahearn (2003) found that single-population flood-frequency distributions provide an inadequate fit for some sites in Massachusetts and Connecticut, respectively. These studies showed that composite mixed-population approaches improved the fit. For steep watersheds, preliminary analyses indicate that the peak flow measured in one or more years of record are caused by tropical cyclones. For example, the Ellis River watershed in New Hampshire (slope 397 ft/mile) had peak flows in 1985, 1991, and 1999 corresponding to Hurricane Gloria, Hurricane Bob and Tropical Storm Floyd, respectively.



Figure 2. Best track for Hurricane Floyd, 7-17 September 1999. <http://www.nhc.noaa.gov/1999floyd.html>

We proposed to incorporate the contribution of mixed populations using Murphy's (2001a, 2001b) approach as follows:

1. **Classify Flood Generation Mechanism** This step characterizes the mechanism that causes each annual peak flows as ordinary, tropical cyclones or ice jams for all study watersheds. Here, ordinary mechanisms refer to, but are not limited to, convective cells, low pressure fronts, and spring snowmelt, and exclude tropical cyclones or ice jams. The National Weather Service's designations will be used to identify tropical storms. The USACE Cold Regions Research and Engineering Laboratory (CRREL) ice jam database will be used to identify floods due to ice jams. In addition, USGS records will be used to confirm the occurrence of ice jams at specific gaging stations. Using the Wilcoxon-Mann-Whitney rank sum test, we will identify which sites contain flood records with significantly different flood populations. If no difference is identified, then the dataset may be treated as a single population and Task 3 is complete. If a difference is identified, then steps 2-5 will be performed to account for the presence of a mixed population.
2. **Conduct Regression Analyses.** Regression analyses will be conducted on each of the three data populations (see Task 6 for regression details) using physical basin characteristics to identify explanatory variables.
3. **Develop Population Based Frequency Factors .** If the distributions differ among populations, their composite frequency distribution may have a sharp curvature or "dog-leg" that cannot be fit by a log-Pearson Type III distribution. In such cases, the development of different frequency distributions by population may produce an estimated frequency curve that fits the observed peak flows better (Ahearn, 2003). Towards this end, three sets of frequency factors ( $K_p$ ),  $K_{p,o}$ ,  $K_{p,i}$ , and  $K_{p,tc}$ , will be developed, one set for each population. This approach will allow us to develop regional frequency factors from K values determined at each gauging stations.
4. **Revise Regression Analysis.** Regression relationships will be developed for each mechanism used to generate the peak flows. Regression analyses will be conducted on each of the three data populations (see Task 6) using the explanatory variables identified in the initial regression analysis (Step 2 above) and frequency factors developed for each gauging station (Step 3 above).
5. **Develop Single Estimation Equation.** As the three populations will have different occurrence rates, they will need to be combined to provide a single peak flow estimate. The general approach is to estimate the composite exceedance probability  $P(Q)$  as

$$P(Q) = P_o(Q|o)P(o) + P_i(Q|i)P(i) + P_{tc}(Q|tc)P(tc) \quad (1)$$

where  $P(Q)$  is the probability of the annual peak flow in any given year exceeding  $Q$ ,  $P_o(Q|o)$  is the conditional probability of the annual peak flow in any given year exceeding  $Q$  given that the annual peak results do not result from an ice jam or a tropical cyclone,  $P(o)$  is the probability that the annual peak does not result from an ice jam or a tropical cyclone,  $P_i(Q|i)$  is the conditional probability of the annual peak flow in any given year exceeding  $Q$  given that the annual peak results from an ice jam,  $P(i)$  is the probability that the annual peak results from an ice jam,  $P_{tc}(Q|tc)$  is the conditional probability of the annual peak flow in any given year exceeding  $Q$  given

that the annual peak results from a tropical cyclone, and  $P(tc)$  is the probability that the annual peak results from a tropical cyclone. Equation (1) can be applied to each ungaged site. Using the regression relationship developed in step 4, each site's physical parameters will be used to calculate site-specific conditional probabilities.

The procedure described above will be compared to the methodology for estimating the probability distribution of combined ice jam and storm induced flooding introduced by one of the co-principal investigators, Vogel and Stedinger (1984).

#### **Task 4: Evaluation of Basin Characteristics Using GIS**

The regression equations seek to predict peak flows for ungaged sites. The development of the regression equations requires a database of peak flows (response or dependent variables) and basin characteristics (explanatory or independent variables). Previous studies have identified basin characteristics that explain the variability of peak flows. Table 1 identifies those basin characteristics for each New England state. Additional potential explanatory variables will be considered in this study and may include variables such as those used in the USGS's study of Maine watersheds (Hodgkins, 1999). The Maine study considered 14 explanatory variables including drainage area, main-channel length, main-channel slope, basin elevation, forest cover, snow, lake area, basin wetlands, upper third wetlands, middle third wetlands, lower third wetlands, mean annual precipitation, 24-hour, 2-year rain, and 24-hour, 100-year rain. Other parameters will also be considered. For example, the use of stream channel geometry may offer significant improvements in resulting regional regression equations as was found by Dingman and Pakia (1999) for 36 watersheds in Vermont and New Hampshire. Mackey et al (1998) also found that stream channel geometry can be very highly related to streamflow discharge for basins in Massachusetts. Wahl (1984) explored this issue more generally.

Table 1. Explanatory basin characteristics by state.

<b>State</b>	<b>Explanatory Variables</b>
Connecticut	Drainage Area, 24-hour Rainfall, Main Channel Stream Length, Main-Channel Slope, Area of Coarse-Grain Stratified Drift
Maine	Drainage Area, Basin Wetlands
Massachusetts	Drainage Area, Basin Storage, Main-Channel Slope, Mean Basin Elevation
New Hampshire	Drainage Area, Main-Channel Slope, 2-year, 24-hour Precipitation
Rhode Island	Drainage Area, Mean Basin Elevation, Forest Cover
Vermont	Drainage Area, Basin Storage, 2-year, 24-hour Precipitation, Seasonal Snow, Mean annual Precipitation, Altitude

Two methods will be used to derive the basin characteristics. Both will use publicly available Geographic Information System (GIS) coverages. The use of public domain GIS coverages is necessary to transfer the study's results to state agencies. The use of GIS reduces the time needed to estimate basin characteristics. The first method is to obtain GIS

coverages from state agencies and data repositories. National databases of interest may include National Land Cover Data (NLCD), Watershed Boundary Dataset (WBD), Parameter-elevation Regressions on Independent Slopes Model Dataset (PRISM), and State Soil Geographic Database (STATSGO) in addition to the topographic databases identified in Task 2.

The second method is to use StreamStats. StreamStats is an integrated GIS application that uses ArcIMS, ArcSDE, ArcGIS, and the ArcHydro Tools. It is being developed in cooperation by the USGS and ESRI (Figure 3). StreamStats incorporates (1) a graphical user interface for site selection, (2) a database of streamflow statistics and other information for data-collection stations, (3) a GIS program that determines drainage basins for ungaged sites and the physical characteristics of the drainage basins, and uses regression equations to estimate streamflow statistics for the basins, and (4) a GIS database to display maps and physical characteristics of the drainage basins (<http://water.usgs.gov/osw/programs/streamstats1.html>). The software's databases will be populated for Vermont, New Hampshire, and Massachusetts by September 2004. Where available, this project will use StreamStats's physical characteristics of the drainage basins.

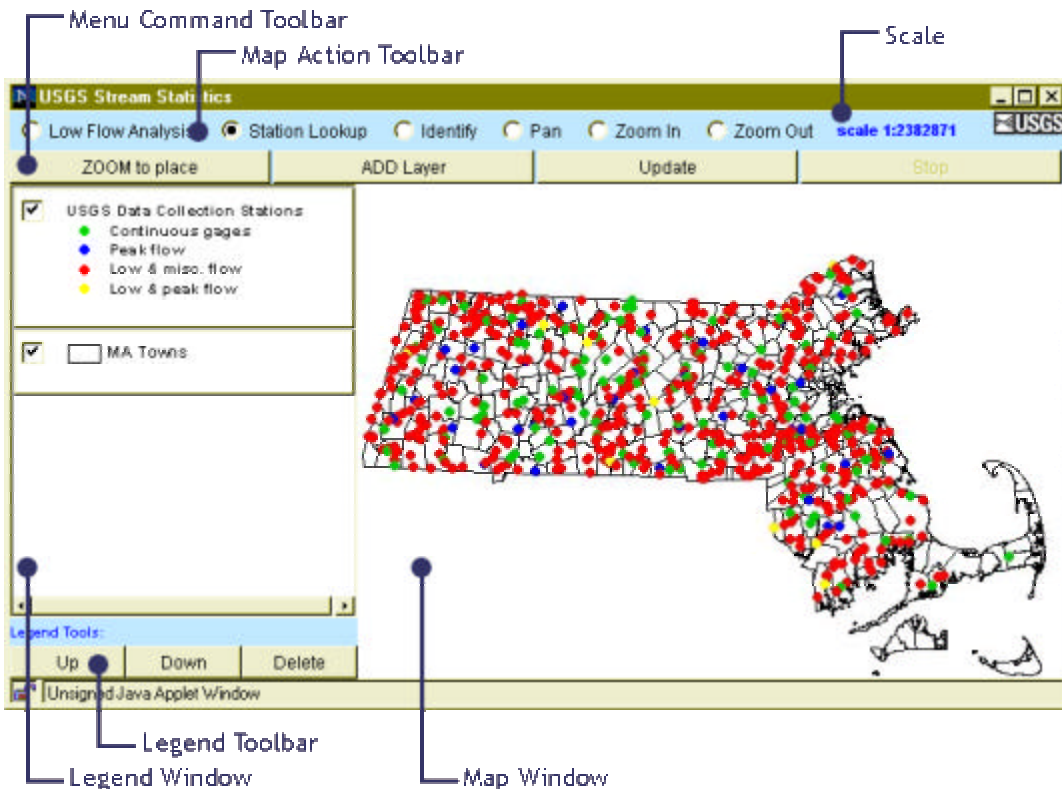


Figure 3. StreamStats v2.0 interface for Massachusetts

## **Task 5: Assess Hydrologic Regions**

The study area is relatively large and may be better characterized by multiple hydrologic regions. This task, the identification of hydrologic regions, will be conducted simultaneously with the Task 6. Mapping of regression residuals will be used to determine if more than one hydrologic region exists for New England. Residuals will be plotted at the centroid of its drainage basin to look for geographical patterns and to determine whether New England should be divided into more than one hydrologic region. If so, separate regression equations will be computed for each region.

## **Task 6: Regression Analysis**

Regression analysis will be conducted using standard USGS regional hydrologic methods including the use of generalized least squares (GLS) regression that is now standard practice. The approach will be developed and presented to individual State offices of the USGS for those states having basins in this study prior to conducting the regression analysis. The approach, briefly outlined below, will follow that applied by the USGS to estimate peak flows in ungaged basins for Maine (Hodgkins, 1999) and Vermont (Olson, 2002).

1. Determine Flows for 2-, 10-, 25-, 50-, and 100-year Recurrence Intervals. The Bulletin 17B approach will be used to determine the peak flows of 2-, 10-, 25-, 50-, and 100-year recurrence intervals at each station identified in Task 2. The Bulletin 17B guidelines will be used to account for zero flows, low outliers, historic peaks, regional information, confidence intervals, and expected quantile probabilities. A log Pearson type 3 distribution will be fit to the peak discharges for each basin. The mean, standard deviation, and coefficient of skewness will be calculated using the common base 10 logarithms of the peak discharges. A weighted skewness coefficient will be determined by combining the basin skewness value with a generalized skew coefficient. A generalized skew coefficient will be developed for the steep watershed in this study according to the Bulletin 17B guidelines and adjusted for bias (Tasker and Stedinger, 1986). The basin peak flow will be estimated for 2-, 10-, 25-, 50-, and 100-year floods at each watershed using a frequency factor  $K_T$  where T is the return period and  $K_T$  is a function of the return period and the skew coefficient.

2. Identify Basins Characteristics for Regression Equations. Ordinary least squares (OLS) regression techniques (Helsel and Hirsch, 1992) will be used to identify basin characteristics (explanatory variables) for the regression equations. The response variables will be those flood values determined in Step 1 of this task. As the OLS regression identifies linear relations between the explanatory and response variables, variables may need to be transformed. For example, the relation between drainage areas and peak flows is typically not linear. Homoscedasticity (a constant variance in the response variable over the range of the explanatory variables) and normality are important metrics in OLS regression. To identify if a transformation is appropriate, transformed and untransformed models will be examined graphically in terms of homoscedasticity, normality of residual, and curvature in a plot of residuals versus predicted.

OLS regression of all possible subsets will be used to determine the best combination of basin characteristics to use in the final regression equations. Initially, all basin characteristics or transformations of these variables will be used with the response variables (the base-10 logarithms of the n-year peak flows; n = 2, 10, 25, 50, 100) from all steep watersheds. The best combination of the variables will be based on standard tests which may include Mallows' Cp statistic, the PRESS statistic, the amount of variability in the response variables explained by the explanatory variables, the statistical significance of the explanatory variables, and the difficulty of calculating the explanatory variables. Multicollinearity of the explanatory variables will be identified by the variance inflation factor (VIF) and addressed by eliminating redundant variables. The influence of individual stations on the regressions will be measured by Cook's D statistic. Watersheds having a high Cook's D will be examined for errors. If errors occurred, the watershed will be corrected (if possible) or deleted. All appropriate types of residual plots will be analyzed to identify linearity, homoscedasticity, normality, the presence of outliers, and biases in the explanatory variables.

3. Develop Regression Equations. The final regression equations will be developed using the generalized least squares (GLS) regression procedure for regional regression of streamflow characteristics as proposed by Stedinger and Tasker (1985, 1986). The advantage of the GLS procedure is that it weights flow observations based on their record length, cross correlation with flow characteristics at other sites, and the model error variance. The approach will be applied using the computer program GLSNET (<http://water.usgs.gov/software/glsnet.html>).

### **Task 7: Evaluation and Validation of Steep Gradient Regression Equations**

The limitations and accuracy of the regression equations developed in Task 6 will be identified and calculated. Limitations with respect to the model selection and explanatory variables will be described in the final report. The sensitivity of model results to errors in explanatory variables will be quantified. Statistical techniques will be used to quantitatively determine the accuracy of the proposed equations. These techniques may include, but are not limited to, the standard error of the estimate, the average standard error of prediction, the average equivalent years of record, and the PRESS statistic.

The standard error of residuals is a measure of how the observed data deviate from the regression results and is an approximation of how well the regression equations will estimate streamflow. The average standard error of prediction is a measure of how well the regression equations will estimate peak flows when applied to ungaged drainage basins. While the standard error of prediction varies from site to site, the average standard error of prediction provides an estimate of the standard error of prediction for individual sites. The average equivalent years of record estimates the average number of years of gaging-station data needed to achieve results with accuracy equal to the regression equations. The PRESS (prediction error sum of squares) statistic is an excellent overall measure of the regression equations. The PRESS statistic is a validation-type statistic. In summary, one station is removed from the data set and the remaining stations are used to recalculate the regression equation. This new equation is used to predict the value for the missing station and to determine the residual difference between that predicted value and the observed value. The process is repeated for each station.



## **Task 8: Prepare Report**

Detailed study results will be written in a format that is readily accessible to practicing engineers and technicians. To facilitate endorsement by the USGS and the Federal Emergency Management Administration, the study report will follow the standard format used in the USGS regression reports and include all appropriate maps, figures, and tables (for example, see Hodgkins' 1999 report for Maine). Flow records for the watershed dataset and the watershed characteristics will be provided in electronic format (both Excel and ASCII flat files). In addition, a fact sheet will be created that is consistent with the format used in the USGS's *Nationwide summary of U.S. Geological Survey regional regression equations for estimating magnitude and frequency of floods for ungaged sites* (1993). This fact sheet will include a project summary, the regression equations, necessary maps, and a list of references.

## **4.0 Implementation**

The implementation plan will be developed in conjunction with all state DOTs in cooperation with the NETC coordinator. This project will identify and conduct the steps to be taken to ensure that the results of this research are put into practice. Detailed application protocols will be written in a format that is readily accessible to practicing engineers and technicians. The fact sheet will be directly applicable to DOT engineers making flood predictions.

## **5.0 Significance of Work and Benefits**

The anticipated results of the proposed study will provide the New England State DOTs with a systematic means to identify steep gradient watersheds and the regression equations necessary to predict flood and average daily flows for these watersheds. The study will use statistical methods to develop regression equations that relate flow predictions to readily available physical parameters and to improve the characterization of design storms. The improved prediction of flood flows will allow state agencies to enhance both the design of hydraulic structures and the public safety in steep gradient watersheds.

## **6.0 Technical Meetings and Dissemination of Results**

The research project team will meet with the Technical Committee for this project a minimum of three times over the course of the project. It is anticipated that these meetings will take place at the start of the project, after Task 2 is completed to discuss the testing plan, and midway through Task 7 to discuss progress and any need for further analysis.

Quarterly progress reports will be submitted to the NETC Coordinator. A Draft Final Report and seven copies will be submitted to the Project Technical Committee for review prior to the completion of the Final Report. Upon approval from the Chairman of the Project Technical Committee, 70 copies of the Final Report will be prepared and submitted to the NETC Coordinator.

The project results will be disseminated through the final report, and presentations and publications at regional and national level meetings. Electronic copies of the final report and fact sheet will be distributed to each state DOT and published on the University of New Hampshire's web site.

## 7.0 Proposed Research Team

The proposed team will consist of Jennifer Jacobs (PI) from University of New Hampshire, Tom Ballestero (Co-PI) from University of New Hampshire, and Richard Vogel (Co-PI) from Tufts University. Dr. Jacobs will collect data and conduct regression analyses with a graduate student and provide overall supervision and guidance in the execution of the tasks and preparation of reports. She will also have primary responsibility for developing and maintaining GIS databases. Tom Ballestero will assist in the database development, and identification of appropriate watersheds (Tasks 1, 2 and 4). Richard Vogel will be primarily responsible for overseeing the statistical analyses including the mixed population flood frequency analysis, the assessment of hydrologic regions, and the development and validation of the regression relationships. In addition, Drs. Vogel and Ballestero will provide the oversight necessary to ensure that the project methods meet USGS standards.

## 8.0 Facilities

The proposed project will conduct the analysis at the University of New Hampshire and Tufts University. The UNH PIs and graduate student will have office space and computers and supporting resources in the state of the art Environmental Technology Building. The building is fully networked with a computer laboratory. The PIs currently have the necessary software (ArcView, ArcGIS, ArcHydro, Minitab, and Fortran) and computers necessary to conduct the proposed project. GRANIT, the NH state GIS database, is maintained on the UNH campus which has information includes NRCS soil maps, National Wetland Inventory maps, geologic resource maps, and aerial photos in a digital format and can provide support to access GIS resources in the New England region. The Tufts Co-PI has comparable computer access and software that will readily support data exchange between PIs.

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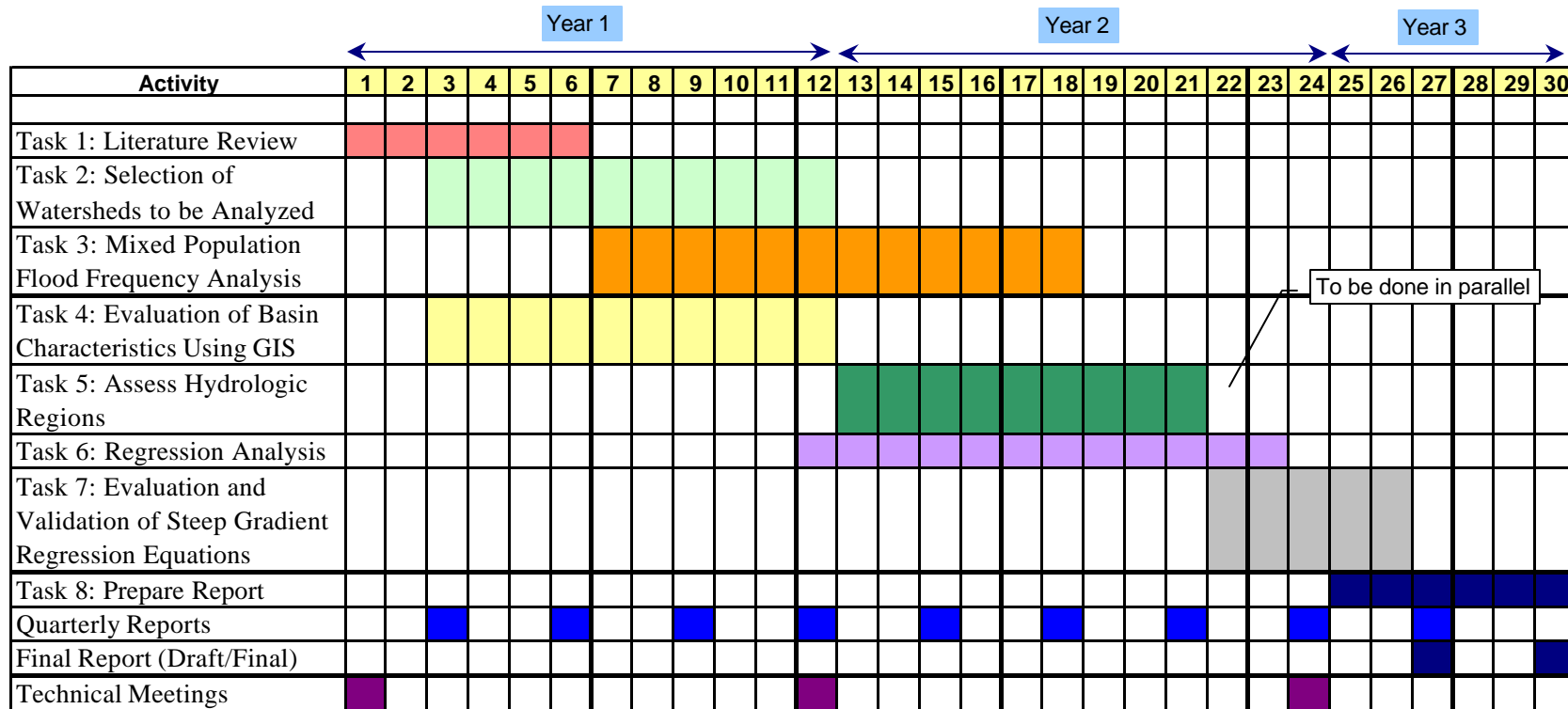
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## 10.0 Schedule

The proposed project schedule is shown in Table 2. The first few months of the project will be dedicated to reviewing the literature and to developing the project databases. A more precise schedule of activities with absolute dates will be developed upon funding.

Table 2. Proposed Schedule of Activities by Month



## 11.0 Budget and Total Cost

The budget for the proposed project is shown below.

<b>Total Project Summary</b>		
<b>Item</b>	<b>Direct Costs</b>	<b>Indirect Costs</b>
UNH Contract	77,875	26,425
Tufts University Subcontract	12,461	3,240
<b>Total</b>	<b>90,336</b>	<b>29,665</b>
<b>Total Project Costs</b>		<b>120,000</b>

<b>University of New Hampshire</b>			
<b>Item</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Budget</b>
Jacobs, Co-PI (0.5 month summer salary)	4,278	4,503	8781
Graduate Student	18,742	19,672	38414
Ballestero, Co-PI (0.5 month summer salary)	6,078		6078
Fringe Benefits (8.5%)	1,363	895	2258
Tuition	8,812	9,262	18074
Travel	1,000	2,000	3000
Materials and Supplies	400	870	1270
Subcontract to Tufts University	15,700		15700
<b>Total Direct Costs</b>			<b>93575</b>

<b>Subcontract - Tufts University</b>	
<b>Item</b>	<b>Budget</b>
Vogel, Co-PI (1 month salary)	10612
Fringe Benefits (8%)	849
Travel	1000
Indirect Costs (26%)	3240
<b>Total Budget</b>	<b>15700</b>

## Appendix A

### Relevant Experience of Principal Investigators

*Dr. Jennifer Jacobs, PI*, has extensive experience in the development of GIS databases for hydrological analysis and in surface water hydrology. She received her Ph.D. in Civil Engineering at Cornell University in 1997. Prior to joining the faculty at the University of New Hampshire in 2003, she was on the faculty at the University of Florida for six years. Dr. Jacobs has developed GIS databases of climate, soils, topographic, landuse and watershed parameters using ArcView and ArcGIS. She has experience analyzing rainfall-runoff response using statistical and analytical models. While at UF, she was the PI on a number of projects with state water management agencies and the Florida Department of Transportation that successfully transferred research to practice. Dr. Jacobs has authored numerous refereed publications and is a member of the American Society of Civil Engineers, the American Geophysical Union, and the American Meteorological Society.

*Dr. Ballesterio, Co-PI*, is a registered Professional Hydrologist and a licensed Professional Engineer. His graduate training (Masters) was in hydrology and hydraulics and (PhD) in stochastic hydrologic methods. He has a long career involvement with modeling of floods. This experience specifically includes record floods in steep watersheds: assisting the USGS with slope-area field measurements after the Laurel Run flood (1977) and field measurements after the Lawn Lake Dam failure (1982). Dr. Ballesterio has taught watershed flood modeling as well as statistical flood predictions, both since 1977. He wrote a code in 1982 to fit probability distributions to flood flows and determine the best-fit probability distribution. This code supported some of his early research to determine extreme large magnitude (and very low return period) floods used for the design of nuclear facilities (Ballesterio, Simons, and Li, 1984).

*Dr. Richard Vogel, Co-PI*, has had extensive experience in the areas of regional hydrology, environmental statistics and the use of geographic information systems for developing regional models of flood flow statistics at ungaged sites. He has developed regional hydrologic models for estimating flood, lowflow and other streamflow statistics from easily measured drainage basin and climatic characteristics for Massachusetts, New England, and even the entire United States. He also has numerous research articles on the spatial, temporal and probabilistic structure of streamflows in New England, United States and Australia. He has also developed statistical methods for augmenting and extending short streamflow records which often plays a central role in regional hydrologic investigations. Many of the methods that were developed in his research are now used in practice and described in Chapters 17, 18 and 19 of the 1993 McGraw-Hill *Handbook of Hydrology*.

**Appendix B**  
**Resumes of Research Team**

## Jennifer M. Jacobs

University of New Hampshire  
Department of Civil Engineering  
240 Environmental Technology Building  
Durham, NH 03824

office: (603) 862-0635

fax: (603) 862-3957

email: jennifer.jacobs@unh.edu

### EDUCATION

Ph.D., CIVIL ENGINEERING August 1997

Cornell University, Ithaca, NY

Dissertation: *Surface Fluxes from Surface Temperature and Mixed Layer Characteristics in the Southern Great Plains*

M.S., CIVIL ENGINEERING May 1993

Tufts University, Medford, MA

Thesis: *The Allocation of Water Withdrawals in a River Basin*

B.S., ELECTRICAL ENGINEERING May 1987

Brown University, Providence, RI

### PROFESSIONAL EXPERIENCE

*Assistant Professor.* University of New Hampshire, Dept. of Civil Engineering, August 2003 – present

*Assistant Professor.* University of Florida, Dept. of Civil and Coastal Engineering, October 1997 – August 2003

*Affiliate Faculty Member.* University of Florida, College of Natural Resources and Environment, 2000 - present

*Affiliate Faculty Member.* University of Florida, Environmental Engineering Sciences, 2001- present

*Environmental Consultant.* Eastern Research Group, Lexington, MA, 1989 - 1993

*Consultant.* Boston Systems Group, Boston, MA, 1987 - 1989

### COMMITTEES / SERVICE / PROFESSIONAL DEVELOPMENT

- CUAHSI, HMTF Committee, 2003 to present
- AGU Remote Sensing Committee, 2001 to present
- AGU Surface Water Hydrology Committee, 2001 to present
- AGU Outstanding Student Paper Award Committee (co-chair 2001), 1999 to 2002
- Session Organizer and Chair, American Geophysical Union 2002 Spring Meeting, Washington, DC, May 2002
- Session Organizer and Chair, American Geophysical Union 2002 Fall Meeting, San Francisco, CA, December 2002



- Session Organizer and Chair, European Geophysical Society/American Geophysical Union/EUG Joint Meeting, Nice, France, April 2003
- Session Organizer and Chair, American Geophysical Union 2003 Fall Meeting, San Francisco, CA, December 2003
- ASCE, Evapotranspiration in Irrigation and Hydrology Committee, 2000 to present
- ASCE, Task Committee on Climate and Water Resources, 2000 to present
- Session Chair, ASCE Joint Conference on Water Resources Engineering and Water Resources Planning and Management, Roanoke, VA, May 2002
- SMEX02 Workshop, Beltsville, MD, January 2003
- American Society for Engineering Education, 1996 to present
- International Association of Hydrological Sciences, 2000 to present
- American Meteorological Society (AMS), 2002 to present
- Scholarly Journal Reviews – 15 reviews for 7 journals
- Proposal Reviews – 7 reviews for 3 agencies

## REFEREED JOURNAL PUBLICATIONS

Note: \* indicates graduate student or post-doc

Jacobs, J.M., Mohanty, B.P., Hsu\*, E., and D.A. Miller. Field scale soil moisture variability and similarity from point measurements during SMEX02. to appear in *Remote Sensing of Environment*. 2004.

Irmak\*, S., M.D. Dukes, and J.M. Jacobs. Estimating grass-reference evapotranspiration using modified Bellani plate evapotranspiration gages. to appear in *ASCE Journal of Irrigation and Drainage*. 2004.

Satti\*, S.R. and J.M. Jacobs. 2004. A GIS-based model to estimate the regionally distributed drought water demand. *Agricultural Water Management*. 66, 1-13.

Satti\*, S.R., J.M. Jacobs and S. Irmak\*. Agricultural water management in a humid region: Sensitivity to climate, soil and crop parameters. to appear in *Agricultural Water Management*. 2004.

Boupha\*, K., J.M. Jacobs, and K. Hatfield. MDL Groundwater Modeling: Laplace transforms and the De Hoog algorithm to solve contaminant transport equations. to appear in *Computers in Geosciences*. 2003.

Guha\*, A., J.M. Jacobs, T.J. Jackson, M. Cosh, E. Hsu\*, and J. Judge. 2003. Soil moisture mapping using ESTAR from the Southern Great Plains experiment (SGP99), *IEEE Geoscience and Remote Sensing Letters*. 41(10), 2392-2397.

Satti\*, S.R. and J.M. Jacobs. 2004. A comparison of Florida crop evapotranspiration and consumptive use permitting methods. *Soil and Crop Society of Florida*. 62, 30-37.

Jacobs, J.M., D.A. Myers\* and B.M. Whitfield\*. 2003. Improved rainfall-runoff estimates using remotely sensed soil moisture. *Journal of American Water Resources Association*. 39(2), 313-324.

Jacobs, J.M. and M. Wang\*, 2003. Atmospheric momentum roughness to determine stage-discharge relationships in vegetated flood plains, *Journal of Hydrologic Engineering*, 8(2), 99-104.

Irmak\*, S., Irmak, A., J.W. Jones, T.A. Howell, J.M. Jacobs, R.G. Allen, and G. Hoogenboom. 2003. Predicting net radiation in the humid regions of the Southeast United States. *Journal of Irrigation and Drainage Engineering*. 129(4), 256-259.

Jacobs, J.M., D.A. Myers\*, M.L. Anderson, and G.R. Diak. 2002. GOES surface insolation to estimate wetlands evapotranspiration, *Journal of Hydrology*. 266, 53-65.

Jacobs, J.M., S.L. Mergelsberg\*, A. Lopera\*, and D.A. Myers\*. 2002. Evapotranspiration from a wet prairie wetland under drought conditions: Paynes Prairie Preserve, Florida, USA, *Wetlands*. 22(2), 374-385.

Jacobs, J.M. and R.M. Vogel. 2000. Closure to: The optimal allocation of water withdrawals in a river basin, *Journal of Water Resources Planning and Management*, 126(1), p.38.

Jacobs, J. M., R. L. Coulter and W. Brutsaert. 2000. Surface flux estimation by bulk ABL similarity with radiosonde and wind-profiler/RASS observations over a land-surface with small roughness, *Advances in Water Resources*., 23(4), 339-348.

Jacobs, J.M. and W. Brutsaert. 1998. Momentum roughness and view-angle dependent heat roughness at a Southern Great Plains test-site, *Journal of Hydrology*, 211, 61-68.

Jacobs, J.M. and R.M. Vogel. 1998. The optimal allocation of water withdrawals in a river basin, *Journal of Water Resources Planning and Management*, ASCE, 124(6), 357-363.

## **JOURNAL MANUSCRIPTS IN PEER REVIEW**

Liu\*, S., Graham, W.D., and J.M. Jacobs. The value of climate forcings to capture soil water dynamics and evapotranspiration using daily potential evapotranspiration. Submitted to *Journal of Hydrology*. August 2003.

Sumner, D.M. and J.M. Jacobs. Actual pasture evapotranspiration modeled using combination methods, reference evapotranspiration, and pan evaporation. Submitted to *Journal of Hydrology*. July 2003.

Loescher\*, H.W., Gholz, H.L., Jacobs, J.M., and S.F. Oberbauer, Energy balance and modeled evapotranspiration for a wet tropical forest in Costa Rica. Submitted to *Journal of Hydrology*. May 2003.

Jacobs, J.M., M.C. Anderson, L.C. Friess, and G.R. Diak. Solar radiation, longwave radiation and emergent wetland evapotranspiration estimates from satellite data in Florida, USA, Submitted to *Hydrological Sciences Journal*. January 2003.

Bryant\*, M.L., Bhat\*, S., and J.M. Jacobs. Throughfall characterization of heterogeneous forest communities in the southeastern U.S., Submitted to *Journal of Hydrology*. November 2002.

Bhat, S., J.M. Jacobs, J. Prenger, and K. Hatfield. Ecological Indicators in Forested Watersheds in Fort Benning, GA: Relationship between Land Use and Stream Water Quality. Submitted to *Ecological Indicators*. February 2004.

## CONFERENCE PROCEEDINGS AND ABSTRACTS

Triebel, G.W., Dukes, M.D., and J.M. Jacobs. Estimation of crop water use of Bahiagrass using lysimeters. 2004 Florida Section ASAE Annual Conference, Stuart, Florida, June 3-4, 2004.

Judge, J., B. Whitfield<sup>1</sup>, and J.M. Jacobs. Calibration of a Field-Scale and a Watershed-Scale SVAT Models for prairie wetland in Florida, Eos Trans. AGU, 84(46), Fall Meet. Suppl., Abstract H11A-03, 2003. 1 page.

Bhat<sup>1</sup>, S., S.R. Satti<sup>1</sup>, J.M. Jacobs and K. Hatfield. Ecological Indicators in Diversified Forested Watersheds: Relationships between Watershed Characteristics and Stream Water Quality in Fort Benning, GA, Eos Trans. AGU, 84(46), Fall Meet. Suppl., Abstract H51C-1058, 2003. 1 page.

Guha, A., M Choi, S R Satti, JM. Jacobs, D.D Bosch, J.H. Prueger and K. Hatfield. Validation of the Community Land Model (CLM) using data collected during the Soil Moisture Experiment 2003 (SMEX03) Eos Trans. AGU, 84(46), Fall Meet. Suppl., Abstract H22B-0932, 2003. 1 page.

Prenger, J.P., K.R. Reddy, S. Bhat, and J. Jacobs. Microbial Nutrient Cycling in the Riparian Zone of a Coastal Plain Stream. 8th Symposium on Biogeochemistry of Wetlands, Ghent, Belgium, September 14-17, 2003.

Ripo\*, G.R., J.M. Jacobs, and J.C. Good, An Algorithm To Integrate Ecological Indicators With Streamflow Withdrawals, Proceedings of the EWRI World Water and Environmental Resources Congress, Philadelphia, PA, June 2003.

Jacobs, J.M., G.R. Ripo\*, J.C. Good, and S.R. Satti\*, Sustainable Watershed Ecohydrology And Optimized Water Management Using A Flow Duration Curve Framework, Supplement to European Geophysical Society/American Geophysical Union/EUG Joint Meeting, Nice, France, April 2003.

Jacobs, J.M., B.P. Mohanty, D.A. Miller, Field-Scale Soil Moisture Spatial Structure Under Different Soil, Slope, Vegetation, and Precipitation During the Soil Moisture Experiment 2002 (SMEX02), Supplement to AGU Fall Meeting, San Francisco, CA, December 2002.

Guha\*, A., E. Hsu\*, J. M. Jacobs, J. Judge, and M.H. Cosh, ESTAR Brightness Temperatures for Soil Moisture Estimation and Spatial Characterization of the Retrieved Fields - A Study From SGP99, Supplement to AGU Fall Meeting, San Francisco, CA, December 2002.

Loeschner\*, H.W., H.L. Gholz, J.M. Jacobs, and S.F. Oberbauer Energy Balance and Modeled Evapotranspiration for a wet Tropical Forest in Costa Rica, Supplement to AGU Fall Meeting, San Francisco, CA, December 2002.

Tkaczyk, M\*, J.W. Jawitz, J.M. Jacobs, S. Bhat\*, P.S. Rao, and N. Haws, Rainfall/Runoff Analysis to Investigate the Effects of Soil Heterogeneity on Watershed Response Utilizing Topmodel, Supplement to AGU Spring Meeting, Washington, DC, May 2002.

Satti\*, S.R and J.M. Jacobs. GWRAPPS: A GIS-based Decision Support System for Florida 1-in-10 Drought Water Requirements, Proceedings of the ASCE World Water and Environmental Resources Conference, Roanoke, Va, May 2002.

Jacobs, J.M., D.A. Myers\*, and M.C. Anderson, Wetlands Evapotranspiration Using Remotely Sensed Solar Radiation, Supplement to AGU Fall Meeting, San Francisco, CA, December 2001.

Good, J.C. and J.M. Jacobs. Ecologically Sustainable Watershed Management using Annualized Flow Duration Curves, Proceedings of the ASCE World Water and Environmental Resources Congress, Orlando, FL, May 2001.

Kleinman, S.S. and J.M. Jacobs. Tracking the Digital Divide: A Longitudinal Study of Undergraduates' Computer Usage and Attitudes. 2001 International Communication Association Annual Conference, Washington, DC, May 2001.

Bhat\*, S., J.M. Jacobs, W. Graham, P.S. Rao, N. Haws\*, W.F. DeBusk, J.W. Jawitz, Identification of Eco-Hydrologic Indicators of Ecological Impact: Phase I Results from Fort Benning, Georgia Watersheds, Supplement to AGU Spring Meeting, Boston, MA, May 2001.

Jacobs, J.M. and J.C. Good. Application of Annualized Flow Duration Curves to Minimum Water Flows and Levels, Supplement to AGU Spring Meeting, Boston, MA, May 2001.

Good J.C. and J.M. Jacobs, Use of Annualized Flow Duration Curves for Minimum Flows and Levels. Florida Section ASAE Annual Conference, Orlando Florida, Cocoa Beach, FL, May 2001.

Jacobs, J.M. and M. Roesner\*. Application of Remotely Sensed Soil Moisture to Surface Runoff for Engineering Hydrology, Proceedings of the 2000 Joint Conference on Water Resources Engineering and Water Resources Planning and Management, Minneapolis, MN, June 2000.

Gurley, K.R., J.M. Jacobs, and A. Kareem. Simulation of multidimensional non-Gaussian stochastic fields, MCS 2000, International Conference on Monte Carlo Simulation, Monte Carlo, Principality of Monaco, June 2000.

Gurley, K.R. and J.M. Jacobs. Probabilistic and Spectral Characterization and Simulation of Soil Moisture Fields. Proceedings of the Eighth ACSE Joint Speciality Conference on Probabilistic Mechanics and Structural Reliability (PMC2000), University of Notre Dame, IN, July 2000.

Jacobs, J.M. and K.R. Gurley. Simulation of Soil Moisture Fields to Capture Probabilistic and Spectral Characteristics, Supplement to AGU Spring Meeting, Washington, DC, 2000.

Jacobs, J.M. and R.M. Vogel. Allocation of Water Withdrawals in a River Basin, Proceedings of the 25<sup>th</sup> Annual Conference on Water Resources Planning and Management, Chicago, IL, June 1998.

Jacobs, J.M. and W. Brutsaert. Estimation of Sensible Heat Fluxes Using Boundary Layer Methods Under Cloudy Skies, Proceedings of the American Geophysical Union 1998 Spring Meeting, Boston, MA, May 1998.

Jacobs, J.M. and W. Brutsaert, Surface Roughness Parameters Over Harvested Wheat in the Southern Great Plains, Supplement to AGU Fall Meeting, San Francisco, CA, December 1997.

Jacobs, J.M. and E.A. Eschenbach. Educating the next generation of engineering professors: Cornell's teaching fellow program, Proceedings of the Annual American Society for Engineering Education Conference, Washington, DC, May 1996.

## **BOOK CHAPTERS**

Leclerc, M. and J. M. Jacobs, Plant Response to Wind Environment: Heat and Mass Exchange in *Plant-Environment Interactions, Second Edition*, R.E. Wilkinson, ed. Marcel Dekker, Inc. New York. 2000. pp. 361-386.

Jacobs, J.M., S.R. Satti, Dukes, M.D., and J.W. Jones. Climate Variability and Impacts on Irrigation Water Demand: Research and Application in Northeast Florida to appear in *EWRI Task Committee on Climate Variability*, J. Garbrecht, ed. 2004.

## **REVIEWS**

Jacobs, J.M. 2003. Review of *Ecohydrology: Darwinian Expression of Vegetation Form and Function*, P.S. Eagleson, Cambridge University Press, Cambridge, United Kingdom to appear in *EOS Transaction, American Geophysical Union*. 2003.

Jacobs, J.M. 2003. Review of *Hydrology and the Management of Watersheds*, 3<sup>rd</sup> Edition, K.N. Brooks, P.F. Ffolliott, H.M. Gregersen, and L.F. DeBano, *Iowa State Press*; Ames, Iowa to appear in *Journal of American Water Resources Association*. 2003.

## **CREATIVE WORKS:**

GIS-based Water Resources and Agricultural Permitting and Planning System (GWRAPPS) - An ArcGIS Decision Support System for St. Johns River Water Management District (SJRWMD), 2002.

POTW Expert Version 1.0 - IBM PC-based expert system to improve Publicly Owned Treatment Works (POTWs) for the U.S. EPA Center for Environmental Research Information (CERI), 1993.

## **HONORS / AWARDS**

- NASA New Investigator Program (NIP) Award – 2001-2004 (see funded research on page 1)

**THOMAS P. BALLESTERO**  
**Hydrology and Water Resources Engineering**

Associate Professor of Civil Engineering  
238 ETB  
University of New Hampshire  
Durham, NH 03824

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Web site: <http://www.unh.edu/civil-engineering/faculty/Ballestero/index.html>

**EDUCATION**

Pennsylvania State University: B.S. in Civil Engineering, 1975  
(Civil and Environmental Engineering)  
Pennsylvania State University: M.S. in Civil Engineering, 1977  
(Hydrology and Hydraulics)  
Colorado State University: Ph.D. in Civil Engineering, 1981  
(Hydrology & Water Resources)

**REGISTRATION**

Professional Engineering License in New Hampshire, Colorado, and Wyoming  
Registered Professional Hydrologist (AIH)  
Certified Ground Water Professional (NGWA)  
Licensed Professional Geologist, New Hampshire

**TECHNICAL SOCIETIES**

American Geophysical Union, Member  
American Institute of Hydrology, Member and Secretary of State Chapter  
American Society of Civil Engineers, Member  
American Water Resources Association, Member  
American Water Works Association, Member  
National Ground Water Association, Member  
Universities Council on Water Resources

**EXPERIENCE SUMMARY**

1989-present	Associate Professor of Civil Engineering, UNH
1993-1999	Chairman, Department of Civil Engineering, UNH
1986-1999	Director, New Hampshire Water Resources Research Center, UNH
1983-1988	Assistant Professor of Civil Engineering, UNH
1982-1983	Division Manager, Water Resources, Simons, Li and Associates, Inc.
1980-1981	Senior Hydrologist, Simons, Li and Associates, Inc.

## **PUBLICATIONS**

Over 80 technical reports and papers on the topics of water resources planning, flood frequency analysis, hydrogeology, hydrology, contaminant fate and transport, solid waste management, and reservoir operating procedures.

## **HONORS AND AWARDS**

1998 τβπ Outstanding Teacher Award  
1995-1997 Mr. and Mrs. Robert C. Davison Environmental Engineering  
Professorship  
1992 University of New Hampshire Public Service Award  
1992 Fulbright Scholar Award  
1991 University of New Hampshire Outstanding Teaching Award  
1991 Fulbright Scholar Award  
1988 τβπ Outstanding Teacher Award  
1986 American Express Partners of the Americas Outstanding Service Award

## **EXPERIENCE NARRATIVE**

At the University of New Hampshire, Dr. Ballestero teaches Fluid Mechanics, Advanced Groundwater Topics, Hydrologic Monitoring, River Mechanics, Open Channel Flow, Engineering Hydrology, Coastal Engineering, Coastal Outfall Design, and Design of Water Transmission Systems. His research interests are broadly in the field of water resources computer simulation and field measurement of parameters. Current research projects upon which he is working include: movement, monitoring and biodegradation characteristics of organic contaminants in soils and ground water; innovative drilling and field techniques for characterization of contaminated sites and investigating environmentally sensitive locations; bedrock hydrogeology, sediment transport and bridge scour, landfill leachate recirculation; ground water mounding under community septic systems; land application of biosolids; urbanization effects on runoff and water quality, simulation of historic salt water reductions to New Hampshire salt water marshes; evaluation of new drilling and ground water monitoring techniques; groundwater flow into coastal and estuarine systems, stream restoration, constructed wetlands from contaminated sediments, and composting of yard and agricultural solid wastes. Dr. Ballestero has taught courses in Concord, NH for personnel employed by the NH Department of Environmental Services. These courses included: landfill design, introduction to ground water hydraulics and hydrology, and surface water hydrology. Dr. Ballestero has also lectured for the NH Technology Transfer Center on Stormwater Drainage and Design of Drainage Structures. He has been active in international courses. He has taught groundwater short courses in both Brazil and Colombia.

Dr. Ballestero has been nationally and internationally involved in water resources projects including: groundwater development in northeast Brazil and Colombia, as well as the large Guaraní aquifer spanning Brazil, Uruguay, Paraguay, and Argentina; riverbank stabilization in Argentina; the effects of port construction in Brazil; testimony before the U.S. Congress regarding ground water contamination; measurement and development of landfill gas in Bermuda; monitoring of groundwater contamination in Colombia and South Korea; assessment of environmental hazards in northern Russia;

estuarine monitoring in Puerto Rico; and an advisory/review capacity on the Boston Harbor clean-up program. In 1991 and 1992 Dr. Ballestero was a Fulbright Scholar in Brazil where he taught ground water and surface water theory and modeling, and researched ground water resources development, desertification, and water quality conditions of rivers. The Fulbright Award also supported Dr. Ballestero's lectures at various universities throughout Brazil. In addition to his Fulbright experience, Dr. Ballestero has lectured on other occasions (1986, 1989, 1998, and 2001) at the Federal and State Universities in Fortaleza, Ceará, Brazil on topics of ground water hydrology, computer simulation of hydrology and hydraulics, bedrock hydrogeology, and stochastic hydrology. At the Ceará State University he taught courses on environmental and water resources. He has also worked with the State of Ceará's technology agency (NUTEC) in hydrogeologic evaluation and development of ground water resources.

In 1996, 1998, 2002, and 2003, Dr. Ballestero co-taught courses in Bogotá, Colombia on: design of ground water monitoring networks, ground water hydraulics, and ground water monitoring and sampling. The 2003 assignment was at the request of the Colombian geological agency, INGEOMINAS, to assist in the development and protection of bedrock groundwater resources in northern Colombia. In 1998, 2002, and 2003 he was an expert for the International Atomic Energy Agency delegated to oversee ground water resources development: on the island of San Andrés, Colombia; in the savanna north of Bogotá, Colombia; and for the Guaraní aquifer. The 2002 assignment also included a two-week short course that incorporated one week of drilling, geophysics, sampling, and monitoring field demonstrations.

Dr. Ballestero peer reviews articles submitted to the following journals: Journal of the American Water Resources Association, Journal of Energy Engineering (ASCE), Rivers, Groundwater (NGWA), Water Resources Research (AGU), Ground Water Monitoring and Remediation (NGWA), and Journal of Hydraulic Engineering (ASCE). He has also provided peer review of proposals and served on expert review panels for NSF, EPA, and USDA. He served for ten years on the Editorial Review Board for Ground Water Monitoring and Remediation, and six years as an Associate Editor for the Journal of the American Water Resources Association. Consulting work with which he is typically involved includes: hydraulic effect of flood plain encroachments, ground water resources delineation and development, ground water contamination, effects of mining on ground water, septic system failure mechanisms, design of sediment ponds and erosion control measures, design and analysis of stormwater management systems, valuation of ground water resources, dissolved oxygen modeling, design of coastal outfalls and harbor works, recirculation of landfill leachate, measurement of vapor fluxes from landfills, closure designs for solid waste dumps, hydrodynamic evaluation of coastal structures, and expert witness testimony.

From January to June, 2000, Dr. Ballestero was on sabbatical at the University of Puerto Rico at Mayagüez. There he taught two graduate courses (Ground Water Engineering and Water Resources Systems Engineering) as well as developed a monitoring plan for the Jobos Bay National Estuarine Research Reserve. Dr. Ballestero is fluent in Portuguese and Spanish.



Aside from these academic and research pursuits at UNH, from 1986 to 1999, Dr. Ballestero was the Director of the New Hampshire Water Resources Research Center. This position entailed: overseeing the annual research program, technology transfer, and water related publications. Annually the Center supports three to six research projects. The Center Director develops short and long term research objectives from the interactions and polling of water resources professionals throughout the State. The Director is also responsible for helping to develop federal water resources legislation by the U.S. Congress. Dr. Ballestero was formerly the Secretary of the National Institutes for Water Resources (NIWR) and the regional representative for the NIWR executive board.

Another administrative position held by Dr. Ballestero at UNH was as Chair of the Civil Engineering Department (1993 – 1999). The department has 12 FTE faculty, 2 research faculty, and 3 full-time staff members. Also, the Department has 200 undergraduate and 50 graduate students. Department annual research expenditures exceed \$2 million. The Department houses the following research institutes: Technology Transfer Center, Environmental Research Group, and the New Hampshire Water Resources Research Center.

Prior to his employment at UNH, Dr. Ballestero was employed by Simons, Li and Associates, Inc. His position there was Senior Hydrologist and Division Manager of the Water Resources Engineering Division. In this capacity, Dr. Ballestero was project manager for projects dealing with water resources development (ground water and surface water supplies), hydropower feasibility analyses, hydrologic analysis and simulation, evaluation of contaminant migration, water rights, and design and evaluation of water monitoring networks. Also, Dr. Ballestero was involved with proposals, corporate marketing, expert witness testimony and corporate management. Dr. Ballestero started and temporarily ran the company branch office in Cheyenne, WY.

#### **PUBLICATIONS** (\* - refereed)

- \* Ballestero, T. P., G. Pulido, and K. Newman, 2004, Comparison of Open Bedrock Well Multi-Level Ground Water Sampling Methods, submitted to Groundwater Monitoring and Remediation. Accepted for publication.
- \* (invited) Ballestero, T. P., , 2004, Chapter 4 "Monitoring and Sampling the Vadose Zone" in Practical Handbook of Ground Water Monitoring, second edition, ed. David M. Nielson, Lewis Publishers, Chelsea, MI.

de Alba, P. and T. Ballestero, 2004, "Residual strength after liquefaction: a rheological approach," Proceedings, 11th International Conference on Soil Dynamics and Earthquake Engineering and 3d International Conference on Earthquake Geotechnical Engineering, Berkeley, Calif. January 7-9, 2004, Vol.2, pp.513-520.

- \* Pulido G., and Ballestero T.P., 2004, HyTests: a set of numerical models for hydrogeologic parameters estimation. Submitted for publication to Groundwater.
- \* Pulido G. and Ballestero T.P., 2004, Gas Injection Tests. Submitted for publication to Water Resources Research.
- \* Pulido G., Ballestero T.P., and Kinner N.E., 2004, Multipurpose Packer System. Submitted for publication to Groundwater Monitoring and Remediation.
- \* Pulido G., Ballestero T.P., Kinner N.E., 2004, Large drawdown slug tests. Submitted for publication to Water Resources Research.
- \* Pulido G, Ballestero TP, Barrera MI, Marbet HJ, and Kinner NE., 2004, Developing a conceptual hydrogeological model for a fractured bedrock formation. Submitted for publication to Hydrogeology Journal.
- \* Roseen, R. M., L. K. Brannaka, and T. P. Ballestero, fall 2003, GIS-Based Analysis of Thermal Imagery for Use in Characterizing Groundwater Discharge Zones in Coastal Waters. submitted to Photogrammetric Engineering and Remote Sensing.
- \* (invited) Roseen, R. M., L. K. Brannaka, and T. P. Ballestero, summer 2003, Methodology Verification For Use Of Thermal Infrared Imagery And Field Techniques For Estimating Groundwater Loading to Coastal Waters. submitted to Ground Water.

Kinner, N. E., T. P. Ballestero, D. W. Fredricksson, P. Ramsay, S. H. Jones, K. S. Newman, D. Hildebrand, J. Gilbert, M. Bubier, G. Grant, and F. Roldan-Garcia, 2003, Natural and Enhanced Bioremediation of Petroleum-Contaminated Salt Marshes, Final report submitted to NOAA-CICEET, Durham, NH.

Kinner, N. E., T. P. Ballestero, and M. Mills, 2003, Distribution of MtBE in Paugus Bay, NH, Final Report submitted to NH DES, Concord, NH.

- \* (invited) Roseen, R. M., L. K. Brannaka, and T. P. Ballestero, Summer 2002, Coastal Groundwater Discharge and It's Significance in Nutrient TMDL's. submitted to Biogeochemistry.

Ballestero, T. P., G. Pulido, and K. Newman, 2002, Comparison of Bedrock Well Sampling Methods, Fractured-Rock Aquifers 2002, NGWA, Denver, CO.

Pulido, G. and T. Ballestero, 2002, Hydraulic Tests in a Fractured Bedrock Formation, Fractured-Rock Aquifers 2002, NGWA, Denver, CO.

Pulido, G. and T. Ballestero, 2002, A Numeric Model for Hydraulic Parameter Estimation in Low-Yielding Formations, Fractured-Rock Aquifers 2002, NGWA, Denver, CO.

Roseen, R. M., L. K. Brannaka, and T. P. Ballestero. 2001. Nutrient Loading From Groundwater and Its Role In TMDL's, Conference Proceedings for American Society of Agricultural Engineers conference on Watershed Management To Meet Emerging TMDL Environmental Regulations, Fort Worth, Texas, Spring 2002.

Roseen, R. M., L. K. Brannaka, T. P. Ballestero, Summer 2001, Poster presentation on *Determination Of Nutrient Loading From Groundwater Discharge Into An Inland Estuary Using Airborne Thermal Imagery*, Coastal Zone 2001, NOAA, Cleveland Ohio.

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Miller, A. C., et. al. 1977, Design of an Ice Pond Cooling System for a Nuclear Power Plant, Water Resources Institute, The Pennsylvania State University.

## **RICHARD M. VOGEL**

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### **BIOSKETCH:**

Dr. Vogel is a tenured full professor of civil and environmental engineering at Tufts University. He has been at Tufts since 1984. In addition to his academic experience, he has approximately five years of consulting experience in the field of hydrology and water supply engineering. Professor Vogel has published over 60 refereed journal articles and has written chapters in several books. He has been a visiting professor at the University of Melbourne in Australia and at Harvard University. In addition to his 20 years of academic experience, he has approximately five years of consulting experience in the field of water resource engineering. His primary expertise is in the area of hydrologic and water resource engineering with particular emphasis on the use of statistical and GIS methods for performing regional hydrologic and environmental analyses. He has used regional hydrologic and GIS methods extensively in the context of both regional and national assessments. In 2000 he completed a national assessment of the impact of climate change on water resources. In 2001 he completed a national assessment of methods for estimation of drought streamflows. He has also published extensively on the probabilistic, spatial and temporal structure of floods in the U.S. and elsewhere.

### **RESEARCH INTERESTS**

- Regional Hydrological and Statistical Methods
- Water Supply Engineering
- Watershed modeling
- Decision Support Systems for Water Supply Management and Watershed Management
- Environmental Statistics
- Watershed Restoration and Management
- Low Impact Development

### **EDUCATION**

- Cornell University, Ph.D., Water Resource Systems, 1985.
- University of Virginia, M.S., Environmental Science and Hydrology, 1979.
- University of Virginia, B.S., Engineering Science and Systems, 1977.

## EMPLOYMENT

- **Tufts University**, Department of Civil and Environmental Engineering,
  - Professor, 1998-Present
  - Associate Professor, 1990-1998
  - Assistant Professor, 1984-1990
- **Harvard University**, Visiting Associate Professor of Environmental Engineering, Division of Applied Environmental Sciences, September 1994 – January 1995.
- **University of Melbourne**, Australia, Visiting Fellow, 1991-1992.
- **Dufresne-Henry Inc.**, North Springfield, Vermont,
  - Department Head, Hydrology Division, 1980-81
  - Hydrologist, 1979-1980

## PROFESSIONAL AND EDITORIAL COMMITTEES

- National Research Council, Water Science and Technology Board Committee on Opportunities to Improve USGS National Water Quality Assessment (NAWQA) Program (2000-2001).
- Editor, Water Resources Monograph Series, American Geophysical Union, 1995-1999.
- Editor of *U.S. National Report, Reviews of Geophysics, Contributions in Hydrology, Quadrennial Report, 1991-1994.*, American Geophysical Union, 1994-95.
- Associate Editor, Hydrological Sciences Journal, 1998-Present.
- Steering Group Member, International Model Parameter Estimation Experiment, (MOPEX)
- Contributing Editor, *Journal of Water Resources Planning and Management*, ASCE, 1998-present
- Associate Editor, *Journal of Water Resources Planning and Management*, ASCE, 1994-1998.
- Water Resource Systems Committee, Environmental and Water Resources Institute, ASCE, 1993-Present.
- Committee on Global Warming and Hydrologic Variability, Control Group Member, Environmental and Water Resources Institute, ASCE, 1993-1994.

## AWARDS

- **1995 Walter L. Huber Civil Engineering Research Prize**, awarded by ASCE for research accomplishments relating to the management of water resources in the face of floods, droughts and climate change.
- **1993 Editors' Citation for Excellence in Refereeing for *Water Resource Research***, American Geophysical Union, Hydrology Section.

- **Outstanding Research Oriented Paper**, May 1989, awarded by ASCE Division of Water Resources Planning and Mgmt for the paper titled "Reliability Indices for Water Supply Systems".
- **Commendation for Outstanding Service**, as faculty advisor to the Tufts ASCE Student Chapter, ASCE, 1984-85, 1985-86, 1986-87, 1987-88.
- **The John R. Freeman Fellowship in Hydrology and Hydraulics**, Boston Society of Civil Engineers, February 1, 1987.
- **Member of Tau Beta Pi**, National Engineering Honor Society

## PUBLICATIONS

### Partial List of Refereed Journal Articles Relating to Floods, Regional Hydrology and GIS Methods to Water Resources

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2. Vogel, R.M. and C.N. Kroll, Low-Flow Frequency Analysis Using Probability Plot Correlation Coefficients, *Journal of Water Resources Planning and Management*, ASCE, Vol. 115, No. 3, pp. 338-357, May 1989.
3. Fennessey, N. and R.M. Vogel, Regional Flow Duration Curves for Ungaged Sites in Massachusetts, ASCE, *Journal of Water Resources Planning and Management*, Vol. 116, No. 4, pp. 530-549, 1990.
4. Vogel, R.M. and C.N. Kroll, Generalized Low-Flow Frequency Relations for Ungaged Sites in Massachusetts, *Water Resources Bulletin*, Vol. 26, No. 2, pp 241-253, 1990.
5. Vogel, R.M. and C.N. Kroll, The Value of Streamflow Record Augmentation Procedures in Low Flow and Flood-Flow Frequency Analysis, *Journal of Hydrology*, Vol. 125, pp 259-276, 1991.
6. Vogel, R.M. and C.N. Kroll, Regional Geohydrologic-Geomorphic Relationships for the Estimation of Low-Flow Statistics, *Water Resources Research*, Vol. 38, No.9. pp 2451-2458, 1992.
7. Vogel, R.M., T.A. McMahon and F.H.S. Chiew, Floodflow Frequency Model Selection in Australia, *Journal of Hydrology*, Vol. 146, pp 421-449, 1993.
8. Vogel, R.M., W.O. Thomas and T.A. McMahon, Floodflow Frequency Model Selection in the Southwestern U.S.A., *Journal of Water Resources Planning and Management Division*, ASCE, Vol. 119, No. 2, pp. 353-366, 1993.
9. Vogel, R.M. and N.M. Fennessey, L-Moment Diagrams Should Replace Product-Moment Diagrams, *Water Resources Research*, Vol. 29, No. 6, pp 1745-1752, 1993.
10. Fennessey, N.M., and R. M. Vogel, Regional Models of Potential Evaporation and Reference Evapotranspiration for the Northeast USA, *Journal of Hydrology*, Vol. 184, pp. 337-354, 1996.

11. Vogel, R.M. and I. Wilson, The Probability Distribution of Annual Maximum, Minimum and Average Streamflow in the United States, *Journal of Hydrologic Engineering*, ASCE, Vol. 1, No. 2, pp. 69-76, 1996.
12. Vogel, R.M., C. Bell, and N.M. Fennessey, Climate, Streamflow and Water Supply in Northeastern United States, *Journal of Hydrology*, Vol. 198/1-4, pp. 42-68, 1997.
13. Vogel, R.M., J. Limbrunner, and Y. Tsai, The Regional Persistence and Variability of Annual Streamflow in the United States, *Water Resources Research*, 34(12), pp. 3445-3459, 1998.
14. Lane, M.E., P.H. Kirshen, and R.M. Vogel, Indicators of the Impacts of Global Climate Change on Water Resources, *Journal of Water Resources Planning and Management*, ASCE, 125(4), 194-204, July/Aug, 1999.
15. Vogel, R.M., I. Wilson and C. Daly, Regional regression models of annual streamflow for the United States, *Journal of Irrigation and Drainage Engineering*, ASCE, 125(3), 148-157, May/June, 1999
16. Vogel, R.M., M. Lane, R.S. Ravindiran and P. Kirshen, Storage Reservoir Behavior in the United States, *Journal of Water Resources Planning and Management*, ASCE, 125(5), Sep/Oct, 1999.
17. Vogel, R.M., and A. Sankarasubramanian Spatial Scaling Properties of Annual Streamflow in the United States, *Hydrologic Sciences Journal*, 45(3), 465-476, 2000.
18. Fernandez, W., R.M. Vogel, and A. Sankarasubramanian, Regional Calibration of a Watershed Model, *Hydrologic Sciences Journal*, 45(5), 689-707, 2000.
19. A. Sankarasubramanian, R.M.Vogel, and J.F. Limbrunner, Climate Elasticity of Streamflow in the United States, *Water Resources Research*, 37(6): 1771-1781, 2001.
20. Sankarasubramanian, A., and R.M. Vogel, Annual Hydroclimatology of the United States, *Water Resources Research*, 38(6), 19-1 – 19-12, 2002.
21. Sankarasubramanian, A., and R.M. Vogel, Comment on: "Basin Hydrologic response relations distributed physiographic descriptors and climate" by K. P. Berger and D. Entekhabi, Vol. 247, 169-182, 2001; *Journal of Hydrology*, Vol. 263, pp. 257-261, 2002.
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