

MINUTES OF ANNUAL MEETING OF DIRECTORS

OF

ENGINEERS CONSTRUCTION, INC.

The annual meeting of the Board of Directors of Engineers Construction, Inc., was held at the office of Kolvoord, Overton & Wilson, PC in Essex, Vermont, on September 24, 2012, at 3:15 p.m.

The following Directors were present:

Kenneth A. Pidgeon  
Scott M. Pidgeon

The President of the Corporation, Kenneth A. Pidgeon, called the meeting to order, and Scott M. Pidgeon acted as Secretary of the meeting.

The Secretary of the meeting presented and read a Waiver of Notice of the meeting signed by all of the Directors, and it was ordered that the same be affixed to the minutes of this meeting.

The President then proceeded with the election of officers for the ensuing year, and nominations having been duly made and seconded, the following officers were unanimously elected to hold office until the first meeting of Directors after the next annual meeting of the Stockholders and until their successors are elected and qualify:

President:	Kenneth A. Pidgeon
Vice President:	Alan W. Pidgeon
Vice President:	Scott M. Pidgeon
Vice President:	Benjamin Dow
Treasurer:	Kenneth A. Pidgeon
Assistant Treasurer:	Scott M. Pidgeon
Secretary:	Scott M. Pidgeon
Assistant Secretary:	Alan W. Pidgeon
Assistant Secretary:	Mark L. Moreau
Assistant Secretary:	Benjamin Dow

After discussion of the "bid process," upon motion duly made and seconded, the following Resolution was unanimously adopted:

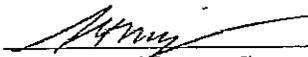
RESOLVED: That the President and Secretary and all Vice Presidents of Engineers Construction, Inc., are hereby authorized to act on behalf of the Corporation in submitting bids, including, but not limited to, signing bid documents on behalf of the Corporation.

After discussion, upon motion duly made and seconded, the following Resolution was unanimously adopted:

RESOLVED: That any Assistant Secretary is hereby authorized to sign as Secretary of the Corporation.

There being no further business presented, upon motion duly made and seconded, the meeting was adjourned.

Dated this 24 day of September, 2012.

  
\_\_\_\_\_  
Scott M. Pidgeon, Secretary

STATE OF VERMONT  
CONTRACT BOND

KNOW ALL MEN BY THESE PRESENTS, That we

Engineers Construction, Incorporated  
PO Box 2187  
South Burlington, VT 05407  
Fidelity & Deposit Company of Maryland

as Principal, and

1400 American Lane, Tower I, 18th Floor  
Schaumburg, IL 60196-1056

as Surety, are held and firmly bound unto the State of Vermont, as Obligee, in the penal sum of Four Hundred Twenty Four Thousand Eight Hundred Eighty Seven Dollars and No Cents (\$424,887.00), good and lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the above bounden Principal has entered into a certain written contract with the above named Obligee, the State of Vermont dated the 28<sup>th</sup> day of March A.D. 2013 for the construction of a certain project in the State of Vermont known as Highgate STP 0297 (8) (Re-Advertised) which contract is hereby referred to and made a part hereof as fully and to the same extent as if set forth at length herein:

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH that, if the above bounden Principal and his subcontractors and his or their agents and servants shall well and truly keep, do and perform, each and every, all and singular the matters and things in said contract set forth and specified to be by the said Principal kept, done and performed at the time and in the manner in said contract specified and shall pay over, make good and reimburse the State of Vermont all loss or losses and damage or damages which the above named Obligee, the State of Vermont, may sustain by reason of failure or default on the part of the Principal or his subcontractors, or his or their agents and servants, to fully carry out the terms of said contract, then this obligation shall be void; otherwise, to be and remain in full force and effect.

In Witness Whereof we hereunto set our hands and seals this 19th day of March A.D. 2013.

In Presence of (TWO WITNESSES REQUIRED)

Sma Wallen  
Wm Cottrell  
as to Principal

Engineers Construction Inc  
Name of Corporation, Co-partnership or Individual  
[Signature] L.S.  
Authorized Signature  
Kenneth A. Pidgeon  
President  
Title

(TWO WITNESSES REQUIRED)  
Melissa Morse-Luke  
Lacey Burlison  
Melissa Morse-Luke  
Lacey Burlison  
as to Surety.

Fidelity & Deposit Company of Maryland  
Bonding Company  
[Signature] L.S.  
Authorized Signature  
Diana L. Blow  
Attorney In Fact  
Title

Compliance Bond  
PRF 09045492

**CONTRACT BOND**

Engineers Construction, Incorporated

PO Box 2187  
South Burlington, VT 05407  
Principal

Fidelity & Deposit Company of Maryland

1400 American Lane, Tower I, 18th Floor  
Schaumburg, IL 60196-1056

Surety.

and

STATE OF VERMONT

Obligee.

Date 3/25 2013

Amount, \$424,887.00

Approved J/25 2013



Secretary of Transportation  
or Duly Authorized Agent

STATE OF VERMONT  
CONTRACT BOND PRF 09045492

KNOW ALL MEN BY THESE PRESENTS, That we

Engineers Construction, Incorporated  
PO Box 2187  
South Burlington, VT 05407

as Principal, and

Fidelity & Deposit Company of Maryland

1400 American Lane, Tower I, 18th Floor  
Schaumburg IL 60196-1056

As Surety, are held and firmly bounden, unto the Secretary of Transportation for the State of Vermont, and his successors in office, as Obligee, in the penal sum of Four Hundred Twenty Four Thousand Eight Hundred Eighty Seven Dollars and No Cents (\$424,887.00), good and lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the above bounden Principal has entered into a certain written contract with the State of Vermont, dated the 25<sup>th</sup> day of MARCH A.D. 2013 for the construction of a certain project in the State of Vermont known Highgate STP 0297 (8) (Re-Advertised) which contract is hereby referred to and made a part hereof as fully and to the same extent as if set forth at length herein:

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH that, if the above bounden, Principal shall pay, settle, liquidate and discharge the claims of all creditors for material, merchandise, labor, rent, hire of vehicles, power shovels, rollers, concrete mixers, tools and other appliances, professional services, premiums and other services used or employed in carrying out the terms of said contract between said Principal and the State of Vermont, and shall pay all taxes, both State and municipal, and contributions to the Vermont Commissioner of Employment and Training, accruing during the term of performance of said contract, this agreement to make such payment being in compliance with the requirements of 19 Vermont Statutes Annotated, Section 10(9), as amended, to furnish security there under, and being in fact such security, then this obligation shall be void; otherwise, to be and remain in full force and effect.

In Witness Whereof we hereunto set our hands and seals this 19th day of March A.D. 2013.

In Presence of (TWO WITNESSES REQUIRED)

Sma Wallen  
Wynn Catlett  
as to Principal

Engineers Construction Inc.  
Name of Corporation, Co-partnership or Individual  
[Signature] L.S.  
Authorized Signature  
Kenneth A. Pidgeon  
President  
Title

(TWO WITNESSES REQUIRED)

Melissa Morse-Luke  
Lacey Burleson  
Melissa Morse-Luke  
Lacey Burleson  
as to Surety.

Fidelity & Deposit Company of Maryland  
Bonding Company  
[Signature] L.S.  
Authorized Signature  
Diana L. Blow  
Attorney In Fact  
Title

Labor & Materials Bond  
PRF 09045492

CONTRACT BOND

Engineers Construction, Incorporated

PO Box 2187  
South Burlington, VT 05407  
Principal

Fidelity & Deposit Company of Maryland

1400 American Lane, Lower J, 18th Floor  
Schaumburg, IL 60196-1056

Surety.

and

STATE OF VERMONT

Obligee.

Date 3/25 2013

Amount: \$424,887.00

Approved 3/25 2013



Secretary of Transportation  
or Duly Authorized Agent

SCHEDULE OF INSURANCE RATES ON EXTRA WORK

APPLICABLE TO THE Highgate STP 0297 (8) (Re-Advertised) PROJECT

To the Secretary of Transportation, Montpelier, Vermont

In connection with the contract for the above project, I/we submit herewith the following classification of work and the rates of insurance applicable to extra work performed and accepted on said project:

WORKER'S COMPENSATION

Classification No. 6217 Rate 11.39

Classification No. 6229 Rate 6.65

Classification No. 5506 Rate 8.70

Classification No. \_\_\_\_\_ Rate \_\_\_\_\_

GENERAL LIABILITY

Classification No. all Rate \$7.55 / m / sales

Classification No. \_\_\_\_\_ Rate \_\_\_\_\_

Classification No. \_\_\_\_\_ Rate \_\_\_\_\_

Classification No. \_\_\_\_\_ Rate \_\_\_\_\_

AUTOMOBILE LIABILITY

Classification No. all Rate \$599.48 per vehicle

Classification No. \_\_\_\_\_ Rate \_\_\_\_\_

Classification No. \_\_\_\_\_ Rate \_\_\_\_\_

Classification No. \_\_\_\_\_ Rate \_\_\_\_\_

\*Federal Social Security Act Rate 7.650%

\*Federal Unemployment Insurance Rate .8% (Net)

\*Vermont Unemployment Compensation Act Rate 7.6%

All items of insurance as above on extra work performed and accepted shall be allowed on the final estimate as per the Vermont Standard Specifications For Construction.

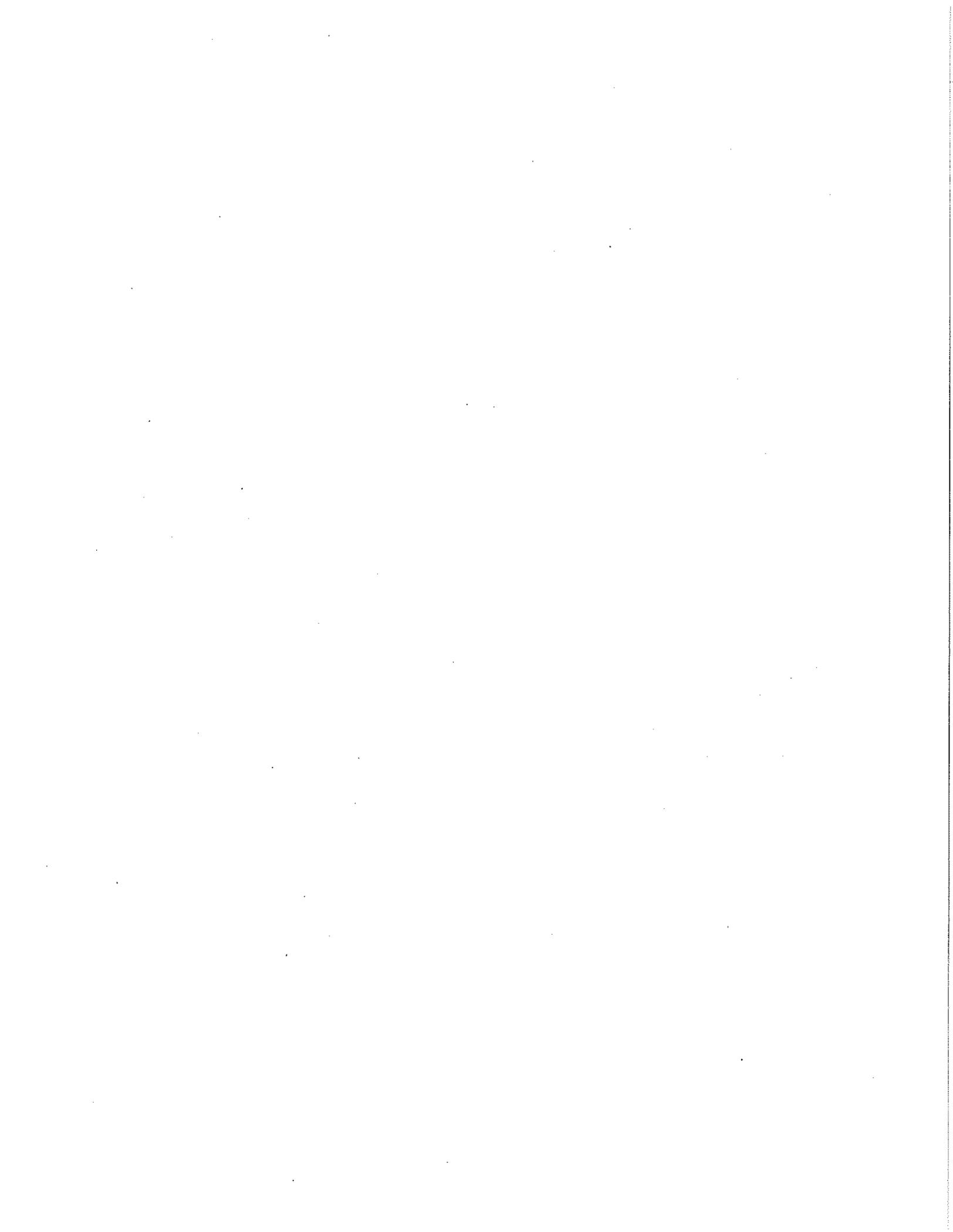
3/22/13  
Date

Engineers Construction Inc  
Name of Corporation, Co-Partnership or Individual

Kenneth A. Pidgeon, President  
Name and Title of Individual Signing the Contract

So. Burlington, VT  
Town or City, State

\*MUST BE FILLED IN





State of Vermont  
 Agency of Transportation  
 Contract Administration  
 One National Life Drive  
 Montpelier, VT 05633-5001  
[www.aot.state.vt.us/conadmin](http://www.aot.state.vt.us/conadmin)

[phone] 802-828-2641  
 [fax] 802-828-5545  
 [ttd] 800-253-0191

CA-95

TO: CONTRACT ADMINISTRATION  
 MONTPELIER, VERMONT

RE: Highgate STP 0297 (8) (Re-Advertised)

I hereby certify that I have received and have in my possession a copy of the STANDARD SPECIFICATIONS FOR CONSTRUCTION, dated 2011.

Respectfully,

Engineers Construction Inc

Name of Corporation, Co-Partnership or Individual

Kenneth A. Pidgeon

Name of Individual Signing the Contract

[Signature]

Signature of Individual Signing the Contract

President

Title of Individual Signing the Contract

(Street) 98 Engineers Drive

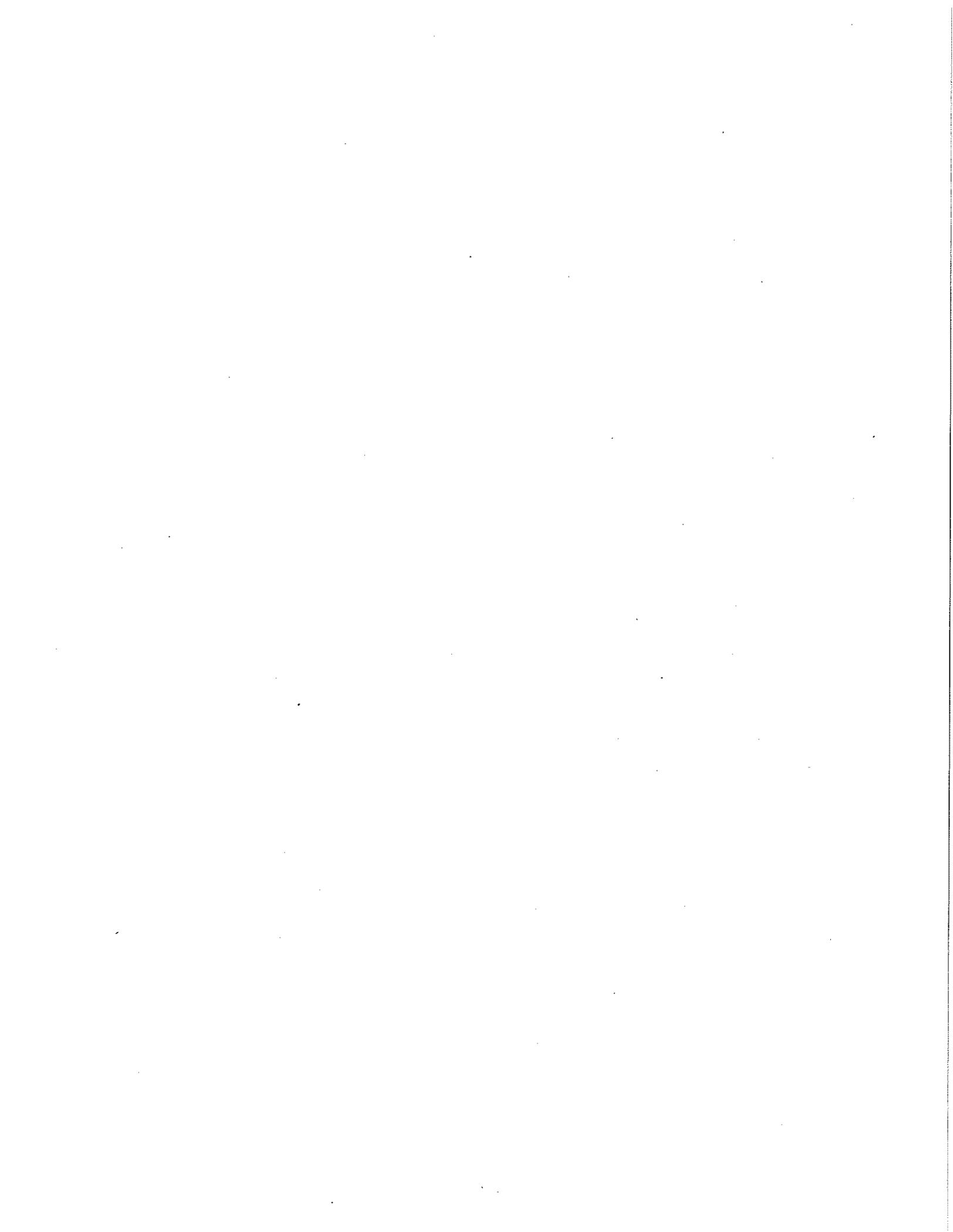
(Town or City) Williston

(State) VT

(Date) 3/22/13

To be filled  
 in completely  
 by Contractor

To be filled  
 in completely  
 by Contractor





# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)  
3/19/2013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Essex Agency, Inc. 2 Railroad Street P.O. Box 239 Essex Junction VT 05452-0239	CONTACT NAME: Emily Mackey
	PHONE (A/C No. Ext): (802) 878-5334 FAX (A/C, No): (802) 878-0852
	E-MAIL ADDRESS: emily@essexagency.com
	INSURER(S) AFFORDING COVERAGE NAIC #
	INSURER A: Admiral Insurance Company
	INSURER B: Continental Western Ins Co
	INSURER C: Scottsdale Insurance Company
	INSURER D: Acadia Insurance Co 31325
	INSURER E:
	INSURER F:

COVERAGES CERTIFICATE NUMBER: 13-14 Master REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
A	GENERAL LIABILITY			CA000008215-08	1/1/2013	1/1/2014	EACH OCCURRENCE \$ 1,000,000
	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY						DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 50,000
	<input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR	X					MED EXP (Any one person) \$ excluded
	<input checked="" type="checkbox"/> Includes X C U						PERSONAL & ADV INJURY \$ 1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE \$ 2,000,000
	<input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC						PRODUCTS - COM/PROP AGG \$ 2,000,000
B	AUTOMOBILE LIABILITY			CAA0170529-17	1/1/2013	1/1/2014	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000
	<input checked="" type="checkbox"/> ANY AUTO						BODILY INJURY (Per person) \$
	<input type="checkbox"/> ALL OWNED AUTOS		<input type="checkbox"/> SCHEDULED AUTOS				BODILY INJURY (Per accident) \$
	<input checked="" type="checkbox"/> HIRED AUTOS		<input checked="" type="checkbox"/> NON-OWNED AUTOS				PROPERTY DAMAGE (Per accident) \$
							Business Auto Extension End \$
C	<input checked="" type="checkbox"/> UMBRELLA LIAB			XLS0078919	1/1/2013	1/1/2014	EACH OCCURRENCE \$ 5,000,000
	<input type="checkbox"/> EXCESS LIAB		<input checked="" type="checkbox"/> OCCUR				AGGREGATE \$ 5,000,000
	<input type="checkbox"/> CLAIMS-MADE						\$
	DED		RETENTION \$				
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY			WCA0170530-17	1/1/2013	1/1/2014	WC STATU-TORY LIMITS <input checked="" type="checkbox"/> OTHER <input type="checkbox"/>
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)		<input type="checkbox"/> Y/N				E.L. EACH ACCIDENT \$ 1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below		N/A				E.L. DISEASE - EA EMPLOYEE \$ 1,000,000
							E.L. DISEASE - POLICY LIMIT \$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

RE: Highgate STP 0297 (8) (Re-Advertised)

Certificate holder is named as Additional Insured in regards to General Liability

## CERTIFICATE HOLDER

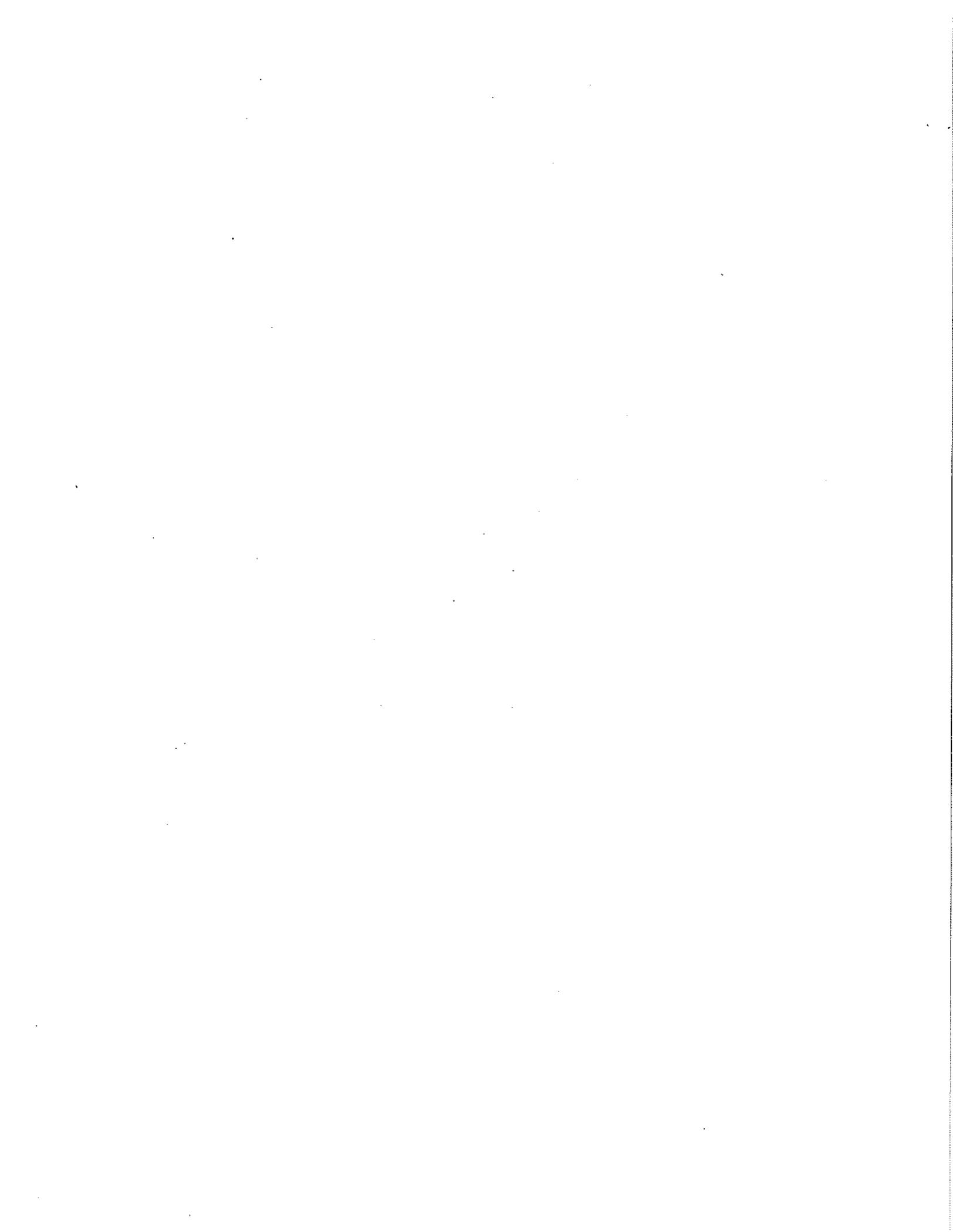
State of Vermont  
Agency of Transportation  
One National Life Drive  
Montpelier, VT 05633-5001

## CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Diana Blow/DIANA *Diana A. Blow*



**Power of Attorney  
FIDELITY AND DEPOSIT COMPANY OF MARYLAND**

KNOW ALL MEN BY THESE PRESENTS: That the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, a corporation of the State of Maryland, by THEODORE G. MARTINEZ, Vice President, and ERIC D. BARNES, Assistant Secretary, in pursuance of authority granted by Article VI, Section 2, of the By-Laws of said Company, which are set forth on the reverse side hereof and are hereby certified to be in full force and effect on the date hereof, does hereby nominate, constitute and appoint David B. HOLTON, Diana Lynn BLOW, Susan M. MONGEON, Elizabeth HARLOW and Melissa Morse LUKE, all of Essex Junction, Vermont, EACH its true and lawful agent and Attorney-in-Fact, to make, execute, seal and deliver, for, and on its behalf as surety, and as its act and deed, any and all bonds and undertakings, and the execution of such bonds or undertakings in pursuance of these presents, shall be as binding upon said Company, as fully and amply, to all intents and purposes, as if they had been duly executed and acknowledged by the regularly elected officers of the Company at its office in Baltimore, Md., in their own proper persons. This power of attorney revokes that issued on behalf of David B. HOLTON, Diana Lynn BLOW, Susan M. MONGEON, Elizabeth A. GRIFFO, Melissa Morse LUKE, dated February 18, 2008.

The said Assistant Secretary does hereby certify that the extract set forth on the reverse side hereof is a true copy of Article VI, Section 2, of the By-Laws of said Company, and is now in force.

IN WITNESS WHEREOF, the said Vice-President and Assistant Secretary have hereunto subscribed their names and affixed the Corporate Seal of the said FIDELITY AND DEPOSIT COMPANY OF MARYLAND, this 10th day of September, A.D. 2010.

ATTEST:

FIDELITY AND DEPOSIT COMPANY OF MARYLAND



*Eric D. Barnes*

*Theodore G. Martinez*

Eric D. Barnes      Assistant Secretary      By:      Theodore G. Martinez

State of Maryland }  
City of Baltimore } ss:

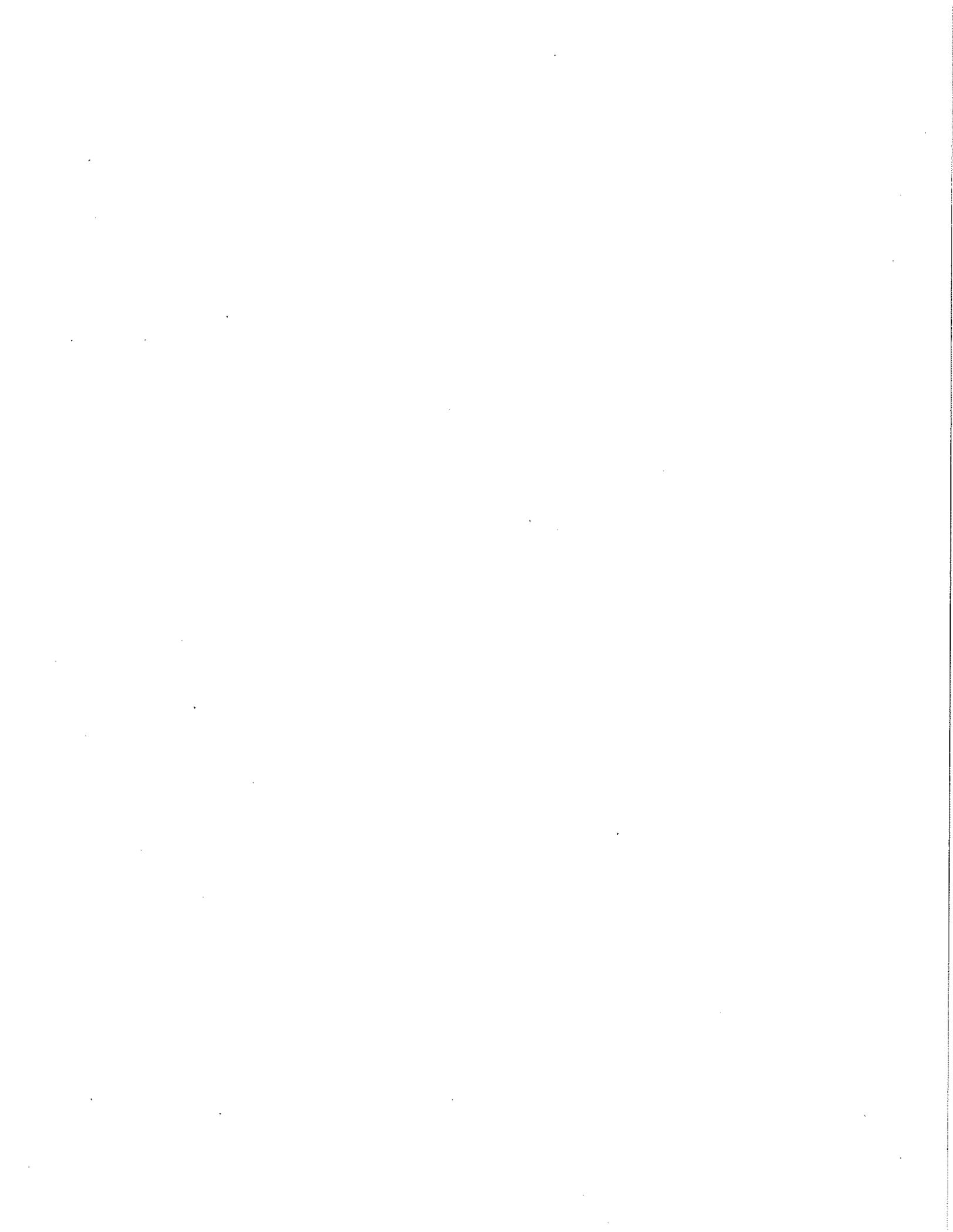
On this 10th day of September, A.D. 2010, before the subscriber, a Notary Public of the State of Maryland, duly commissioned and qualified, came THEODORE G. MARTINEZ, Vice President, and ERIC D. BARNES, Assistant Secretary of the FIDELITY AND DEPOSIT COMPANY OF MARYLAND, to me personally known to be the individuals and officers described in and who executed the preceding instrument, and they each acknowledged the execution of the same, and being by me duly sworn, severally and each for himself depose and saith, that they are the said officers of the Company aforesaid, and that the seal affixed to the preceding instrument is the Corporate Seal of said Company, and that the said Corporate Seal and their signatures as such officers were duly affixed and subscribed to the said instrument by the authority and direction of the said Corporation.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my Official Seal the day and year first above written.



*Constance A. Dunn*

Constance A. Dunn      Notary Public  
My Commission Expires: July 14, 2011



VERMONT

CA-111-A

Project  
Highgate STP 0297 (8) (Re-Advertised)

VERMONT  
AGENCY OF TRANSPORTATION  
2011 Standard Specifications for Construction

CONTRACT AGREEMENT

Engineers Construction, Incorporated  
PO Box 2187  
South Burlington, VT 05407

Required Contract Provisions for Federal-Aid Construction  
Standard Federal EEO Specifications  
Vermont Agency of Transportation Contractor Workforce Reporting Requirements  
Workers' Compensation; State Contracts Compliance Requirement  
General Special Provisions dated December 4, 2012  
Bulletin 3.5 Attachment C: Standard State Provisions for Contracts and Grants  
Special Provisions  
Vermont Minimum Labor & Truck Rates  
Disadvantaged Business Enterprise (DBE) Policy Contract Requirements  
US Department of Labor Davis – Bacon Wage Rates  
Asphalt Price Adjustment Provisions dated April 6, 2010  
Geotechnical Evaluation of Embankment Erosion, Bridge 6, VT 207, Highgate, Vermont dated November 5,  
2008  
Certification for Federal-Aid Contracts  
Contractor's EEO Certification  
Contract CA-111-B Form  
Schedule of Items  
Contractor's Signature Page

**REQUIRED CONTRACT PROVISIONS  
FEDERAL-AID CONSTRUCTION CONTRACTS**

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- I. General
- II. Nondiscrimination
- III. Nonsegregated Facilities
- IV. Davis-Bacon and Related Act Provisions
- V. Contract Work Hours and Safety Standards Act Provisions
- VI. Subletting or Assigning the Contract
- VII. Safety: Accident Prevention
- VIII. False Statements Concerning Highway Projects
- IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
- X. Compliance with Governmentwide Suspension and Debarment Requirements
- XI. Certification Regarding Use of Contract Funds for Lobbying

**ATTACHMENTS**

Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

**I. GENERAL**

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.
3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.
4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

## II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding \$10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. **Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:
  - a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.
  - b. The contractor will accept as its operating policy the following statement:
 

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."
2. **EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.
3. **Dissemination of Policy:** All members of the contractor'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 contractor's EEO policy and contractual responsibilities to provide EEO 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:
  - a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.
  - b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

- c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.
  - d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.
  - e. The contractor's EEO 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.
4. **Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.
- a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.
  - b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.
  - c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.
5. **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, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:
- a. The contractor 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 contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.
  - c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor 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 contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its 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 contractor will inform every complainant of all of their avenues of appeal.
6. **Training and Promotion:**
- a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

- b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).
  - c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.
  - d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.
7. **Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:
- a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.
  - b. The contractor will use good faith efforts to incorporate an EEO 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, national origin, age or disability.
  - c. The contractor 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 contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.
  - d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.
8. **Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.
9. **Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.
- a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.
  - b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.
10. **Assurance Required by 49 CFR 26.13(b):**
- a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

- b. The contractor 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 contracting agency deems appropriate.

11. **Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

- (1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;
- (2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and
- (3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

### III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of \$10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

### IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding \$2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 "Contract provisions and related matters" with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

## 1. Minimum wages

- a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

- b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
- (i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
  - (ii) The classification is utilized in the area by the construction industry; and
  - (iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
- (4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

- c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
- d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

## 2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

## 3. Payrolls and basic records

- a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
- b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee ( e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.

- (2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:
- (i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
  - (ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
  - (iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.
- (4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
- c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

#### 4. Apprentices and trainees

##### a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job-site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. **Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. **Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. **Contract termination: debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
8. **Compliance with Davis-Bacon and Related Act requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
9. **Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.
10. **Certification of eligibility.**
  - a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
  - b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
  - c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

#### V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. **Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
2. **Violation; liability for unpaid wages; liquidated damages.** In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.
3. **Withholding for unpaid wages and liquidated damages.** The FHWA or the contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.
4. **Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

## VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).
  - a. The term "perform work with its own organization" refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:
    - (1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
    - (2) the prime contractor remains responsible for the quality of the work of the leased employees;
    - (3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
    - (4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.
  - B "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.
2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.
3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.
4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.
5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

## VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).
3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

#### VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

#### IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

## X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost \$25,000 or more – as defined in 2 CFR Parts 180 and 1200.

### 1. Instructions for Certification – First Tier Participants:

- a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
- b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.
- c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.
- d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contractor). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).
- f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.
- g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.
- h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epls.gov/>), which is compiled by the General Services Administration.
- i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

- j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

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**2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:**

- a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:
- (1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;
  - (2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them 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;
  - (3) Are 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 (a)(2) of this certification; and
  - (4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
- b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

**2. Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost \$25,000 or more - 2 CFR Parts 180 and 1200)

- a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.
- b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
- c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.
- d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. "First Tier Covered Transactions" refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). "Lower Tier Covered Transactions" refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). "First Tier Participant" refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). "Lower Tier Participant" refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

- e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
- f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the \$25,000 threshold.
- g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (<https://www.epis.gov/>), which is compiled by the General Services Administration.
- h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
- i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

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#### **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:**

- 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 participating in covered transactions 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.

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#### **XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 (49 CFR 20).

- 1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:
  - a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

- b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.
3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

#### **ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS**

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:
  - a. To the extent that qualified persons regularly residing in the area are not available.
  - b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.
  - c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.
2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.
3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.
4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.
5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.
6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

**STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY**  
**CONSTRUCTION CONTRACT SPECIFICATIONS**  
**(EXECUTIVE ORDER 11246)**

1. As used in these specifications:
  - a. "Covered Area" means the geographical area described in the solicitation from which this contract resulted.
  - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority.
  - c. "Employer Identification Number" means the Federal Social Security Number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

A Minority Group Member is:

- ...American Indian or Alaskan Native  
consisting of all persons having origins in any of the original people of North American and who maintain cultural identification through tribal affiliations or community recognition.
- ...Black  
consisting of all persons having origins in any of the Black racial groups of Africa.
- ...Asian or Pacific Islander  
consisting of all persons having origins in any of the original people of the Far East, Southeast Asia, the Indian Sub-Continent or the Pacific Islands. This area includes China, India, Japan, Korea, the Philippines and Samoa.
- ...Hispanic  
consisting of all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish culture or origin.
- ...Cape Verde an  
consisting of all persons having origins in the Cape Verde Islands.
- ...Portuguese  
consisting of all persons of Portuguese, Brazilian or other Portuguese culture or origin.

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000.00 the provisions of these specifications and the notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in the Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or subcontract participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or subcontractor's failure to make good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in Paragraphs 7a through p of these specifications. The goals set for the Contractor in the solicitation from which this contract resulted are expressed as percentages in the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.
5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the Contractor has a collective bargaining agreement to refer either minority or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:
  - a. Ensure and maintain a working environment free of harassment, intimidation and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment with specific attention to minority or female individuals working at such sites or in such facilities.
  - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available and maintain a record of the organizations' responses.

- c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
- d. Provide immediate written notifications to the Regional Director when the union or unions, with which the Contractor has a collective bargaining agreement, have not referred to the Contractor a minority person or woman sent by the Contractor or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under Paragraph 7b above.
- f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, Supervisors etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, and providing written notification to, and discussing the Contractor's EEO policy with, other Contractors and subcontractors with whom the Contractor anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notifications to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

- j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.
  - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
  - l. Conduct, at least annually, an inventory and evaluation of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
  - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment-related activities to ensure that the EEO policy and Contractor's obligations under these specifications are being carried out.
  - n. Ensure that all facilities and company activities are non-segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
  - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
  - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (Paragraph 7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the Contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under Paragraph 7a through p of these Specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's, and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's non-compliance.
9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is under-utilized).

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex or national origin.
11. The Contractor shall not enter into any subcontract with any person for firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, terminations and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in Paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment-related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application or requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

**NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION TO ENSURE EQUAL  
EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)**

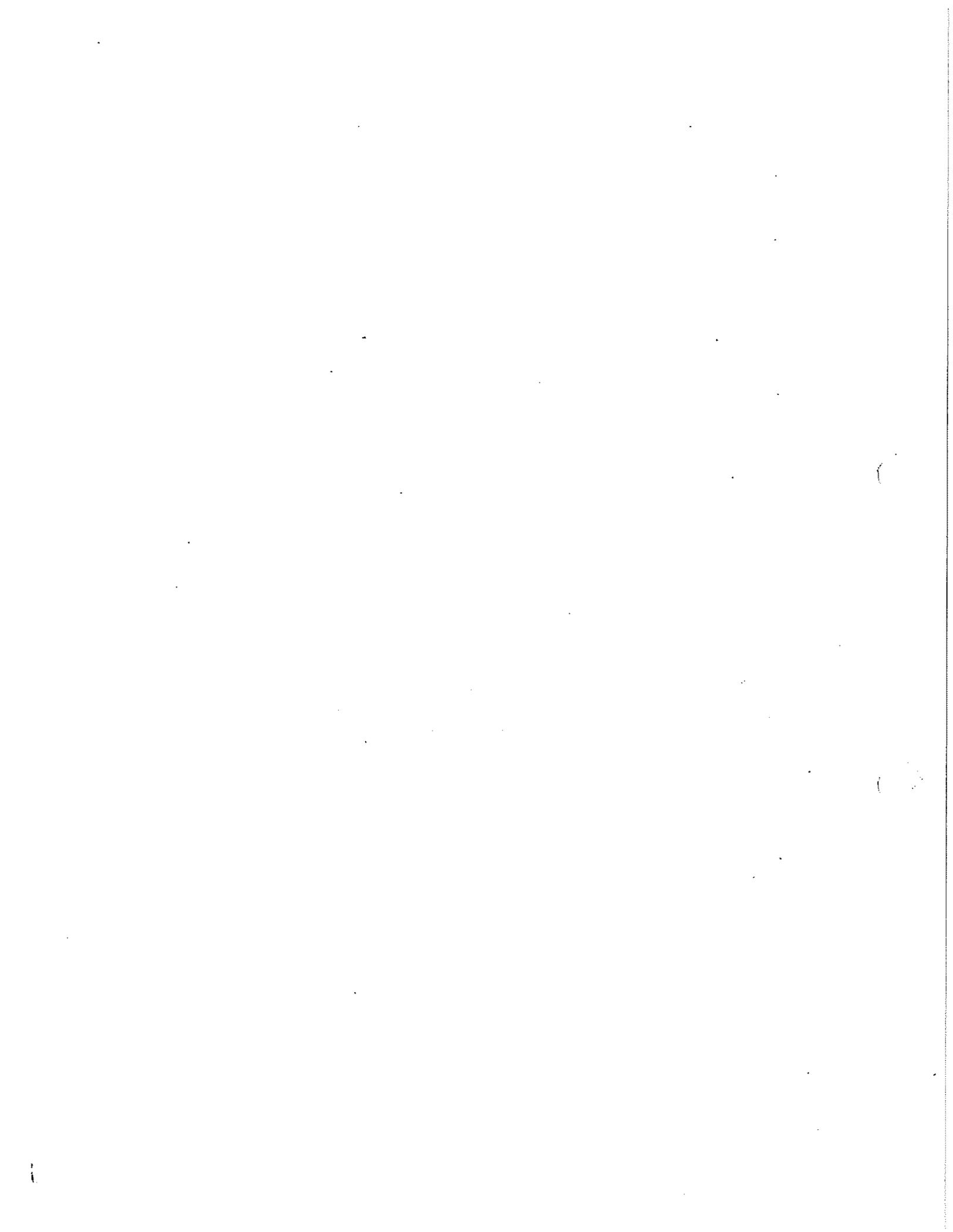
1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Economic Areas	Timetables	Goals for Minority participation for each trade (%)	Goals for Female Participation in each trade (%)
Entire State of Vermont:			
<u>Vermont</u> 003 Burlington, VT Non-SMSA Counties NH Coos; NH Grafton; NH Sullivan; VT Addison; VT Caledonia; VT Chittenden; VT Essex; VT Franklin; VT Grand Isle; VT Lamoille; VT Orange; VT Orleans; VT Rutland; VT Washington; VT Windsor	Indefinite	0.8	6.9
<u>Connecticut (Mass)</u> 006 Hartford - New Haven Springfield, CT-MA Non-SMSA Counties CT Litchfield; CT Windham; MA Franklin; NH Cheshire; VT Windham	Indefinite	5.9	
<u>New York</u> 007 Albany - Schenectady - Troy, NY Non-SMSA Counties NY Clinton; NY Columbia; NY Essex; NY Fulton; NY Greene; NY Hamilton; NY Schoharie; NY Warren; NY Washington; VT Bennington	Indefinite	2.6	

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the Contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulation in CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract and in each trade, and the Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

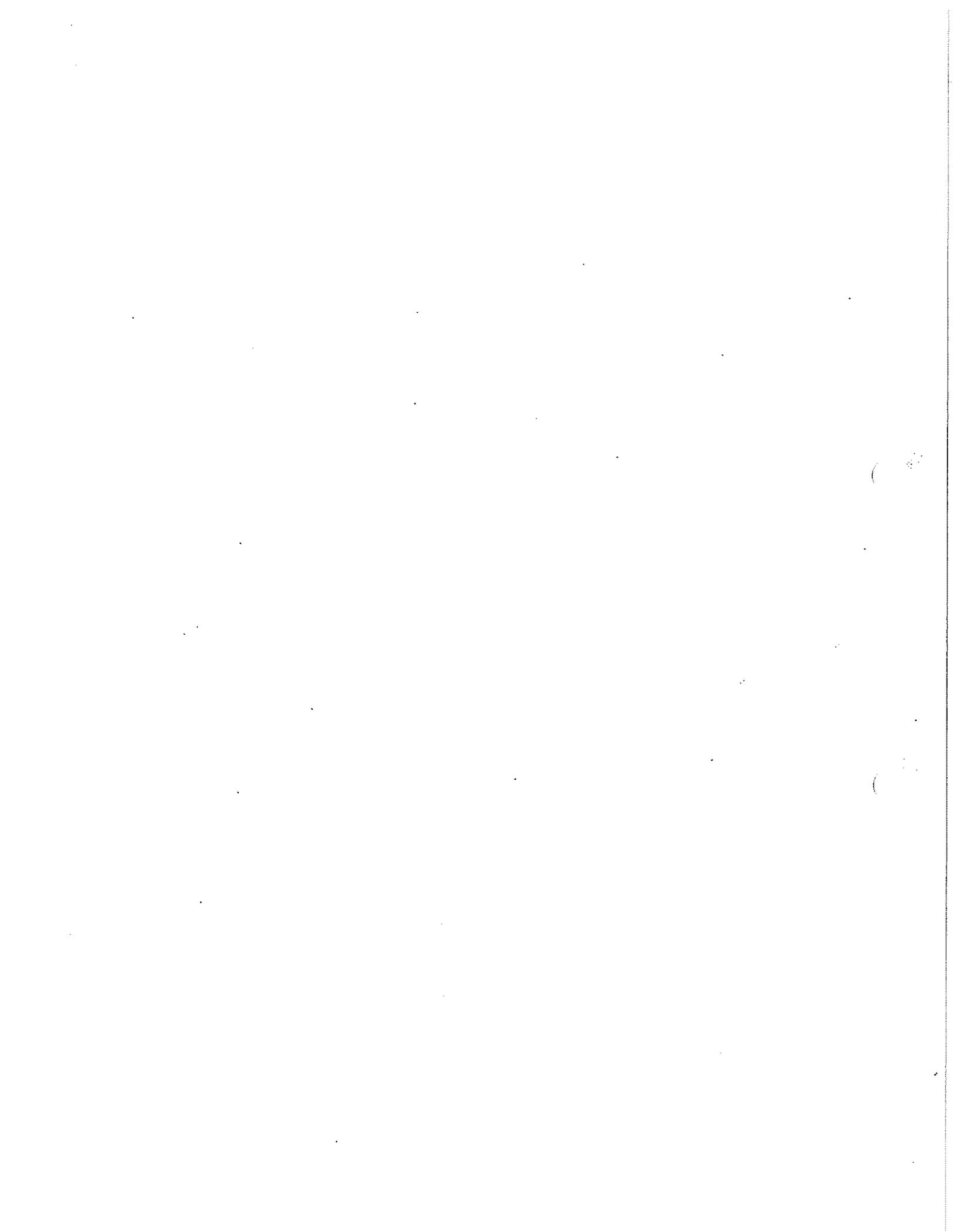
3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within ten working days of award of any construction subcontract in excess of \$10,000.00 at any tier for construction work under the contract resulting from this solicitation. The notifications shall list the name, address and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; and the geographical area in which the subcontract is to be performed.
4. As used in this Notice, and in the contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county and city, if any)



**VERMONT AGENCY OF TRANSPORTATION  
CONTRACTOR WORKFORCE REPORTING REQUIREMENTS**

The Contractor/Subcontractor shall submit to the State Resident Engineer assigned to this project, monthly and cumulative workforce information, on reporting forms provided herein. The monthly and cumulative workforce information shall be listed by construction trade category with the percentage of minority and female project hours in each category indicated. Failure to provide this information to the Resident Engineer on a monthly basis will result in suspension of bi-weekly progress payments, or part thereof due under the contract, until such time as the Contractor or Subcontractor demonstrates compliance with these contract terms.

**Note:** In lieu of using the reporting forms provided herein, the Contractor may use U.S. Department of Labor form CC-257, "Monthly Employment Utilization Report".





**INSTRUCTIONS FOR FILING  
MONTHLY EMPLOYMENT UTILIZATION REPORT**

1. **PROJECT NAME AND NUMBER**  
Complete project name and number as assigned by the Vermont Agency of Transportation.
2. **CONTRACTOR'S NAME AND ADDRESS**  
Indicate the name and address of the *PRIME CONTRACTOR* with a construction contract funded in whole or in part with Federal funds.
3. **CURRENT GOALS**  
See section of contract regarding requirement for Affirmative Action (Executive Order 11246).
4. **REPORTING PERIOD**  
Monthly, beginning with the effective date of the contract.
5. **CONSTRUCTION TRADE CLASSIFICATION**  
Indicate only those classifications used on this contract.
6. **TOTAL NUMBER – ALL WORK HOURS OF EMPLOYEES BY TRADE**  
Indicate the total number of hours (male and female *combined*) worked by employees in each trade classification.
7. **BLACK,/HISPANIC/ASIAN/AMERICAN INDIAN/WHITE CATEGORIES**  
Indicate the total number of hours (male and female *separated*) worked by each specified ethnic group of employees in each classification.
8. **PERCENTAGE OF TOTAL WORK HOURS - MINORITY**  
Indicate the PERCENTAGE of total minority work hours (male and female *MINORITIES combined*) of all work hours (the sum of the BLACK, HISPANIC, ASIAN, and AMERICAN INDIAN columns divided by the sum of TOTAL NUMBER OF ALL WORK HOURS - just one figure for each construction trade.)
9. **PERCENTAGE OF TOTAL WORK HOURS - FEMALE**  
Divide the TOTAL NUMBER – ALL WORK HOURS OF EMPLOYEES BY TRADE for each classification by the total number of females reported in BLACK, HISPANIC, ASIAN, AMERICAN INDIAN and WHITE for each classification.
10. **TOTAL NUMBER OF EMPLOYEES**  
Indicate the total number of male employees and the total number of female employees working in each classification in the contractor's work force during the reporting period.
11. **TOTAL NUMBER OF MINORITY EMPLOYEES**  
Indicate the total number of male *MINORITY* employees and the total number of female *MINORITY (non-white)* employees working in each classification in the contractor's work force during the reporting period.
12. **COMPLETE THE FORM: SIGNATURE, TITLE, PHONE NUMBER, DATE, PAGE \_\_\_\_ OF \_\_\_\_.**
13. **AT THE END OF EACH MONTH, SUBMIT** the completed Monthly Employment Utilization Report Form to the State Resident Engineer on the project site. One of these forms should be completed for each month of the contract.

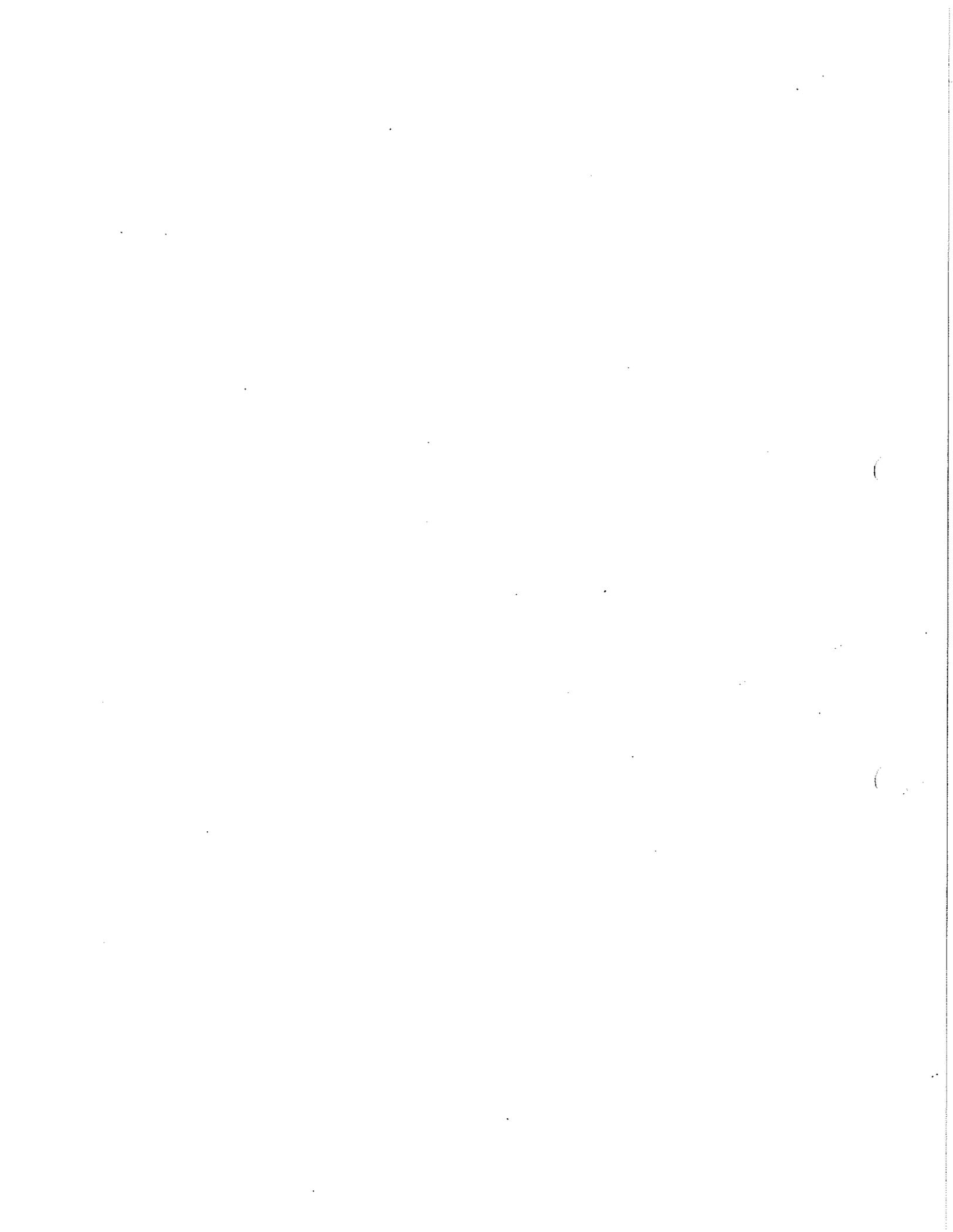


**INSTRUCTIONS FOR FILING  
CUMULATIVE MONTHLY EMPLOYMENT UTILIZATION REPORT**

*[Using the Monthly Employment Utilization Reports collected from the subcontractors on the job, COMBINE all the information to complete the CUMULATIVE Monthly Employment Utilization Report Form and submit to the State Resident Engineer on the project each month.]*

1. **PROJECT NAME AND NUMBER**  
Complete project name and number as assigned by the Vermont Agency of Transportation.
2. **CONTRACTOR'S NAME AND ADDRESS**  
Indicate the name and address of the *PRIME CONTRACTOR* with a construction contract funded in whole or in part with Federal funds.
3. **CURRENT GOALS**  
See section of contract regarding requirement for Affirmative Action (Executive Order 11246).
4. **REPORTING PERIOD**  
Monthly, beginning with the effective date of the contract.
5. **CONSTRUCTION TRADE CLASSIFICATION**  
Indicate only those classifications used on this contract.
6. **TOTAL NUMBER – ALL WORK HOURS OF EMPLOYEES BY TRADE**  
Indicate the total number of hours (male and female *combined*) worked by employees in each trade classification.
7. **BLACK,/HISPANIC/ASIAN/AMERICAN INDIAN/WHITE CATEGORIES**  
Indicate the total number of hours (male and female *separated*) worked by each specified ethnic group of employees in each classification.
8. **PERCENTAGE OF TOTAL WORK HOURS - MINORITY**  
Indicate the PERCENTAGE of total minority work hours (male and female *MINORITIES combined*) of all work hours (the sum of the BLACK, HISPANIC, ASIAN, and AMERICAN INDIAN columns divided by the sum of TOTAL NUMBER OF ALL WORK HOURS - just one figure for each construction trade.)
9. **PERCENTAGE OF TOTAL WORK HOURS - FEMALE**  
Divide the TOTAL NUMBER – ALL WORK HOURS OF EMPLOYEES BY TRADE for each classification by the total number of females reported in BLACK, HISPANIC, ASIAN, AMERICAN INDIAN and WHITE for each classification.
10. **TOTAL NUMBER OF EMPLOYEES**  
Indicate the total number of male employees and the total number of female employees working in each classification in the contractor's work force during the reporting period.
11. **TOTAL NUMBER OF MINORITY EMPLOYEES**  
Indicate the total number of male *MINORITY* employees and the total number of female *MINORITY (non-white)* employees working in each classification in the contractor's work force during the reporting period.
12. **COMPLETE THE FORM: SIGNATURE, TITLE, PHONE NUMBER, DATE, PAGE \_\_\_\_ OF \_\_\_\_.**
13. **AT THE END OF EACH MONTH, SUBMIT** the completed CUMULATIVE Monthly Employment Utilization Report Form to the State Resident Engineer on the project site. One of these forms should be completed for each month of the contract.





GENERAL SPECIAL PROVISIONS FOR ALL PROJECTS  
2011 STANDARD SPECIFICATIONS

SECTION 105 - CONTROL OF THE WORK

1. 105.03 PLANS AND WORKING DRAWINGS, part (b) Working Drawings, subpart (4) List of Working Drawings, is hereby modified by deleting the phrase "Roadway, Traffic, and Safety Engineer" and replacing it with the phrase "Project Manager" in the twenty-third row (beginning "641").
2. 105.14 SUNDAY AND HOLIDAY WORK, part (b) Holidays, is hereby corrected by deleting punctuation ",", at the end of the paragraph and replacing it with punctuation ".".
3. 105.16 LOAD RESTRICTIONS, part (a) General, is hereby modified by being deleted in its entirety and replaced with the following:
  - (a) General. All Contractors, subcontractors, suppliers, or others involved in any project-related activities shall comply with all legal load restrictions specified in Title 23 VSA § 1392 in the hauling of equipment or material on public roads, including that beyond the limits of the project. The application for and possession of any hauling or related permit will not relieve the Contractor or others involved in any project-related activities of any liability that may arise due to any damage resulting from the use or moving of equipment, vehicles, or any other project-related activity.
4. 105.16 LOAD RESTRICTIONS, part (b) Limitations on Use of Equipment and Vehicles, is hereby modified by being deleted in its entirety and replaced with the following:
  - (b) Limitations on Use of Equipment and Vehicles. Use of equipment and vehicles is subject to the following:
    - (1) No vehicle or equipment exceeding the load restrictions cited in Title 23 VSA § 1392 will be permitted on any structure as defined by the Engineer.
    - (2) The operation of any equipment or vehicle of such mass (weight) or any other project-related equipment loaded so as to cause damage to structures, the roadway, or to any other type of active construction will not be permitted, regardless of the limits set forth in Title 23.
    - (3) Hauling or operation of said vehicles or equipment over any permanent course of any bituminous pavement or any structure during active construction will not be permitted.
    - (4) No loads of any category will be permitted on a concrete pavement or concrete structure prior to expiration of the curing period and until the concrete reaches its specified 28-day compressive strength.
    - (5) Notwithstanding those restrictions above, the Contractor shall be responsible for any and all damages incurred to any public roadway as defined in Title 23 due to the use of any equipment or vehicles related to project activities.

5. 105.26 OPENING WASTE, BORROW, AND STAGING AREAS, part (f), is hereby corrected by deleting punctuation "." at the end of the paragraph.

SECTION 108 - PROSECUTION AND PROGRESS

6. 108.11 DETERMINATION OF EXTENSION OF CONTRACT TIME FOR COMPLETION, part (b) Determination of Contract Completion Date Extension, subpart (8), is hereby modified by deleting the phrase ", delays in submittals, errors in submittals, and the Contractor's means and methods of construction".
7. 108.11 DETERMINATION OF EXTENSION OF CONTRACT TIME FOR COMPLETION, part (b) Determination of Contract Completion Date Extension, subpart (9), is hereby modified by deleting the phrase ", including but not limited to the Contractor's means and methods of construction".
8. 108.11 DETERMINATION OF EXTENSION OF CONTRACT TIME FOR COMPLETION, part (b) Determination of Contract Completion Date Extension, subpart (11), is hereby modified by being deleted in its entirety.
9. 108.11 DETERMINATION OF EXTENSION OF CONTRACT TIME FOR COMPLETION, part (b) Determination of Contract Completion Date Extension, subpart (13), is hereby modified by adding the following as the first sentence:

Industry-wide material or supply shortages not reasonably anticipated by the Contractor at the time the Contract was entered.

10. 108.11 DETERMINATION OF EXTENSION OF CONTRACT TIME FOR COMPLETION, part (b) Determination of Contract Completion Date Extension, subpart (13), is hereby further modified by changing the word "Delay" to the word "Delays" at the beginning of the second sentence.

SECTION 109 - MEASUREMENT AND PAYMENT

11. SECTION 109 - MEASUREMENT AND PAYMENT, is hereby corrected by deleting pages 1-141 and 1-142 in their entirety.

SECTION 203 - EXCAVATION AND EMBANKMENTS

12. 203.01 DESCRIPTION, is hereby modified by adding the phrase "performing test borings for the purpose of determining areas of roadway and embankment subsurface voids;" after the phrase "trimming and shaping of slopes;" in the first sentence of the first paragraph.
13. 203.01 DESCRIPTION, is hereby further modified by adding the following new part (1):
- (1) Test Borings. Test Borings shall consist of an investigative and planned approach to determining areas of roadway and embankment subsurface voids and repairing bored areas.
14. 203.02 MATERIALS, is hereby modified by adding the following to the Subsection listing:

PVC Plastic Pipe.....710.06

15. 203.02 MATERIALS, is hereby further modified by adding the following paragraphs:

Concrete for backfilling subsurface voids shall meet the requirements of Controlled Density (Flowable) Fill of Section 541.

Bituminous concrete pavement shall conform to the requirements of Section 406 or 490, as applicable for the Contract, with the exception that the mix design submittal and plant inspection requirements set forth in Section 406 or 490 will not apply.

16. 203.03 GENERAL CONSTRUCTION REQUIREMENTS, is hereby modified by adding the following as the eighth paragraph:

Prior to the construction of Test Borings and the placement of Controlled Density (Flowable) Fill, the Contractor shall submit to the Engineer site-specific plans, detailing the schedule of work (for these two items), type and location of drilling, sleeve installation, pumping system, confirmatory boring operation, method of filling bore hole (with or without voids being encountered), and repair of the roadway section (sand, gravel, and pavement).

17. 203.11 EMBANKMENTS, is hereby modified by adding the following new part (e):

- (e) Test Borings. Test borings shall be performed at the approximate locations indicated in the Plans and/or as directed by the Engineer.

When used adjacent to culverts, test borings shall extend to a depth equal to the bottom of the culvert using casing advanced drilling methods. Alternate drilling equipment that provides a suitably clean, open hole may be submitted to the Engineer for approval.

If void(s) are encountered, Controlled Density (Flowable) Fill shall be placed to completely fill the void(s). Confirmatory borings shall be performed in these locations as directed by the Engineer.

The roadway surface at boring hole locations shall be backfilled and then patched using Bituminous Concrete Pavement.

18. 203.13 METHOD OF MEASUREMENT, is hereby modified by adding the following new part (e):

- (e) Test Borings. The quantity of Test Borings to be measured for payment will be the number of meters (linear feet) of test boring performed in the complete and accepted work.

19. 203.14 BASIS OF PAYMENT, is hereby modified by adding the phrase "and Test Borings" after the phrase "Shoulder Berm Removal" in the first sentence of the first paragraph.

20. 203.14 BASIS OF PAYMENT, is hereby further modified by adding the phrase "submitting site-specific plans as required, performing test borings, installing sleeves, backfilling, patching with bituminous concrete pavement," after the phrase "work specified," in the second sentence of the first paragraph.

21. 203.14 BASIS OF PAYMENT, is hereby corrected by adding a period at the end of the sixth paragraph.
22. 203.14 BASIS OF PAYMENT, is hereby still further modified by adding the following paragraph and pay item:

Filling of subsurface voids encountered in performing Test Borings will be paid for under Contract item 541.45.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
203.45 Test Borings	Meter (Linear Foot)

SECTION 406 - MARSHALL BITUMINOUS CONCRETE PAVEMENT

23. 406.03 COMPOSITION OF MIXTURE, part (f) Boxed Samples, is hereby corrected by adding the word "Engineer" to the end of the second (last) sentence.
24. 406.16 SURFACE TOLERANCE, is hereby modified by adding the phrase ", with the exception of all limited access highway on and off ramps," after the phrase "miscellaneous mix" in the second (last) sentence of the sixth (last) paragraph.

SECTION 490 - SUPERPAVE BITUMINOUS CONCRETE PAVEMENT

25. 490.14 COMPACTION, part (c) Coring Protocol, is hereby corrected by deleting text "0" and replacing it with text ")" in the first sentence of the seventh paragraph.
26. 490.16 SURFACE TOLERANCE, is hereby modified by adding the phrase ", with the exception of all limited access highway on and off ramps," after the phrase "miscellaneous mix" in the second (last) sentence of the sixth (last) paragraph.

SECTION 501 - HPC STRUCTURAL CONCRETE

27. 501.03 CLASSIFICATION AND PROPORTIONING, TABLE 501.03A (Metric), is hereby modified by deleting the fourth column (with header "Max. Slump (mm)") in its entirety and replacing it with the following:

Max. Slump (mm)
---
---
---
N/A
---

28. 501.03 CLASSIFICATION AND PROPORTIONING, TABLE 501.03A (Metric), is hereby further modified by adding the following footnote:

<sup>7</sup> The mix shall not exhibit segregation at the slump/spread used at placement. If the Engineer suspects there is segregation, the Engineer will require a slump/spread test be performed by the Contractor to visually observe the characteristics of the mix. If in the opinion of the Engineer the mix does exhibit segregation, the load will be rejected and subsequent load(s) shall be tested, at a minimum of 3 loads or until the problem is corrected.

If the Contractor needs a concrete with a slump greater than 200 mm, the Contractor shall propose to the Engineer to use an SCC mix, which shall be submitted to the Engineer for review and acceptance.

29. 501.03 CLASSIFICATION AND PROPORTIONING, TABLE 501.03A (English), is hereby modified by deleting the fourth column (with header "Max. Slump (in)") in its entirety and replacing it with the following:

Max. <sup>7</sup> Slump (mm)
---
---
---
N/A
---

30. 501.03 CLASSIFICATION AND PROPORTIONING, TABLE 501.03A (English), is hereby corrected by deleting text "700 mm" and replacing it with text "28 inches" in footnote 4.

31. 501.03 CLASSIFICATION AND PROPORTIONING, TABLE 501.03A (English), is hereby further modified by adding the following footnote:

<sup>7</sup> The mix shall not exhibit segregation at the slump/spread used at placement. If the Engineer suspects there is segregation, the Engineer will require a slump/spread test be performed by the Contractor to visually observe the characteristics of the mix. If in the opinion of the Engineer the mix does exhibit segregation, the load will be rejected and subsequent load(s) shall be tested, at a minimum of 3 loads or until the problem is corrected.

If the Contractor needs a concrete with a slump greater than 8 inches, the Contractor shall propose to the Engineer to use an SCC mix, which shall be submitted to the Engineer for review and acceptance.

SECTION 507 -- REINFORCING STEEL

32. 507.01 DESCRIPTION, is hereby modified by adding the phrase "of the level specified" after the phrase "bar reinforcement".
33. 507.01 DESCRIPTION, is hereby further modified by adding the following paragraphs:

Levels and associated types of reinforcing steel are specified as follows:

- (a) Level I (Limited Corrosion Resistance). Level I reinforcing includes plain, low alloy, and epoxy coated reinforcing steel.
- (b) Level II (Improved Corrosion Resistance). Level II reinforcing includes stainless clad and dual-coated reinforcing steel.
- (c) Level III (Exceptional Corrosion Resistance). Level III reinforcing includes solid stainless reinforcing steel.

The location, level, and when specified, type of reinforcing shall be as indicated in the Plans. Reinforcing supplied shall meet the requirements of the level specified or any higher level. Only one type of reinforcing steel shall be used for each level for the Contract work, unless permitted in writing by the Engineer.

34. 507.02 MATERIALS, is hereby modified by deleting the sixth (final) entry in the Subsection listing.
35. 507.03 FABRICATION AND SHIPMENT, part (a) General, is hereby modified by adding the phrase "deformed bar" after the phrase "shall be" in the first paragraph.
36. 507.03 FABRICATION AND SHIPMENT, part (a) General, is hereby corrected by deleting punctuation "." and replacing it with punctuation "." at the end of the first paragraph.
37. 507.04 PROTECTION OF MATERIAL, is hereby modified by adding the following as the second sentence in the first paragraph:
- When multiple levels of reinforcing steel are used on a project, they shall be stored separately, including during transport in order that there is no direct contact between the bars.
38. 507.04 PROTECTION OF MATERIAL, is hereby further modified by deleting the phrase "The epoxy coating" and replacing it with the word "Coatings" in the third sentence of the third paragraph.
39. 507.04 PROTECTION OF MATERIAL, is hereby still further modified by deleting the phrase "as required for damaged areas" and replacing it with the phrase "per the coating manufacturer's recommendations and to the satisfaction of the Engineer" in the third sentence of the fifth (last) paragraph.

40. 507.04 PROTECTION OF MATERIAL, is hereby still further modified by adding the following paragraph:

All ends of Level II reinforcement where the mild steel core is exposed shall be capped in accordance with one of the following:

- (a) Heat-shrink cap applied in accordance with the cap manufacturer's instructions.
- (b) Neoprene cap adhered with silicone or epoxy sealant.
- (c) Stainless steel cap epoxied in place.
- (d) Stainless steel seal weld.

41. 507.05 PLACING AND FASTENING REINFORCING STEEL, is hereby modified by deleting the sixth paragraph in its entirety and replacing it with the following:

Tie wires and supports used for installation of reinforcement shall be composed of the same material as any steel being contacted or shall be nonmetallic or coated with a dielectric (electrically insulated) material to prevent reactions between dissimilar metals. When forms are to be removed in their entirety, uncoated steel chairs equipped with snug-fitting, high-density, polyethylene tips which provide 3 mm (1/4 inch) clearance between the metal and any exposed surface may be used.

42. 507.10 METHOD OF MEASUREMENT, is hereby modified by deleting the phrase ", Epoxy Coated Reinforcing Steel, and Galvanized Reinforcing Steel" and replacing it with the phrase "of the type and size specified" in the first paragraph.

43. 507.10 METHOD OF MEASUREMENT, is hereby further modified by adding the phrase "of the type specified" at the end of the second paragraph (beginning "The quantity of Drilling and Grouting Dowels...").

44. 507.11 BASIS OF PAYMENT, is hereby modified by deleting the following pay items:

<u>Pay Item</u>	<u>Pay Unit</u>
507.15 Reinforcing Steel	Kilogram (Pound)
507.17 Epoxy Coated Reinforcing Steel	Kilogram (Pound)
507.18 Galvanized Reinforcing Steel	Kilogram (Pound)

45. 507.11 BASIS OF PAYMENT, is hereby further modified by adding the following pay items:

<u>Pay Item</u>	<u>Pay Unit</u>
507.11 Reinforcing Steel, Level I	Kilogram (Pound)
507.12 Reinforcing Steel, Level II	Kilogram (Pound)
507.13 Reinforcing Steel, Level III	Kilogram (Pound)

SECTION 516 - EXPANSION DEVICES

46. 516.01 DESCRIPTION, is hereby modified by adding the phrase ", or partially removing and modifying," after the word "installing".

47. 516.05A PARTIAL REMOVAL AND MODIFICATION, is hereby made a new Subsection of the Standard Specifications as follows:

516.05A PARTIAL REMOVAL AND MODIFICATION. The Contractor shall partially remove and modify the existing bridge joint at the locations indicated in the Plans and as directed by the Engineer.

Steel for new joint plates shall meet the requirements of Subsection 714.02.

The Contractor shall remove and dispose of existing joint plates, drain troughs, and associated hardware.

The Contractor shall grind existing steel plates and/or shoulder concrete to the configuration shown on the Plans. The final surface shall be to the satisfaction of the Engineer.

48. 516.06 METHOD OF MEASUREMENT, is hereby modified by adding the following paragraph:

The quantity of Partial Removal and Modification of Bridge Joint to be measured for payment will be the number of meters (linear feet) of bridge joint removed and modified in the complete and accepted work, measured along its centerline.

49. 516.07 BASIS OF PAYMENT, is hereby modified by adding the following paragraph and pay item:

The accepted quantity of Partial Removal and Modification of Bridge Joint will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for partially removing and modifying the existing joint as specified and as detailed in the Plans, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
516.20 Partial Removal and Modification of Bridge Joint	Meter (Linear Foot)

SECTION 525 - BRIDGE RAILINGS

50. 525.02 MATERIALS, is hereby modified by adding the following as the third entry in the Subsection listing:

Structural Steel.....714.02

51. 525.06 INSTALLATION, part (a) General, is hereby modified by adding the following as the sixth (last) paragraph:

Concrete railing shall receive an aesthetic finish in accordance with Subsection 501.16. Cracks in concrete railing shall be repaired by a method approved by the Engineer. Cracks in concrete greater than 0.25 mm (0.01 inch) may be cause for rejection.

52. 525.08 BASIS OF PAYMENT, is hereby modified by adding the phrase "for furnishing all forms, joint filler, admixtures, trial batches, and connection plates for approach railing terminal connectors; for satisfactory completion of any necessary repairs, surface finishing, and curing;" after the phrase "for all work necessary for verifying and adjusting post height and/or bolt spacing of existing posts;" in the second (last) sentence of the third paragraph.

53. 525.08 BASIS OF PAYMENT, is hereby further modified by adding the following pay item:

<u>Pay Item</u>	<u>Pay Unit</u>
525.45 Bridge Railing, Galvanized Steel Tubing/ Concrete Combination	Meter (Linear Foot)

SECTION 531 - BRIDGE BEARING DEVICES

54. 531.04 FABRICATION, part (b) Surface Protection, is hereby corrected by deleting punctuation ",." at the end of the paragraph and replacing it with punctuation ".".

SECTION 540 - PRECAST CONCRETE

55. 540.02 MATERIALS, is hereby modified by deleting the fourteenth entry (beginning "Coated Bar Reinforcement...") in the Subsection listing.

56. 540.02 MATERIALS, is hereby further modified by adding the following as the twenty-eighth entry in the Subsection listing:

Sheet Membrane Waterproofing, Preformed Sheet.....726.11

57. 540.07 FABRICATION, part (e) Placing Concrete, is hereby modified by deleting the phrase "done with care" and replacing it with the phrase "performed in accordance with Subsection 501.10(f)" in the third (last) sentence.

58. 540.10 INSTALLATION, is hereby modified by adding the following new part (c):

(c) Sheet Membrane Waterproofing. A reinforced asphalt, synthetic resin, or coal-tar based preformed sheet membrane shall be placed over the joints of precast concrete units in accordance with the Contract Documents. All work performed shall be in accordance with the manufacturer's recommendations.

Material for membrane shall meet the requirements of Subsection 726.11.

Waterproofing shall not be performed in wet weather or when the temperature is below 5°C (40°F), without the authorization of the Engineer.

The concrete surfaces that are to be waterproofed shall be reasonably smooth and free from projections or holes and shall be cleaned of dust and loose material. The surfaces shall be visibly dry prior to and during application of the membrane system.

59. 540.14 BASIS OF PAYMENT, is hereby modified by adding the following paragraph:

Furnishing and placing preformed sheet membrane waterproofing, including primer, mastic, polyurethane membrane sealant, and surface preparation, is considered incidental to the work for Precast Concrete Structure.

SECTION 541 - STRUCTURAL CONCRETE

60. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (Metric), is hereby modified by deleting footnote designation "\*" in the first and fourth entries of the third row (for "Class A" concrete).
61. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (Metric), is hereby further modified by deleting footnote "\*" and associated text (beginning "\*\* When this class of concrete...").

62. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (Metric), is hereby still further modified by deleting the fourth (with header "Range in Slump (mm)") and fifth (with header "Air Cont. (%)") columns in their entirety and replacing them with the following:

Range* in Slump (mm)	Air Content (%)
---	7.0 ± 1.5
---	7.0 ± 1.5
---	7.0 ± 1.5
---	5.5 ± 1.5
---	5.5 ± 1.5
---	7.0 ± 1.5

63. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (Metric), is hereby still further modified by adding the following footnote:

\* The mix shall not exhibit segregation at the slump/spread used at placement. If the Engineer suspects there is segregation, the Engineer will require a slump/spread test be performed by the Contractor to visually observe the characteristics of the mix. If in the opinion of the Engineer the mix does exhibit segregation, the load will be rejected and subsequent load(s) shall be tested, at a minimum of 3 loads or until the problem is corrected.

If the Contractor needs a concrete with a slump greater than 200 mm, the Contractor shall propose to the Engineer to use an SCC mix, which shall be submitted to the Engineer for review and acceptance.

64. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (English), is hereby modified by deleting footnote designation "\*" in the first and fourth entries of the third row (for "Class A" concrete).
65. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (English), is hereby further modified by deleting footnote "\*" and associated text (beginning "\* When this class of concrete...").

66. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (English), is hereby still further modified by deleting the fourth (with header "Range in Slump (in.)") and fifth (with header "Air Cont. (%)") columns in their entirety and replacing them with the following:

Range* in Slump (mm)	Air Content (%)
---	7.0 ± 1.5
---	7.0 ± 1.5
---	7.0 ± 1.5
---	5.5 ± 1.5
---	5.5 ± 1.5
---	7.0 ± 1.5

67. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (English), is hereby still further modified by adding the following footnote:

\* The mix shall not exhibit segregation at the slump/spread used at placement. If the Engineer suspects there is segregation, the Engineer will require a slump/spread test be performed by the Contractor to visually observe the characteristics of the mix. If in the opinion of the Engineer the mix does exhibit segregation, the load will be rejected and subsequent load(s) shall be tested, at a minimum of 3 loads or until the problem is corrected.

If the Contractor needs a concrete with a slump greater than 8 inches, the Contractor shall propose to the Engineer to use an SCC mix, which shall be submitted to the Engineer for review and acceptance.

68. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (Metric) is hereby modified by adding the following as the eighth (bottom) row with the included footnotes:

Controlled Density (Flowable) Fill	To be designed ***	To be designed ****	To be designed *****	10 min.	704.01 (Fine Aggregate)	0.85 max. *****	---
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- \*\*\* A mineral admixture may be used to replace a portion of the cement.
- \*\*\*\* The minimum amount of water shall be used to produce the desirable flow for the intended use without showing segregation.
- \*\*\*\*\* The slump (flowability) shall be such that material is able to completely fill the voids or area as needed without segregation.
- \*\*\*\*\*A minimum of 3 cylinders per test age required to constitute a test. If average strength at 28 days exceeds 115% of max. strength, then payment for Contract item 541.45 will be 85% of the Contract bid price.

69. 541.03 CLASSIFICATION AND PROPORTIONING, TABLE 541.03A (English) is hereby modified by adding the following as the eighth (bottom) row with the included footnotes:

Controlled Density (Flowable) Fill	To be designed ***	To be designed ****	To be designed *****	10 min.	704.01 (Fine Aggregate)	125 max. *****	---
---	--------------------------	---------------------------	----------------------------	------------	-------------------------------	----------------------	-----

- \*\*\* A mineral admixture may be used to replace a portion of the cement.
- \*\*\*\* The minimum amount of water shall be used to produce the desirable flow for the intended use without showing segregation.
- \*\*\*\*\* The slump (flowability) shall be such that material is able to completely fill the voids or area as needed without segregation.
- \*\*\*\*\*A minimum of 3 cylinders per test age required to constitute a test. If average strength at 28 days exceeds 115% of max. strength, then payment for Contract item 541.45 will be 85% of the Contract bid price.
70. 541.10 PLACING CONCRETE, part (c) Placement Limitations, is hereby modified by adding the following paragraphs:

Flowable fill shall be applied to voids and other locations as specified in the Contract Documents and as directed by the Engineer. Flowable fill shall be able to completely fill the existing voids.

If voids are discovered, the Engineer may direct the Contractor to submit a plan for filling the remaining voids. This work, including preparing and submitting the plan and filling any remaining voids, will be at the Contractor's expense.

71. 541.19 METHOD OF MEASUREMENT, is hereby modified by deleting the phrase "or LW" and replacing it with the phrase "LW, or Flowable Fill" in the first sentence of the first paragraph.
72. 541.20 BASIS OF PAYMENT, is hereby modified by adding the following pay item:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
541.45 Controlled Density (Flowable) Fill	Cubic Meter (Cubic Yard)

SECTION 580 - STRUCTURAL CONCRETE REPAIR

73. 580.02 MATERIALS, is hereby modified by adding the following to the Subsection listing:

Polymer Concrete Repair Material.....780.05

74. 580.03 PROPORTIONING AND MIXING, is hereby modified by deleting the last sentence of the first paragraph in its entirety and replacing it with the following:

The product shall not be extended with sand or gravel, except for Rapid Setting Concrete Repair Material with Coarse Aggregate and Polymer Concrete Repair Material when mixed with approved aggregates in conformance with the manufacturer's recommendations.

75. 580.04 SURFACE PREPARATION FOR REPAIRS, OVERLAYS AND MEMBRANES, is hereby modified by adding the word "abrasive" after the phrase "shall be" and before the phrase "blast cleaned" in the first sentence of the third paragraph.

76. 580.04 SURFACE PREPARATION FOR REPAIRS, OVERLAYS AND MEMBRANES, is hereby further modified by adding the phrase ", or Polymer Concrete Repair Material," after the word "Aggregate" in the sixth paragraph.

77. 580.08 METHOD OF MEASUREMENT, is hereby modified by deleting the phrase "and not for new patches, which will be the responsibility of the Contractor" and replacing it with the phrase ", with no deductions made for areas of new patches" in the second sentence of the ninth paragraph.

78. 580.08 METHOD OF MEASUREMENT, is hereby further modified by adding the phrase ", and Polymer Concrete Repair Material" after the word "Aggregate" in the first sentence of the tenth paragraph.

79. 580.09 BASIS OF PAYMENT, is hereby modified by adding the phrase ", and Polymer Concrete Repair Material" after the word "Aggregate" in the seventh paragraph.

80. 580.09 BASIS OF PAYMENT, is hereby further modified by adding the following pay item:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
580.21 Polymer Concrete Repair Material	Cubic Meter (Cubic Yard)

SECTION 608 - EQUIPMENT RENTAL

81. 608.02 GENERAL REQUIREMENTS, is hereby modified by adding the following new part (i):

(i) Truck-Mounted Attenuator, Advanced Warning Vehicle/Protection Vehicle (AWV/PV). Truck-Mounted Attenuator, AWV/PV shall consist of a Truck-Mounted Attenuator meeting the requirements of Subsection 608.02(h) and be equipped with a Changeable Message Sign in accordance with the MUTCD. The Changeable Message Sign shall be mounted so as to be clearly visible to the traveling public and shall be capable of being controlled from inside the cab of the vehicle, with capable controls including but not limited to turning the sign on and off, changing between preset messages, and inserting new messages when approved by the Engineer. Phases of signing shall have the ability to change automatically when required.

82. 608.04 BASIS OF PAYMENT, is hereby modified by changing the word "item" to "items" and by adding the phrase "and Truck-Mounted Attenuator, AWV/PV" after the phrase "Truck-Mounted Attenuator" in the second (last) paragraph.

83. 608.04 BASIS OF PAYMENT, is hereby further modified by adding the following pay item:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
608.50 Truck-Mounted Attenuator, AWV/PV	Hour

SECTION 613 - STONE FILL, RIPRAP, AND SLOPE PAVING

84. 613.02 MATERIALS, is hereby modified by adding the following to the Subsection listing:

Rock Fill for Gabions.....	706.06
Gabion Baskets.....	712.04

85. 613.04 PLACING, is hereby modified by adding the following new part (d):

(d) Rock Fill for Gabions. The furnishing and installing of gabion baskets shall be performed in accordance with the manufacturer's recommendations.

The Contractor should expect to perform some manual stone placement to minimize voids and to create a neat, flat vertical surface of gabions.

86. 613.05 METHOD OF MEASUREMENT, is hereby modified by adding the following paragraph:

The quantity of Gabion Wall to be measured for payment will be the number of cubic meters (cubic yards) of Rock Fill for Gabions placed in the complete and accepted work.

87. 613.06 BASIS OF PAYMENT, is hereby modified by adding the phrase "and Gabion Wall" after the word "specified" in the first sentence of the first paragraph.
88. 613.06 BASIS OF PAYMENT, is hereby modified by adding the phrase ", including gabion baskets," after the word "material" in the third (last) sentence of the first paragraph.
89. 613.06 BASIS OF PAYMENT, is hereby still further modified by adding the phrase "or rock" after the word "stone" in the first sentence of the second paragraph.
90. 613.06 BASIS OF PAYMENT, is hereby still further modified by adding the following paragraph:

Geotextile fabric and bedding material for Gabion Wall will be paid for under the appropriate Contract items.

91. 613.06 BASIS OF PAYMENT, is hereby still further modified by adding the following pay item:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
613.25 Gabion Wall	Cubic Meter (Cubic Yard)

SECTION 616 - CURBS AND GUTTERS

92. 616.05 REPOINTING GRANITE BRIDGE CURB, is hereby made a new Subsection of the Standard Specifications as follows:

616.05 REPOINTING GRANITE BRIDGE CURB. The existing mortar bed and vertical curb joints shall be repointed as shown on the Plans. Mortar shall meet the requirements of Subsection 707.01.

93. 616.14 METHOD OF MEASUREMENT, is hereby modified by adding the following as the second paragraph:

The quantity of Repointing Granite Bridge Curb to be measured for payment will be the number of liters (gallons) of mortar applied in the completed and accepted work, measured to the nearest liter (gallon).

94. 616.14 METHOD OF MEASUREMENT, is hereby corrected by changing the word "portland" to "Portland" in the fifth (last) paragraph.

95. 616.15 BASIS OF PAYMENT, is hereby modified by adding the following as the second paragraph:

The accepted quantity of Repointing Granite Bridge Curb will be paid for at the Contract unit price per liter (gallon). Payment will be full compensation for furnishing, transporting, handling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

96. 616.15 BASIS OF PAYMENT, is hereby corrected by changing the word "portland" to "Portland" in the fourth paragraph.

97. 616.15 BASIS OF PAYMENT, is hereby further modified by adding the following pay item:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
616.225 Repointing Granite Bridge Curb	Liter (Gallon)

SECTION 621 - TRAFFIC BARRIERS

98. 621.01 DESCRIPTION, is hereby modified by adding the phrase "repairing," after the phrase "removing,".
99. 621.02 MATERIALS, is hereby modified by adding the following as the fifth entry in the Subsection listing:

Wire Rope or Cable.....713.03

100. 621.13 REPLACEMENT, ADJUSTMENT, REMOVAL, AND DISPOSAL OF GURADRAIL OR GUIDE POSTS, is hereby modified by deleting the phrase "post assemblies and panel units" and replacing it with the phrase "guardrail components" in the second sentence of the first paragraph.
101. 621.13 REPLACEMENT, ADJUSTMENT, REMOVAL, AND DISPOSAL OF GUARDRAIL OR GUIDE POSTS, is hereby further modified by deleting the phrase "post assembly replacement or guardrail beam replacement occur" and replacing it with the phrase "guardrail component replacement occurs" in the fourth paragraph.
102. 621.13 REPLACEMENT, ADJUSTMENT, REMOVAL, AND DISPOSAL OF GURADRAIL OR GUIDE POSTS, is hereby still further modified by adding the following as the sixth and seventh paragraphs:

Offset blocks designated for replacement shall be replaced in-kind. Materials shall be in conformance with the applicable requirements of Subsection 728.01 for either wood, steel, or alternative blockouts.

Cable guardrail repair shall be performed in accordance with VTrans Standard Drawing G-6 and as directed by the Engineer.

103. 621.14 METHOD OF MEASUREMENT, is hereby modified by adding the following as the fourth and fifth paragraphs of the Subsection text:

The quantities of Cable Guardrail J-Bolt, Galvanized and Cable Guardrail Splice Unit to be measured for payment will be the number of units installed in the complete and accepted work.

The quantity of Replacement of Guardrail Cable to be measured for payment will be the number of meters (linear feet) installed in the complete and accepted work.

104. 621.14 METHOD OF MEASUREMENT, is hereby further modified by adding the following as the eighth paragraph of the Subsection text:

The quantities of Steel Beam Guardrail Delineator and Steel Beam Guardrail Offset Block to be measured for payment will be the number of each component replaced in the complete and accepted work.

105. 621.15 BASIS OF PAYMENT, is hereby modified by adding the following as the second, third, and fourth paragraphs of the Subsection text:

The accepted quantities of Cable Guardrail J-Bolt, Galvanized and Cable Guardrail Splice Unit will be paid for at the Contract unit price for each.

The accepted quantity of Replacement of Cable Guardrail will be paid for at the Contract unit price per meter (linear foot).

The accepted quantities of Steel Beam Guardrail Delineator and Steel Beam Guardrail Offset Block will be paid for at the Contract unit price for each.

106. 621.15 BASIS OF PAYMENT, is hereby further modified by adding the phrase "removing and disposing of damaged guardrail component(s)," after the phrase "specified," in the first sentence of the tenth paragraph.

107. 621.15 BASIS OF PAYMENT, is hereby still further modified by adding the following pay items:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
621.173 Cable Guardrail J-Bolt, Galvanized	Each
621.174 Cable Guardrail Splice Unit	Each
621.175 Replacement of Guardrail Cable	Meter (Linear Foot)
621.218 Steel Beam Guardrail Delineator	Each
621.219 Steel Beam Guardrail Offset Block	Each
621.70 Guardrail Approach Section, Galvanized Type I	Each
621.71 Guardrail Approach Section, Galvanized Type II	Each
621.726 Guardrail Approach Section, Galvanized 3 Rail Box Beam w/Curb	Each
621.735 Guardrail Approach Section, Steel Beam	Each
621.736 Guardrail Approach Section, Steel Beam w/2.4 m (8 feet) Posts	Each
621.737 Guardrail Approach Section, Galvanized HD Steel Beam	Each
621.738 Guardrail Approach Section, Galvanized HD Steel Beam w/2.4 m (8 feet) Posts	Each
621.748 Guardrail Approach Section to Concrete Combination Bridge Railing, TL-3	Each

SECTION 677 - OVERHEAD TRAFFIC SIGN SUPPORTS

108. 677.01 DESCRIPTION, is hereby modified by adding the phrase "and removing and disposing of existing overhead traffic sign supports," after the phrase "supports,".

109. 677.03 GENERAL, is hereby modified by adding the following paragraph:

Where existing overhead traffic sign supports are to be removed, the Contractor shall remove and dispose of the entire sign assembly, including concrete footings, to a depth of 450 mm (18 inches) below existing grade. Areas of ground disturbance shall be restored to the satisfaction of the Engineer.

110. 677.05 METHOD OF MEASUREMENT, is hereby modified by adding the following paragraph:

The quantity of Remove Existing Overhead Sign Assembly of the type specified to be measured for payment will be the number of each assembly removed in the complete and accepted work.

111. 677.06 BASIS OF PAYMENT, is hereby modified by adding the following paragraphs and pay items:

The accepted quantity of Remove Existing Overhead Sign Assembly of the type specified will be paid for at the Contract unit price per each. Payment will be full compensation for removing and disposing of assembly components, including concrete footings; for performing any excavation necessary; for restoring areas of ground disturbance; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Costs associated with providing traffic control and/or flaggers for performing the work will be paid under the appropriate Contract item(s).

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
677.30 Remove Existing Overhead Sign Assembly, Cantilever	Each
677.35 Remove Existing Overhead Sign Assembly, Multi-Support	Each

SECTION 678 - TRAFFIC CONTROL SIGNALS

112. 678.01 DESCRIPTION, is hereby modified by adding the phrase ", and removing existing traffic control systems" after the word "system" in the first paragraph.

113. 678.02 MATERIALS, is hereby corrected by deleting "converts" and replacing it with the word "covers" in the second sentence of the last paragraph of the Subsection text.

114. 678.11 INSTALLATION, sixteenth paragraph, part (a), is hereby modified by adding the following as the third sentence:

The Contractor shall remove any equipment to be salvaged or reused in such a manner that the equipment is not damaged.

115. 678.13 METHOD OF MEASUREMENT, is hereby modified by adding the following paragraph:

The quantity of Removal of Existing Traffic Control Signal System to be measured for payment will be for each traffic control signal system removed in the complete and accepted work.

116. 678.14 BASIS OF PAYMENT, is hereby modified by adding the phrase "all removal, disposal, and salvage and/or reuse of existing system equipment and components," after the phrase "Electrical Wiring," in the second sentence of the first paragraph.

117. 678.14 BASIS OF PAYMENT, is hereby further modified by adding the following paragraph and pay item:

The accepted quantity of Removal of Existing Traffic Control Signal System will be paid for at the Contract unit price per each. Payment will be full compensation for removing and handling the existing traffic control signal system components as specified in the Contract Documents and for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
678.45 Removal of Existing Traffic Control Signal System	Each

SECTION 700 GENERAL

118. 700.01 GENERAL STATEMENT, is hereby corrected by deleting punctuation "...," at the end of the first sentence of the fourth paragraph and replacing it with punctuation ".".

SECTION 713 -- REINFORCING STEEL, WELDED WIRE REINFORCEMENT, AND  
REINFORCING STRAND

119. 713.01 BAR REINFORCEMENT, is hereby modified by deleting the phrase "conforming to AASHTO M 31M/M 31, including supplementary requirements" and replacing it with the phrase ", unless otherwise specified in the Contract Documents" in the first paragraph.
120. 713.01 BAR REINFORCEMENT, is hereby further modified by adding the following new parts (a)-(f) and associated paragraphs:
- (a) Plain Reinforcing Steel. Plain reinforcing steel shall conform to AASHTO M 31M/M 31, including supplementary requirements.
  - (b) Low Alloy Reinforcing Steel. Low alloy reinforcing steel shall conform to ASTM A 706/A 706M.
  - (c) Epoxy Coated Reinforcing Steel. Epoxy coated reinforcing steel shall have an electrostatically applied organic epoxy protective coating, which has been prequalified, fabricated, tested, and installed in accordance with AASHTO M 284M/M 284 or ASTM A 884.
  - (d) Stainless Clad Reinforcing Steel. Stainless clad reinforcing steel shall meet the requirements of AASHTO M 329M/M 329.
  - (e) Dual-Coated Reinforcing Steel. Dual-coated reinforcing steel shall meet the requirements of ASTM A 1055/A 1055M.
  - (f) Solid Stainless Reinforcing Steel. Solid stainless reinforcing steel shall meet the requirements of ASTM A 955/A 955M with one of the following UNS designations: S24100, S30400, S31603, S31653, S32101, S32201, S32205, or S32304. Different designations shall not be mixed within the same project.

Where no core steel requirements are specified in the above specifications, the steel core of the bar reinforcement shall meet the requirements of plain reinforcing steel.

Certification. A Type D Certification shall be furnished in accordance with Subsection 700.02. Certification for Epoxy Coated Reinforcing Steel shall include the coating and coating process.

121. 713.07 COATED BAR REINFORCEMENT, is hereby modified by being deleted in its entirety.

SECTION 714 - STRUCTURAL STEEL

122. 714.08 ANCHOR BOLTS, BEARING DEVICES, is hereby corrected by deleting ".F" and replacing it with "F" in the first sentence of the first paragraph.
123. 714.08 ANCHOR BOLTS, BEARING DEVICES, is hereby further corrected by deleting punctuation ".," and replacing it with punctuation "." at the end of the second sentence of the first paragraph.

SECTION 726 - PROTECTIVE COATINGS AND WATERPROOFING MATERIALS

124. 726.10 CONCRETE STAINING AND SEALING SYSTEMS, is hereby made a new Subsection of the Standard Specifications as follows:

726.10 CONCRETE STAINING AND SEALING SYSTEMS. Approved Concrete Staining and Sealing Systems shall be one of the Concrete Staining and Sealing Systems on the Approved Products List on file with the Agency's Materials and Research Section.

125. 726.11 SHEET MEMBRANE WATERPROOFING, PREFORMED SHEET, is hereby made a new Subsection of the Standard Specifications as follows:

726.11 SHEET MEMBRANE WATERPROOFING, PREFORMED SHEET. Approved Preformed Sheet Membrane Waterproofing Systems shall be one of the Preformed Sheet Membrane Waterproofing Systems on the Approved Products List on file with the Agency's Materials and Research Section.

SECTION 731 - BEARING PADS FOR STRUCTURES

126. 731.03 ELASTOMERIC MATERIAL, is hereby modified by deleting the second and third paragraphs in their entirety and replacing them with the following:

Unless noted otherwise, elastomer shall have a design hardness of 50 points and a design shear modulus of 0.8 MPa (110 psi).

Testing of elastomeric material shall be waived for bearings that will be encased in concrete in the final work. All other bearings shall be tested in accordance with the following table:

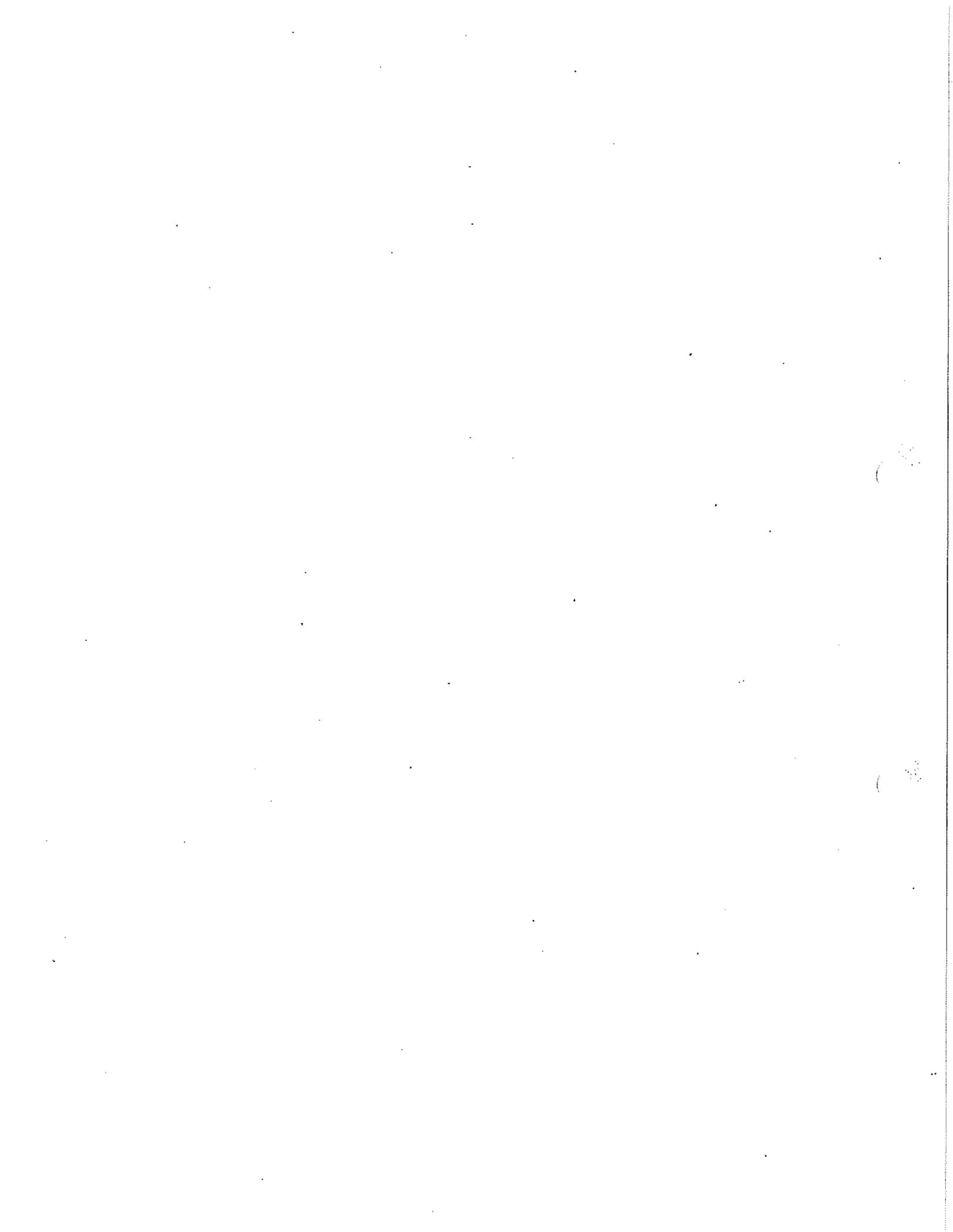
TABLE 731.03A - REQUIRED TESTS

Material Property	Test Method	Required Result
Hardness	ASTM D 2240	design hardness +/- 5 points
	or	
Shear Modulus	ASTM D 412 with AASTHO M 251 Section 8.8.4	design shear modulus +/- 15%
Low Temperature Brittleness	ASTM D 746 Procedure B	Pass Grade 4 test
Shear Bond Strength	AASHTO M 251 Annex A2 or Appendix X2	Pass
Min Tensile Strength	ASTM D 412	15.6 MPa (2250 psi)
Min Ultimate Elongation	ASTM D 412	(650 - 5 X design hardness)%

SECTION 780 -- CONCRETE REPAIR MATERIALS

127. 780.05 POLYMER CONCRETE REPAIR MATERIAL, is hereby made a new Subsection of the Standard Specifications as follows:

780.05 POLYMER CONCRETE REPAIR MATERIAL. Approved Polymer Concrete Repair Materials shall be one of the Polymer Concrete Repair Materials on the Approved Products List on file with the Agency's Materials and Research Section.



## ATTACHMENT C: STANDARD STATE PROVISIONS FOR CONTRACTS AND GRANTS

1. **Entire Agreement:** This Agreement, whether in the form of a Contract, State Funded Grant, or Federally Funded Grant, represents the entire agreement between the parties on the subject matter. All prior agreements, representations, statements, negotiations, and understandings shall have no effect.
2. **Applicable Law:** This Agreement will be governed by the laws of the State of Vermont.
3. **Definitions:** For purposes of this Attachment, "Party" shall mean the Contractor, Grantee or Subrecipient, with whom the State of Vermont is executing this Agreement and consistent with the form of the Agreement.
4. **Appropriations:** If this Agreement extends into more than one fiscal year of the State (July 1 to June 30), and if appropriations are insufficient to support this Agreement, the State may cancel at the end of the fiscal year, or otherwise upon the expiration of existing appropriation authority. In the case that this Agreement is a Grant that is funded in whole or in part by federal funds, and in the event federal funds become unavailable or reduced, the State may suspend or cancel this Grant immediately, and the State shall have no obligation to pay Subrecipient from State revenues.
5. **No Employee Benefits For Party:** The Party understands that the State will not provide any individual retirement benefits, group life insurance, group health and dental insurance, vacation or sick leave, workers compensation or other benefits or services available to State employees, nor will the state withhold any state or federal taxes except as required under applicable tax laws, which shall be determined in advance of execution of the Agreement. The Party understands that all tax returns required by the Internal Revenue Code and the State of Vermont, including but not limited to income, withholding, sales and use, and rooms and meals, must be filed by the Party, and information as to Agreement income will be provided by the State of Vermont to the Internal Revenue Service and the Vermont Department of Taxes.
6. **Independence, Liability:** The Party will act in an independent capacity and not as officers or employees of the State.

The Party shall defend the State and its officers and employees against all claims or suits arising in whole or in part from any act or omission of the Party or of any agent of the Party. The State shall notify the Party in the event of any such claim or suit, and the Party shall immediately retain counsel and otherwise provide a complete defense against the entire claim or suit.

After a final judgment or settlement the Party may request recoupment of specific defense costs and may file suit in Washington Superior Court requesting recoupment. The Party shall be entitled to recoup costs only upon a showing that such costs were entirely unrelated to the defense of any claim arising from an act or omission of the Party.

The Party shall indemnify the State and its officers and employees in the event that the State, its officers or employees become legally obligated to pay any damages or losses arising from any act or omission of the Party.

7. **Insurance:** Before commencing work on this Agreement the Party must provide certificates of insurance to show that the following minimum coverages are in effect. It is the responsibility of the Party to maintain current certificates of insurance on file with the state through the term of the Agreement. No warranty is made that the coverages and limits listed

herein are adequate to cover and protect the interests of the Party for the Party's operations. These are solely minimums that have been established to protect the interests of the State.

Workers Compensation: With respect to all operations performed, the Party shall carry workers' compensation insurance in accordance with the laws of the State of Vermont.

General Liability and Property Damage: With respect to all operations performed under the contract, the Party shall carry general liability insurance having all major divisions of coverage including, but not limited to:

Premises - Operations  
Products and Completed Operations  
Personal Injury Liability  
Contractual Liability

The policy shall be on an occurrence form and limits shall not be less than:

\$1,000,000 Per Occurrence  
\$1,000,000 General Aggregate  
\$1,000,000 Products/Completed Operations Aggregate  
\$ 50,000 Fire/ Legal/Liability

Party shall name the State of Vermont and its officers and employees as additional insureds for liability arising out of this Agreement.

Automotive Liability: The Party shall carry automotive liability insurance covering all motor vehicles, including hired and non-owned coverage, used in connection with the Agreement. Limits of coverage shall not be less than: \$1,000,000 combined single limit.

Party shall name the State of Vermont and its officers and employees as additional insureds for liability arising out of this Agreement.

8. **Reliance by the State on Representations:** All payments by the State under this Agreement will be made in reliance upon the accuracy of all prior representations by the Party, including but not limited to bills, invoices, progress reports and other proofs of work.
9. **Requirement to Have a Single Audit:** In the case that this Agreement is a Grant that is funded in whole or in part by federal funds, the Subrecipient will complete the Subrecipient Annual Report annually within 45 days after its fiscal year end, informing the State of Vermont whether or not a single audit is required for the prior fiscal year. If a single audit is required, the Subrecipient will submit a copy of the audit report to the granting Party within 9 months. If a single audit is not required, only the Subrecipient Annual Report is required.

A single audit is required if the subrecipient expends \$500,000 or more in federal assistance during its fiscal year and must be conducted in accordance with OMB Circular A-133. The Subrecipient Annual Report is required to be submitted within 45 days, whether or not a single audit is required.

10. **Records Available for Audit:** The Party will maintain all books, documents, payroll papers, accounting records and other evidence pertaining to costs incurred under this agreement and make them available at reasonable times during the period of the Agreement and for three years thereafter for inspection by any authorized representatives of the State or Federal Government. If any litigation, claim, or audit is started before the expiration of the three year period, the records shall be retained until all litigation, claims or audit findings

involving the records have been resolved. The State, by any authorized representative, shall have the right at all reasonable times to inspect or otherwise evaluate the work performed or being performed under this Agreement.

**11. Fair Employment Practices and Americans with Disabilities Act:** Party agrees to comply with the requirement of Title 21 V.S.A. Chapter 5, Subchapter 6, relating to fair employment practices, to the full extent applicable. Party shall also ensure, to the full extent required by the Americans with Disabilities Act of 1990, as amended, that qualified individuals with disabilities receive equitable access to the services, programs, and activities provided by the Party under this Agreement. Party further agrees to include this provision in all subcontracts.

**12. Set Off:** The State may set off any sums which the Party owes the State against any sums due the Party under this Agreement; provided, however, that any set off of amounts due the State of Vermont as taxes shall be in accordance with the procedures more specifically provided hereinafter.

**13. Taxes Due to the State:**

- a. Party understands and acknowledges responsibility, if applicable, for compliance with State tax laws, including income tax withholding for employees performing services within the State, payment of use tax on property used within the State, corporate and/or personal income tax on income earned within the State.
- b. Party certifies under the pains and penalties of perjury that, as of the date the Agreement is signed, the Party is in good standing with respect to, or in full compliance with, a plan to pay any and all taxes due the State of Vermont.
- c. Party understands that final payment under this Agreement may be withheld if the Commissioner of Taxes determines that the Party is not in good standing with respect to or in full compliance with a plan to pay any and all taxes due to the State of Vermont.
- d. Party also understands the State may set off taxes (and related penalties, interest and fees) due to the State of Vermont, but only if the Party has failed to make an appeal within the time allowed by law, or an appeal has been taken and finally determined and the Party has no further legal recourse to contest the amounts due.

**14. Child Support:** (Applicable if the Party is a natural person, not a corporation or partnership.) Party states that, as of the date the Agreement is signed, he/she:

- a. is not under any obligation to pay child support; or
- b. is under such an obligation and is in good standing with respect to that obligation; or
- c. has agreed to a payment plan with the Vermont Office of Child Support Services and is in full compliance with that plan.

Party makes this statement with regard to support owed to any and all children residing in Vermont. In addition, if the Party is a resident of Vermont, Party makes this statement with regard to support owed to any and all children residing in any other state or territory of the United States.

**15. Sub-Agreements:** Party shall not assign, subcontract or subgrant the performance of his Agreement or any portion thereof to any other Party without the prior written approval of

the State. Party also agrees to include in all subcontract or subgrant agreements a tax certification in accordance with paragraph 13 above.

16. **No Gifts or Gratuities:** Party shall not give title or possession of any thing of substantial value (including property, currency, travel and/or education programs) to any officer or employee of the State during the term of this Agreement.
17. **Copies:** All written reports prepared under this Agreement will be printed using both sides of the paper.
18. **Certification Regarding Debarment:** Party certifies under pains and penalties of perjury that, as of the date that this Agreement is signed, neither Party nor Party's principals (officers, directors, owners, or partners) are presently debarred, suspended, proposed for debarment, declared ineligible or excluded from participation in federal programs, or programs supported in whole or in part by federal funds.

Party further certifies under pains and penalties of perjury that, as of the date that this Agreement is signed, Party is not presently debarred, suspended, nor named on the State's debarment list at: <http://bgs.vermont.gov/purchasing/debarment>

19. **Certification Regarding Use of State Funds:** In the case that Party is an employer and this Agreement is a State Funded Grant in excess of \$1,001, Party certifies that none of these State funds will be used to interfere with or restrain the exercise of Party's employee's rights with respect to unionization.

(End of Standard Provisions)

Special Provisions for: Highgate STP 0297(8)(Re-advertised)

1. LABOR SUPPLY. Available workers for this Contract may be obtained from Manager, Employment & Training, St. Albans, VT. The latest edition of the DBE Registry can be obtained from the Office of Civil Rights and Labor's Webpage at the following address: [www.aot.state.vt.us/CivilRights/default.htm](http://www.aot.state.vt.us/CivilRights/default.htm). Contractors that do not have access to the internet may obtain a copy from the Office of Contract Administration upon request.
2. CONTRACT COMPLETION DATE. This Contract shall be completed on or before October 11, 2013.
3. NOTICE TO BIDDERS. U.S. Department of Labor Davis-Bacon wage rates are applicable to this Contract. Copies of the applicable rates are included in this proposal.
4. CONTACT WITH THE AGENCY. From the time of advertising until the actual bid opening for this Contract, all prospective Contractors, subcontractors, and suppliers shall direct all inquiries related to this project solely to the Agency's Office of Contract Administration at (802) 828-2641. This number may also be accessed via the Agency's TTY/TDD Telecommunications Relay Service at 1-800-253-0191.

*The deadline for submitting inquiries related to this project to the Office of Contract Administration is 4:30 p.m. Eastern Standard Time on February 22, 2013. No exceptions will be made to this requirement.*

5. NOTICE TO BIDDERS. The Contractor is hereby notified that in the absence of the Engineer, the Agency's Safety Officer and the Agency's Hazardous Materials and Waste Coordinator shall each have the authority to suspend work when they determine that a serious safety or environmental violation exists on the job site. The period of time work is suspended due to a serious safety or environmental violation will not be justification for an extension of time.
6. NOTICE TO BIDDERS - INCENTIVE/DISINCENTIVE (I/D). The Agency's intent is to have the bridge closure period (BCP) be as short a duration as possible. To encourage the Contractor to provide a maximum effort to complete the identified work for I/D within the period as defined below, the Agency is willing to pay an incentive.

- (a) Dates. The allowable BCP will be one (1) weekend, herein defined for the purposes of this Contract as the period from 6:00 p.m. Friday to 6:00 a.m. on the following Monday. Approved closure dates (in calendar year 2013) are as follows:

May 3-6	July 26-29
May 10-13	August 9-12
May 17-20	August 16-19
May 31-June 3	September 6-9
June 7-10	September 13-16
June 14-17	September 20-23
June 21-24	September 27-30
July 12-15	

During the BCP, the Contractor will be allowed to work 24 hours per day. The Contractor shall schedule their work such that the bridge is not closed during a holiday period.

Upon any Contractor's receipt of the VAOT Contract award letter, the Contractor shall submit to the VAOT Construction Section for review and approval a certified letter indicating the BEGIN CONSTRUCTION DATE for the BCP work. This letter shall be received by the Construction Section a minimum of fourteen (14) calendar days prior to the BEGIN CONSTRUCTION DATE indicated in the letter. The BEGIN CONSTRUCTION DATE shall be determined by the Contractor.

The I/D period as established above for this Contract is absolutely fixed and will not be changed for any Act of God, omission, improper action, direction of the Engineer, or any other reason unless done so by the Secretary and only under extreme conditions as determined by the Secretary.

- (b) Identified Work. All work required to open the project facility to a minimum of one-way traffic, including installation of final guardrail.
- (c) Pay Schedule. The Contractor will be compensated at a rate of two hundred dollars (\$200) per hour for each hour, or part thereof, that the Identified Work is completed before the end of the I/D Period (allowable BCP).

The maximum I/D compensation allowable under this Contract will be \$7200 (Seven-thousand Two-hundred Dollars).

For each hour, or part thereof, after 6 a.m. on the Monday of the BCP that the Identified Work remains uncompleted, the Contractor will be penalized at a rate of two hundred dollars (\$200) per hour.

This penalty is separate from, and will be imposed in addition to, liquidated damages which may be imposed for failure to complete the Contract on time.

- (d) Underruns and Overruns. The proposal indicates an estimated quantity for each Contract pay item. The fact that the actual amounts used in the construction of this project may vary from the estimate will not be a basis or cause for changing any of the conditions for I/D.

The Agency recognizes that additional work beyond the work indicated in the Plans is always possible in any construction contract. The Agency is willing to pay for necessary additional work in accordance with the terms and requirements of the Contract and the Standard Specifications for Construction, however, the Contractor shall absorb any resulting construction time within the original project and CPM Schedules, and there will be no adjustments or changes to the I/D dates or I/D conditions.

- (e) Payment. Payment will be made as specified in Section 900.

- 7. STANDARD SPECIFICATIONS. The provisions of the 2011 STANDARD SPECIFICATIONS FOR CONSTRUCTION, as modified herein, shall apply to this Contract.

8. SUPPLEMENTAL SPECIFICATIONS AND CONTRACT REQUIREMENTS. The Contractor's attention is directed to the following specifications and contract requirements included in the Proposal form and effective for this Contract:

Required Contract Provisions for Federal-Aid Construction  
Standard Federal EEO Specifications  
VT Agency of Transportation Contractor Workforce Reporting Requirements  
Workers' Compensation; State Contracts Compliance Requirement  
General Special Provisions dated December 4, 2012  
Bulletin 3.5 Attachment C: Standard State Provisions for Contracts and Grants  
Vermont Minimum Labor & Truck Rates  
Disadvantaged Business Enterprise (DBE) Policy Contract Requirements  
U.S. Department of Labor Davis-Bacon Wage Rates  
Asphalt Price Adjustment Provisions dated April 6, 2010  
Geotechnical Evaluation of Embankment Erosion, Bridge 6, VT 207, Highgate, Vermont dated November 5, 2008  
Certification for Federal-Aid Contracts  
Contractor's EEO Certification Form  
Debarment & Non-Collusion Affidavit

9. NOTICE TO BIDDERS - ADDITIONAL CONTRACT REQUIREMENT. For construction and transportation projects over \$250,000.00, a payroll process by which during every pay period the Contractor collects from the subcontractors or independent contractors a list of all workers who were on the jobsite during the pay period, the work performed by those workers on the jobsite, and a daily census of the jobsite. This information, including confirmation that Contractors, subcontractors, and independent contractors have the appropriate workers' compensation coverage for all workers at the jobsite, and similar information for the subcontractors regarding their subcontractors shall also be provided to the Department of Labor and to the Department of Banking, Insurance, Securities, and Health Care Administration, upon request, and shall be available to the public.
10. NOTICE TO BIDDERS - REQUIREMENTS FOR NIGHTTIME WORK. The Contractor is hereby notified that night work will be allowed within the bridge closure period. For the purposes of this Contract, "night" shall mean from the hours of 7:00 p.m. until 5:00 a.m. of the following day. The Engineer may abbreviate this time period as necessary for safety considerations.

Night work shall be performed in accordance with the National Cooperative Highway Research Program (NCHRP) Report 476 - "Guidelines for Design and Operation of Nighttime Traffic Control for Highway Maintenance and Construction". A copy of this guideline specification may be downloaded from the following website:  
[http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_476.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_476.pdf).

Prior to beginning night work, the Contractor shall design a lighting system and present it to the Engineer for approval. The Contractor shall not perform any night work or activities within the project limits until the lighting system has been fully approved and is in place on the project.

The designed lighting system shall be mobile, shall be mounted separately from other construction equipment, shall illuminate the entire work area to daylight intensity with minimal glare, and shall be a surrounding design that minimizes shadows in the work area as much as possible.

The locations at which Flaggers and/or Uniformed Traffic Officers are stationed, whether within, on the edge of, or outside of the work area, shall be separately illuminated to the same intensity, minimal glare, and minimal shadow requirements as the work area.

All costs associated with the lighting system will be considered incidental to item 900.645 Special Provision (Traffic Control, All-Inclusive).

11. NOTICE TO BIDDERS. All temporary construction signs shall meet the following requirements:
- A. Where sign installations are not protected by guardrail or other approved traffic barriers, all sign stands and post installations shall meet National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH). The appropriate resource shall be determined as described in the MASH publication. No sign posts shall extend over the top of the sign installed on said post(s). When anchors are installed, stub shall not be greater than 100 mm (4 inches) above existing ground.
  - B. As a minimum, roll up sign material shall have ASTM D 4956 Type VI fluorescent orange retroreflective sheeting.
  - C. All post-mounted signs and solid substrate portable signs shall have ASTM D 4956 Type VII, Type VIII, or Type IX fluorescent orange retroreflective sheeting.
  - D. All retroreflective sheeting on traffic cones, barricades, and drums shall be at a minimum ASTM D 4956 Type III sheeting.
  - E. All stationary signs shall be mounted on two 4.5 kg/m (3 lb/ft) flanged channel posts or 51 mm (2 inch) square steel inserted in 57 mm (2 1/4") galvanized square steel anchors. No sign posts shall extend over the top edge of sign installed on said posts.
  - F. Prior to placing temporary work zone signs on the project, the Contractor must furnish for the Engineer's approval a detail for temporary work zone signs on steel posts showing stubs projecting a maximum of 100 mm (4 inches) above ground level and bolts for sign post.
  - G. Construction signs shall be installed so as to not interfere with nor obstruct the view of existing traffic control devices, stopping sight distance, and corner sight distance from drives and town highways.
  - H. Speed zones, if used, should be a maximum of 16 kph (10 mph) below existing posted speeds. Temporary speed limit certificates must be approved by the Director of Program Development.

12. NOTICE TO BIDDERS. All retroreflective sheeting on permanent signs (signs to remain after the project is completed) shall be at a minimum ASTM D 4956 Type III sheeting, unless otherwise shown on the Plans.
13. ENVIRONMENTAL. Immediately adjacent to the project area there are several rare, threatened, and endangered species known to historically exist in the Missisquoi River at this location. No in-stream work is anticipated, although construction activities could potentially have secondary impacts if protection measures are not put in place addressing sediment and erosion control. Strict adherence to Subsections 105.22-105.29 of the VTrans Standard Specifications for Construction (2011) addressing environmental protection and proper erosion and sediment control measures is required to avoid unnecessary discharges during construction activities. A site specific erosion and sediment control plan will need to be reviewed prior to construction activities. Access, staging, and waste areas will need to be reviewed as they are proposed.
14. UTILITIES. Existing underground facilities owned by Telephone Operating Company of Vermont, LLC will not require adjustment. The Contractor is cautioned to protect these facilities from damage. The contact person for Telephone Operating Company of Vermont, LLC is Network Engineer Dan Maple [Tel.: (802)295-8152 (W), (802) 222-1842 (C)].

The Contractor is advised that exploratory excavation to locate existing underground facilities may be necessary to protect these facilities from damage. Where approved by the Engineer, these utilities shall be located and/or exposed by methods such as air/vacuum excavation and/or hand digging to determine their exact location. This exploratory work shall be classified as Trench Excavation of Earth, Exploratory and payment will be made under Contract item 204.22.

Employees or agents of the above listed company are to be allowed free and full access within the project limits with the tools, materials, and equipment necessary to install, operate, maintain, place, replace, relocate, and remove their facilities.

There will be no extra compensation paid to the Contractor for any inconvenience caused by working around and with the company or their facilities.

Act No. 86 of 1987 (30 VSA Chapter 86) ("Dig Safe") requires that notice be given prior to making an excavation. It is suggested that the Permit Holder or his/her contractor telephone 1-888-344-7233 at least 48 hours before, and not more than 30 days before, beginning any excavation at any location.

Should the Contractor desire additional adjustments of the utility facilities for his/her convenience, proper arrangements shall be made in conformance with Subsection 105.07 of the Standard Specifications for Construction.

15. HIGHWAY PARKING RESTRICTIONS. Only such trucks and equipment as are necessary for the construction of this project will be permitted to stop or park on the shoulders or right-of-way of the highway or intersecting highways. All trucks or equipment so stopped or parked shall be at least 1.2 m (4 feet) from the edge of the thru traffic lanes. Parking or stopping on the traveled portion of the roadway will not be permitted unless authorized by the Engineer to meet field conditions.

Private automobiles of workers will not be permitted to stop or park on the shoulders or right-of-way of the highway or intersecting highways.

Each of the Contractor's trucks or equipment used for the construction of this project and permitted to park or stop as provided above shall be equipped with flashing light signals on the front and rear and the signals shall be operating at all times when parked or stopped on the highway unless otherwise authorized by the Engineer.

The flashing light signals shall be visibly distinct from and physically separate from the hazard warning system required by Federal and State motor vehicle laws and regulations. At least one of these flashing light signals shall be visible to traffic approaching from any angle at all times.

Qualified traffic control personnel shall be employed whenever the Contractor's vehicles or equipment (including that which belongs to the individual workers) enter or leave the traffic flow. All movement, in or out of the traffic flow, shall be with the flow of traffic.

16. SPECIAL CONSTRUCTION REQUIREMENTS.

- A. With the exception of the bridge closure period as specified in Special Provision No. 6(a), the Contractor will be permitted to work on this project during holiday periods. However, during holiday periods, the Contractor shall conduct operations in such a manner that the Contractor's operations do not interfere with the safe and full access to existing drives within the project limits and do not interfere with the safe movement of traffic nor encroach upon any travel lane of any roadway open to traffic, within or near the project and its limits.

Designated holiday periods shall begin at 12:00 noon on the day before the weekend or holiday, whichever applies, and shall end at 7:00 a.m. on the day after the holiday or the weekend, as appropriate.

Anticipated holidays or weekends include but are not limited to Memorial Day, Fourth of July, and Labor Day.

Additional holidays may be designated by the Engineer depending on anticipated traffic volume, season of the year, and local custom. As specified in Subsection 105.14, and except as allowed under Special Provision No. 6(a), construction operations shall not be performed on any Sunday without the authorization of the Engineer.

The Engineer may require the Contractor to cease some or all operations for a holiday or holiday weekend and the Engineer may increase, but in no case may decrease, the time period to be observed both before and after a holiday or holiday weekend as necessary to ensure the safe, free movement of holiday traffic within and near the project.

If, during a holiday period, the Engineer determines that a portion or all of a particular operation is interfering with the safe, free movement of the traveling public within or near the project limits, the Engineer shall order the operation or portion thereof halted. The Contractor shall immediately comply with the order to cease and shall not resume the operation or portion thereof during the remainder of the holiday period.

- B. The Contractor shall maintain a safe access to all drives and intersecting side roads at all times during the construction of this project.
- C. Two-way radios shall be provided by the Contractor when requested by the Engineer for use by traffic control personnel. All costs for furnishing and using two-way radios will not be paid for directly, but will be considered incidental to Contract item 900.645 Special Provision (Traffic Control, All-Inclusive).
- D. The Contractor shall have available on the project the current editions of the Manual on Uniform Traffic Control Devices (MUTCD) and the Standard Highway Signs and Markings (SHSM) Book. Information for obtaining these publications may be found at: <http://mutcd.fhwa.dot.gov/index.htm>.

#### ASPHALT PRICE ADJUSTMENT

- 17. SUPPLEMENTAL SPECIFICATION - ASPHALT PRICE ADJUSTMENT, dated April 6, 2010, is hereby made a new Subsection of the Specifications, superseding all previous editions and their modifications.
- 18. SUPPLEMENTAL SPECIFICATION - ASPHALT PRICE ADJUSTMENT, dated April 6, 2010, GENERAL REQUIREMENTS AND CONDITIONS, part (b) text, is hereby modified by being deleted in its entirety and replaced with text "NOT USED".

The index price for asphalt cement is \$559.00 per ton.

In addition to materials produced under Contract pay item(s) as allowed in GENERAL REQUIREMENTS AND CONDITIONS, part (a) of the Supplemental Specification, asphalt cement produced under Contract item 900.680 Special Provision (Bituminous Concrete Pavement, Small Quantity) will be included for adjustment.

If an emulsified asphaltic liquid is used in the Contract work under any Contract item subject to the Asphalt Price Adjustment provisions and that liquid is not included in the table under subpart (5) of PRICE ADJUSTMENT PROCEDURES of the Supplemental Specification, the ACEA as defined in subpart (5) for that liquid will be that as determined by averaging Contractor certified test results for the project.

SECTION 108 - PROSECUTION AND PROGRESS

19. 108.11 DETERMINATION OF EXTENSION OF CONTRACT TIME FOR COMPLETION, part (b) Determination of Contract Completion Date Extension, is hereby modified by adding new subpart (11) as follows:

(11) The days from April 15th to December 1st, inclusive, on which the weather or condition of the ground caused suspension of the work.

SECTION 900 - SPECIAL PROVISION ITEMS

COARSE AGGREGATE BACKFILL

20. DESCRIPTION. This work shall consist of furnishing and placing coarse aggregate backfill as shown in the Plans and as directed by the Engineer.
21. MATERIALS. Gradation shall meet the requirements of Table 704.02B.
22. CONSTRUCTION REQUIREMENTS. The surface where backfill is to be placed shall be prepared to a smooth condition free of debris, depressions, or obstructions which may damage the geotextile.

Geotextile fabric shall be placed in accordance with Section 649.

Coarse aggregate backfill shall be placed in uniform layers of not more than 150 mm (6 inches) in thickness and thoroughly compacted by use of air or mechanical tampers. The coarse aggregate backfill shall not be placed directly by dumping from haul vehicles or by pushing material by bulldozers, graders, or other equipment. Placing shall be limited to the use of hand shovels, backhoes, front end loaders, or other similar types of equipment as approved by the Engineer.

23. METHOD OF MEASUREMENT. The quantity of Special Provision (Coarse Aggregate Backfill) to be measured for payment will be the number of cubic meters (cubic yards) installed in the complete and accepted work, measured within the limits shown on the Plans or as directed by the Engineer.
24. BASIS OF PAYMENT. The accepted quantity of Special Provision (Coarse Aggregate Backfill) will be paid for at the Contract unit price per cubic meter (cubic yard). Payment will be full compensation for furnishing, transporting, handling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Excavation and geotextile fabric will be paid for separately under the appropriate Contract items.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.608 Special Provision (Coarse Aggregate Backfill)	Cubic Yard

ROCK ANCHORS

25. DESCRIPTION. This work shall consist of furnishing, installing, and testing rock anchors at the locations indicated in the Plans.
26. GENERAL. Rock anchors consist of steel bars inserted in boreholes drilled into the rock. Rock anchors shall be post tensioned, have an anchorage or bonded anchor length, and may require two-stage grouting. The borehole annulus is to be filled with cement grout in order to provide encapsulation and corrosion protection for the steel bar. The rock anchors will be finished as detailed in the Plans and specified herein.
27. APPLICABLE STANDARDS AND SPECIFICATIONS. The most recent versions of the cited standards and specifications shall be used to govern the quality of work and materials.

ASTM A 36	Standard Specification for Structural Steel
ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings for Iron and Steel Products
ASTM A 153	Zinc Coating (Hot-Dip Galvanized) on Iron and Steel Hardware
ASTM A 563	Standard Specification for Carbon and Alloy Steel Nuts
ASTM A 722	Uncoated High Strength Steel Bar for Prestressing Concrete
ASTM A 789	Standard Practice for Repair of Damaged Hot Dip Galvanized Coatings
ASTM C 109	Compressive Strength of Hydraulic Cement Mortars
ASTM F 436	Standard Specification for Hardened Steel Washers
Post Tensioning Institute Recommendations for Prestressed Rock and Soil Anchors, 2006.	

28. MATERIALS.

- (a) Rock Anchors and Accessories. All rock anchors shall consist, at a minimum, of Grade 150, galvanized, continuous thread bar with a nominal diameter of 1 inch. The bars shall consist of prestressing steel conforming to ASTM A 722.

Rock anchor steel shall be handled and stored in such a manner as to avoid damage or corrosion. Damage to the rock anchor steel as a result of abrasion, cuts, nicks, welds, and weld splatter will be cause for rejection by the Engineer.

Rock anchor steel shall be protected from dirt, rust and deleterious substances. All exposed parts of the rock anchor, bearing plate, and spherical nuts shall be galvanized in accordance with ASTM A 123/ASTM A 153. Bar ends, where cut, shall be painted with a cold galvanizing compound following installation.

Bearing plates shall be of steel conforming to the requirements of ASTM A 36 and be as detailed in the Plans.

Beveled or spherical washers shall be steel or malleable iron. Flat washers shall be quenched and tempered steel and shall conform to the requirements of ASTM F 436.

Anchor nuts shall be the manufacturer's standard heavy-duty hexagon head type designed for use with the rock anchors and shall be galvanized in accordance with ASTM A 153. Anchor nuts shall develop an ultimate strength not less than 100 percent of the guaranteed ultimate strength (GUTS) of the bar and conform to ASTM A 436.

Centralizers shall be made from plastic such as Schedule 40 PVC or class 200 PVC pipe, and shall support the bar so a ½ inch thick minimum cover of grout is maintained over the bar. Centralizers shall allow grout to flow freely around the bar. Centralizers shall be installed 3 feet from each end and at maximum 7 foot intervals between ends.

Couplings shall be Grade 150 steel, galvanized, and designed to equal the guaranteed ultimate strength of the bars.

- (b) Cement. All Portland cement used to make grout shall, at a minimum, comply with the requirements of ASTM C 150, Type II or III. Chemical additives shall not be used without prior approval of the Engineer.
- (c) Mixing Water. The water used for mixing shall be potable and free from substances which might be deleterious or corrosive to concrete or steel, and shall be furnished by the Contractor. The Contractor, if requested by the Engineer, shall submit reports of tests made by a competent laboratory on samples of the water which the Contractor proposes to use or is using.

29. SUBMITTALS.

- (a) Qualifications. Not less than two weeks prior to beginning any rock anchoring, the Contractor shall provide qualifications of Contractor's personnel in writing to the Engineer. The supervisors and drill operators shall have a minimum of two years of demonstrated experience in the installation of rock anchors.
- (b) Work Plan. Not less than two weeks prior to beginning rock anchoring, the Contractor shall submit a detailed work plan for the rock anchors. The plan shall include:
  - (1) The proposed rope access methods and safety plan.
  - (2) Details of rock anchor type, couplings, face plate and nut, and method of installation for grout tubes and centralizers.
  - (3) Calibration certificates for equipment to be used for rock anchor installation and testing.

- (4) Manufacturer's certificates/mill sheets for rock anchors and associated hardware.
- (5) Proposed method of installation for rock anchors, including grout mixes, and drilling method.

Work shall not begin until the submittals have been approved in writing by the Engineer.

- (c) Field Reports. The Contractor shall submit a field report on a daily basis to the Engineer. The field report shall include records of the location, length, and number of rock anchors installed, performance tests completed, and any difficulties encountered while drilling or installing the rock anchors.

30. CONSTRUCTION REQUIREMENTS.

- (a) General. Work shall proceed according to the approved Work Plan and schedule submitted by the Contractor prior to the beginning of work.
- (b) Drilling. The orientation of the drill hole shall be as shown on the Plans. The anchors shall be installed within 5 degrees of the specified angle.

The Contractor shall flush the drill hole of all drill cuttings and debris with compressed air prior to the installation of the rock anchor.

Holes drilled for rock anchoring in which anchor installation is considered by the Engineer to be unacceptable or impractical shall be re-drilled at the Contractor's expense.

The Contractor's drillers shall keep and provide a borehole log for each borehole drilled for rock anchors. The log shall include, but not be limited to, the following:

- (1) Hole location, diameter, length, and angle from horizontal.
- (2) Date/time of drilling, drilling equipment used, encountered subsurface conditions (groundwater, joints, voids, soil/weak rock, etc.), and name of driller.

The Contractor shall submit the logs to the Engineer on a daily basis.

- (c) Grout Mixing. Cement grout shall consist of a maximum of five gallons of clean potable water per sack consisting of 94 pounds of Type II or III Portland cement. The grout shall be mixed for a minimum of five minutes in a paddle-type grout mixer and passed through a #4 size sieve before being used. Grout may be pumped or fed by gravity into the tremmie pipe or grout tube. Grout containing lumps or that has been in the grout mixer for more than 30 minutes shall not be used. No chemical additives shall be used unless approved in writing by the Engineer. The use of epoxy grout will not be permitted.

The Contractor shall flush the drill hole of all drill cuttings and debris with compressed air prior to grout installation.

- (d) Anchor Installation. Anchor installation shall be completed in three stages consisting of establishing an anchorage for the bar, tensioning, and grout encapsulation of the tensioned anchor. Depending on the type of anchorage, two-stage grouting may be required. Design Load (DL) for the anchor shall be as specified on the Plans.

Following acceptable testing of the bond zone and locking-off the anchor at the design load (DL), the second stage encapsulation grouting shall be completed. The quantity of grout required to fill each hole will vary and is highly dependent upon geologic conditions.

Grouting of holes shall be performed by placing grout through a tremmie tube installed at the bottom of the open hole. The tremmie tube may be withdrawn as grouting proceeds, however grout shall be maintained over the end of the tremmie tube at all times.

First stage grouting, if used to establish the anchorage, will be completed to establish a bond length sufficient to resist the DL or as directed by the Engineer. For the first stage grouting, the anchor bar should be inserted in the hole and the grout placed through a tremmie tube to the level desired. Observe the grout level for five minutes. If grout level drops more than one inch, re-fill the hole to the level desired. The use of a grout sock will be permitted to limit grout loss.

Second stage grouting will be completed when the first stage anchor grout has attained at least 50 percent of its specified 28-day compressive strength and can resist the DL or the anchorage has been tested. The Contractor shall re-flush the hole of all debris with compressed air prior to second stage grouting. Following the placement of the grout through a tremmie tube and filling the "birds beak" annulus between the anchor and the hole with hand-packed grout, the bearing plate, washer, and nut will be installed and the anchor loaded to 1.10 times the DL. The nut shall be tightened with a wrench to lock off the anchor at the DL and the jack shall be removed.

After acceptance of the anchor by the Engineer, the end of the bar shall be cut to its final length as directed by the Engineer. Cutting of the bars with torches will not be permitted. Anchor ends, where cut, shall be painted with a cold galvanizing compound following installation.

- (e) Anchor Grout Testing. The strength of the grout for the anchors shall be tested at least every 10 anchors. The testing shall be performed by VTrans. Acceptable grout shall have a minimum compressive strength of 4500 psi at 28 days.

(f) Rock Anchor Testing.

- (1) For each different method of anchor installation, two successful performance tests shall be performed to verify the Contractor's installation methods, anchor pullout capacity, and design assumptions. The tests shall be performed prior to installation of production anchors at locations within the limits of work specified by the Engineer. Anchor testing shall not be performed until the anchor grout has attained at least 50 percent of its specified 28-day compressive strength. All test data shall be recorded and submitted to the Engineer in writing.
- (2) Fifteen percent of production soil anchors will be proof tested. Anchor testing shall not be performed until the anchor grout has attained at least 50 percent of its specified 28-day compressive strength. All test data shall be recorded and submitted to the Engineer in writing.
- (3) Testing equipment shall include two dial gauges, a dial gauge support, jack and pressure gauge, a load cell, and a reaction frame. A minimum of two dial gauges capable of measuring to 0.001 inch shall be available at the site to measure the anchor movement. The dial gauges shall have a minimum travel sufficient to allow the test to be performed without re-setting the dial gauge. The dial gauges shall be aligned within 5 degrees of the axis of the dowel and shall be supported independent of the jacking set-up and the soil. A hydraulic jack, pressure gauge, and pump shall be used to apply and measure the test load. Test set-up shall be as approved by the Engineer.
- (4) The jack and pressure gauge shall be calibrated by an independent test laboratory as a unit. The pressure gauge shall be graduated in 100 psi increments or less. The jack shall be capable of tensioning anchor bars to 80 percent of the guaranteed ultimate tensile strength of the bars within the rated pressure capacity of the pumping units, unless approved otherwise by the Engineer.
- (5) The jack shall be independently supported and centered over the anchor so that the anchor does not carry the weight of the jack. The stressing equipment shall be placed over the anchor in such a manner that the jack, bearing plates, and stressing anchorage are in alignment. The jack shall be positioned at the beginning of the test such that unloading and repositioning of the jack will not be required during the test. The Contractor will be required to provide a bearing pad for each test. The bearing pad shall be constructed to a size and thickness that will prevent failure of the pad or movement of the test jack or bearing plate.

- (6) Details of the testing arrangement, including the method of distributing test load pressures to the excavation surface or reaction frame, test anchor bar size, grouted hole diameter, and reaction plate dimensioning shall be developed by the Contractor and submitted to the Engineer for approval. The test anchors shall be constructed using the same equipment, methods, and hole diameter as planned for the production anchors. Changes in the drilling or installation method may require additional performance testing as determined by the Engineer; such testing shall be provided at no additional cost to VTrans.
  
- (7) Performance test anchors shall have both bonded and unbonded lengths. Prior to testing, only the bonded length of the test anchor shall be grouted. The unbonded length of the test anchor shall be at least 2 feet unless approved otherwise by the Engineer. The bond length shall be determined by the Engineer based on the design pullout load for the anchors and the design bond stress indicated in the WMSS design documents. The test load (TL) shall not exceed 1.33 times the design load (DL) and shall not exceed 80 percent of the guaranteed ultimate tensile strength for the bar. The DL for the anchors shall be taken as the pre-tensioning load as specified on the Plans.
  
- (8) Performance test anchors shall be cyclically and incrementally loaded and unloaded in accordance with the schedule shown below. The load shall be decreased to the alignment load (AL) after each cycle maximum, and the movement of each successive alignment load step shall be recorded. At each load increment, the total movement of the pulling head shall be recorded to the nearest .0001 inch with respect to an independent fixed reference point. The load shall be held at each increment just long enough to obtain the movement reading but no longer than 1 minute. Movement readings at the maximum test load (1.33 DL) shall be taken at 1, 2, 3, 4, 5, 6 and 10 minutes to measure creep rate. If the total creep movement between 1 and 10 minutes exceeds 0.040 inch, the test load shall be maintained for an additional 50 minutes. Total movements shall then be recorded at 20, 30, 40, 50 and 60 minutes from the start of the test load hold time.

Cycle	Increment	1	2	3	4	5	6
1	AL	0.25DL					
2	AL	0.25DL	0.5DL				
3	AL	0.25DL	0.5DL	0.75DL			
4	AL	0.25DL	0.5DL	0.75DL	1.0DL		
5	AL	0.25DL	0.5DL	0.75DL	1.0DL	1.25DL	
6	AL	0.25DL	0.5DL	0.75DL	1.0DL	1.25DL	1.33DL

- (9) Proof test anchors shall be incrementally loaded in accordance with the schedule shown below. At each load increment, the total movement of the pulling head shall be recorded to the nearest 0.001 inch with respect to an independent fixed reference point. Movement readings at the maximum test load (1.33 DL) shall be taken at 1, 2, 3, 4, 5, 6 and 10 minutes to measure creep rate. If the total creep movement between 1 and 10 minutes exceeds 0.040 inch, the test load shall be maintained for an additional 50 minutes. Total movements shall then be recorded at 20, 30, 40, 50 and 60 minutes from the start of the test load hold time.

Load	Movement Measurement	
AL		
0.25 DL	X	
0.50 DL	X	
0.75 DL	X	
1.00 DL	X	
1.25 DL	X	
1.33 DL	X	Test Load start
		X Test Load at final
	hold	

- (g) Anchor Test Acceptance. A test dowel shall be considered acceptable when:

- (1) A creep rate is observed to be less than 0.04 inches per log cycle of time between the 1 and 10 minute reading or, if exceeded, less than 0.080 inches per log cycle of time between the 6 and 60 minute readings and the rate is linear or decreasing at the end of the creep test load hold period.
- (2) The total movement at the test load exceeds 80 percent of the theoretical elongation of the unbonded length (plus jack length), and is less than 100 percent of the theoretical elongation of the unbonded length (plus jack length) plus 50 percent of the bonded length.
- (3) A pullout failure does not occur during testing. Pullout failure is defined as the load at which attempts to increase the test load simply result in continued pullout movement of the test anchor.

- (h) The Contractor shall evaluate the results of each performance test and submit a test results summary to the Engineer. Anchor installation methods that do not satisfy the anchor testing requirements shall be considered inadequate. The Contractor shall propose alternative methods and install replacement performance test anchors at no additional cost to VTrans.

31. METHOD OF MEASUREMENT. The quantity of Special Provision (Rock Anchor Testing) to be measured for payment will be the number of each rock anchor test performed in the complete and accepted work.

The quantity of Special Provision (Rock Anchor) to be measured for payment will be the number of meters (linear feet) of anchors installed in the complete and accepted work, as obtained from the Contractor's daily field reports approved by the Engineer.

32. BASIS FOR PAYMENT. The accepted quantity of Special Provision (Rock Anchor Testing) will be paid for at the Contract unit price per each. Payment will be full compensation for performance testing the rock anchors, proof testing production anchors, obtaining acceptable results for all tests, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

The accepted quantity of Special Provision (Rock Anchor) will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for furnishing, drilling, installing, and grouting the rock anchor and for furnishing all labor, tools, equipment, and incidentals to complete the work.

Payment for preparing and making required submittals will not be made separately, but will be considered incidental to the work under this Section.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Rock Anchor Testing)	Each
900.640 Special Provision (Rock Anchor)	Linear Foot

ROCK DOWELING

33. DESCRIPTION. This work shall consist of furnishing, installing, and testing rock dowels at the locations indicated in the Plans and as directed by the Engineer.

The work includes high-angle installation of rock dowels to be completed using industrial rope access methods.

34. GENERAL. Rock doweling shall consist of galvanized continuous thread steel bars (Grade 75 (minimum) continuous thread bar) inserted in boreholes drilled into rock. For installed bar lengths of 7 feet or less, the boreholes shall be filled with cement grout using a tremie pipe prior to insertion of the bars. For installed bar lengths of greater than 7 feet, a grout tube attached to the bar or removable tremie pipe shall be used to install the grout after the bar is installed. When installed as rock dowels, the bars are not post tensioned. Installation of rock dowels shall be performed in accordance with the Plans and as directed by the Engineer.

35. APPLICABLE STANDARDS AND SPECIFICATIONS. The most recent versions of the cited standards and specifications shall be used to govern the quality of work and materials.

ASTM A 36	Standard Specification for Structural Steel
ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings for Iron and Steel Products
ASTM A 153	Zinc Coating (Hot-Dip Galvanized) on Iron and Steel Hardware
ASTM C 109	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars
ASTM C 150	Standard Specification for Portland Cement
ASTM C 452	Standard Test Method for Potential Expansion of Portland Cement Mortars Exposed to Sulfate
ASTM E 329	Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction

36. MATERIALS.

(a) Rock Dowels. Rock dowels shall, at a minimum, consist of Grade 75 steel manufactured for use as rock dowels and be in the form of continuous thread bar, as manufactured by Dwyidag, SAS, Williams, or an approved equal, with a minimum diameter specified on the Plans. Appurtenant bearing plates with spherical seats and spherical nuts shall be manufactured by the thread bar manufacturer for rock doweling applications.

Rock dowel steel shall be handled and stored in such a manner as to avoid damage or corrosion. Damage to the rock dowel steel as a result of abrasion, cuts, nicks, welds, or weld splatter will be cause for rejection by the Engineer.

Rock dowel steel shall be protected from dirt, rust, and deleterious substances. All exposed parts of the rock dowel, bearing plate, and spherical nuts on the surface shall be galvanized. Dowel ends, where cut, shall be painted with a cold galvanizing compound following installation.

(b) Cement. Portland cement for grout shall, at a minimum, comply with the requirements of ASTM C 150, Type II or III.

(c) Mixing Water. The water used for mixing shall be potable and free from substances which might be deleterious or corrosive to concrete or steel, and shall be furnished by the Contractor. The Contractor, if requested by the Engineer, shall submit reports of tests made by a competent laboratory on samples of the water which the Contractor proposes to use or is using.

37. SUBMITTALS.

- (a) Qualifications. Not less than two weeks prior to beginning any rock doweling, the Contractor shall provide qualifications of Contractor's personnel in writing to the Engineer. The supervisors and drill operators shall have a minimum of two years of demonstrated experience in the installation of rock dowels.
- (b) Work Plan. Not less than two weeks prior to beginning rock doweling, the Contractor shall submit a detailed work plan for the rock doweling. The plan shall include:
  - (1) The proposed construction sequence and schedule.
  - (2) The proposed rope access methods and safety plan.
  - (3) The proposed drilling method and equipment.
  - (4) The proposed drill hole diameter.
  - (5) The proposed steel for the rock dowel, bearing plates, and nuts, including manufacturer's certificates/mill sheets.
  - (6) The proposed corrosion protection for the rock dowel system.
  - (7) Contractor's proposed mix design for grout.

Work shall not begin until the appropriate submittals have been approved in writing by the Engineer.

- (c) Field Reports. The Contractor shall submit a field report on a daily basis to the Engineer for approval. The field report shall include the location and description of dowels installed, and for each dowel, the length of dowel, installation angle and direction, number of cement bags used, and water cement ratio of grout.

38. CONSTRUCTION REQUIREMENTS.

- (a) General. Work shall proceed according to the approved Work Plan and schedule submitted by the Contractor prior to the beginning of work.
- (b) Drilling. The orientation of the drill hole shall be as shown on the Plans. The dowels shall be installed within 5 degrees of the specified angle.

The Contractor shall flush the drill hole of all drill cuttings and debris with compressed air prior to the installation of the rock dowel.

Holes drilled for rock doweling in which dowel installation is considered by the Engineer to be unacceptable or impractical shall be re-drilled at the Contractor's expense.

The Contractor's drillers shall keep and provide a borehole log for each borehole drilled for rock dowels. The log shall include, but not be limited to, the following:

- (1) Hole location, diameter, length, and angle from horizontal.
- (2) Date/time of drilling, drilling equipment used, encountered subsurface conditions (groundwater, joints, voids, soil/weak rock, etc.), and name of driller.

The Contractor shall submit the logs to the Engineer on a daily basis.

- (c) Grout Mixing. Cement grout shall consist of a maximum of five gallons of clean potable water per sack consisting of 94 pounds of Type II or III Portland cement. The grout shall be mixed for a minimum of five minutes in a paddle-type grout mixer and passed through a #4 size sieve before being used. Grout may be pumped or fed by gravity into the tremmie pipe or grout tube. Grout containing lumps or that has been in the grout mixer for more than 30 minutes shall not be used. No chemical additives shall be used unless approved in writing by the Engineer. The use of epoxy grout will not be permitted.

The Contractor shall flush the drill hole of all drill cuttings and debris with compressed air prior to grout installation.

- (d) Dowel Installation. For installed bar lengths of 7 feet or less, tremmie neat cement grout into hole with tremmie pipe at the toe of the hole. Fill hole with grout while withdrawing tremmie pipe at a rate such that the bottom of the tremmie pipe remains at or below the rising grout surface.

For installed bar lengths of greater than 7 feet, leave hole full of fluid grout for five minutes. If grout level drops by less than 1 inch, insert bar with centralizers into hole. If grout level drops by more than 1 inch in five minutes, re-fill hole with grout. If grout level continues to drop for more than 15 minutes, thicken grout mix as directed by the Engineer. Insert bar with centralizers once the level stabilizes.

For all dowel bar installations, the annular space between the dowel and the drill hole perimeter in the completed installation shall be completely filled with cement grout over the full depth of the hole. Sufficient grout shall be used such that, at a minimum, a small amount of grout extrudes from the collar of the hole when the dowel is inserted to ensure that no voids are left around the bar. The quantity of grout that is required to fill each dowel hole will vary, and is highly dependent on geological conditions.

- (e) Dowel Grout Testing. The strength of the grout for the dowels shall be tested at least every 10 dowels. The testing shall be performed by the Contractor in accordance with ASTM C 109. Acceptable grout shall have a minimum compressive strength of 4500 psi at 28 days.

39. METHOD OF MEASUREMENT. The quantity of Special Provision (Rock Doweling) to be measured for payment will be the number of meters (linear feet) of dowels installed in the complete and accepted work, as obtained from the Contractor's daily field reports approved by the Engineer.
40. BASIS FOR PAYMENT. The accepted quantity of Special Provision (Rock Doweling) will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for furnishing, drilling, installing, and grouting the rock dowels, for performing any testing required, and for furnishing all labor, tools, equipment, and incidentals to complete the work.

Payment for preparing and making required submittals will not be made separately, but will be considered incidental to the work under this Section.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Rock Doweling)	Linear Foot

WIRE MESH SLOPE STABILIZATION SYSTEM

41. DESCRIPTION. This work shall consist of furnishing, installing, and testing a mesh-faced slope stabilization system, referred to in these specifications as "Wire Mesh for Slope Stabilization" (WMSS), and soil anchors at the location indicated in the Plans and as directed by the Engineer.
42. GENERAL WORK REQUIREMENTS. Work required for the WMSS includes but is not limited to the following: slope clearing and scaling as needed; installation and testing of soil anchors of length and orientation as indicated in the Contract Documents; placement of stone facing; installation of steel wire mesh and related materials, and attachment to soil anchors at specified pre-tensioned levels.
- It is prescribed that a system commonly used for such applications such as TECCO wire mesh and related materials available from GeoBrugg North America, LLC, New London CT, (860) 442-9945, or an equivalent system approved by the Engineer will be installed.
43. DESIGN REQUIREMENTS. The installation of the WMSS shall follow the manufacturer's standards and requirements. Soil anchor design and testing shall follow guidelines presented in "Recommendations for Prestressed Rock and Soil Anchors" prepared by the Post Tensioning Institute, Third Edition, 1996.
44. SUBSURFACE INFORMATION. Available information concerning subsurface soil, rock, and groundwater conditions at WMSS designated areas is presented in the "Geotechnical Evaluation of Embankment Erosion, Bridge 6, VT 207, Highgate, Vermont" report dated November 5, 2008 and included in the Contract Documents. If the Contractor requires additional subsurface information, the Contractor may obtain such information at no additional cost to VTrans.

45. EXISTING SITE CONDITIONS. The Contractor shall verify all existing dimensions and site slope conditions where WMSS and soil anchors are required, and shall be responsible for determining actual locations of all existing utilities shown on the Plans, and those utilities or underground obstructions not shown on the Plans that may impact or conflict with the WMSS and soil anchors installation.
46. PRE-INSTALLATION MEETING. A pre-installation meeting shall be held prior to the start of work on the WMSS and shall be attended by the Engineer, subcontractor(s), and the Contractor. The pre-installation meeting shall be conducted to clarify the construction requirements for the work, to coordinate construction activities, and to identify contractual relationships and responsibilities.
47. CONSTRUCTION METHODS AND SEQUENCE.
- (a) The Contractor is responsible for construction means and methods and control of the work associated with WMSS construction, including soil anchor and wire mesh installation. This includes, but is not limited to, the construction sequence, the safety of the workers, temporary handrails, work area access, barriers, and lifting of materials and construction equipment into and out of the work area.
  - (b) The construction sequence shall be in accordance with the approved WMSS manufacturer's instructions, unless approved otherwise by the Engineer.
48. SUBMITTALS.
- (a) Qualifications. Not less than two weeks prior to beginning the work, qualifications shall be submitted to the Engineer for approval. Qualifications shall be provided for the WMSS and soil anchors subcontractors and on-site superintendent responsible for slope clearing and scaling, anchor installation and testing, and wire mesh installation. A reference list shall be provided for the company and the on-site superintendent listing at least three projects completed within the last three years requiring the installation of anchors and tensioned wire mesh facing on soil slopes of similar or greater height and similar or greater steepness as the WMSS system required for this project. A brief description of each project with the owner's name and current phone number shall be included.
  - (b) Work Plan. Not less than two weeks prior to beginning construction of the WMSS, the Contractor shall submit a detailed Work Plan for the WMSS and soil anchors. The Work Plan shall include but not be limited to:
    - (1) The proposed construction sequence and schedule.
    - (2) The proposed rope access methods and safety plan.
    - (3) The proposed drilling method and equipment, including drill rig type and drillhole diameter; and the method of cuttings removal.

- (4) Grout mix design, including brand and type of Portland cement; source, gradation, and quality of all aggregates; proportions of mix by weight and water-cement ratio; and manufacturer and brand name of all admixtures.
  - (5) Anchor grout placement procedures and equipment.
  - (c) Testing. The following information concerning testing of permanent soil anchors shall be submitted to the Engineer:
    - (1) The number and locations of anchors to be subjected to performance testing, and the Test Load to be used in testing.
    - (2) Anchor performance testing equipment, including details of the jacking frame and appurtenant bracing, and methods of installing test anchors. Identification numbers and certified calibration records for each test jack and pressure gauge pair to be used. Calibration records shall include the date tested, device identification number, and the calibration test results and shall be certified for an accuracy of at least 2% of the applied certification loads by a qualified independent testing laboratory within 90 days prior to submittal.
  - (d) Mill Tests. Certified mill test results for anchors from each heat specifying the ultimate strength, elongation, and composition prior to delivery.
  - (e) Certifications. Manufacturer certifications for the anchor centralizers, couplers, and galvanizing.
  - (f) Wire Mesh System Materials. Prior to installation, the Contractor shall submit to the Engineer certifications stating the technical data of the wire mesh, compression claws, spike plates, and boundary ropes. As applicable, the certifications from the manufacturer shall include tensile strength, wire quality, mesh shape, corrosion protection, spike plate dimensions, and boundary rope breaking force.
  - (g) Record Drawings. Accurate records documenting the WMSS as-built construction shall be maintained by the Contractor and submitted to the Engineer. The Contractor shall obtain as-built anchor locations and all other information as required by VTrans.
49. CLEARING AND CLEANING OF SLOPE. The limits of clearing shall extend ten feet outside the limits of the slope protection system or as approved by the Engineer.

Vegetation shall be cut flush with ground surface so that the stone course can be placed in a manner that promotes complete contact of the wire mesh with the protected surface. Should removal of face protrusions result in voids beneath the mesh, contractor shall determine the appropriate method of backfilling based on field conditions. The proposed method shall be approved by the Engineer.

50. SOIL ANCHORS.

(a) Materials. Materials for construction shall be furnished new and without defects. Defective materials rejected by the Engineer shall be removed by the Contractor. The materials for soil anchors shall consist of the following:

- (1) Anchor bars, nuts, and plates shall conform to AASHTO M 31, grade 75 or higher. All anchor bars and end hardware shall be hot-dipped galvanized conforming to ASTM A 767. Bar couplers shall be hot-dipped galvanized conforming to ASTM A 767 and shall develop the ultimate tensile strength of the bars, as certified by the manufacturer.
- (2) Centralizers shall be constructed of Schedule 40 PVC, shall be securely attached to the anchor bar, sized to position the anchor bar within 1 inch of the center of the drillhole, sized to allow tremie pipe insertion to the bottom of the drillhole, and sized to allow grout to flow freely up the drillhole.
- (3) Anchor grout shall be a neat cement, with a minimum 3-day compressive strength of 1500 psi and a minimum 28-day compressive strength of 4000 psi per AASHTO T 106. Cement shall conform to AASHTO M 85, Type 1.

(b) Material Handling and Storage.

- (1) Cement shall be adequately stored to prevent moisture degradation and partial hydration. Cement that has become caked or lumpy shall not be used. Aggregates shall be stored so that segregation and the inclusion of foreign materials are prevented. The bottom 6 inches of aggregate piles in contact with the ground shall not be used.
- (2) All anchor bars shall be carefully handled and shall be stored on supports to keep the steel from contact with the ground. Steel bars shall be picked up in such a way as to prevent overstressing. Damage to the steel or galvanized coating as a result of overstressing, abrasion, cuts, nicks, welds, and weld spatter shall be cause for rejection by the Engineer. Grounding of welding leads to the dowel steel will not be allowed. Anchor steel shall be protected from and sufficiently free of dirt, rust, and other deleterious substances prior to installation. Heavy corrosion or pitting of anchors shall be cause for rejection by the Engineer. For damaged galvanized anchors, the coating shall be repaired in accordance with the manufacturer's recommendations.

(c) Anchor Installation.

- (1) Successful anchor performance tests shall be performed as described in part (f) of this Subsection prior to starting installation of production anchors.
- (2) Anchors shall be installed at the locations and to the lengths indicated on the Plans and/or as directed by the Engineer during construction. The Engineer may add, eliminate, or relocate anchors to accommodate actual field conditions.
- (3) The Contractor shall select the drilling equipment and methods suitable for the ground conditions. The drillhole diameter shall be selected to provide the minimum specified grout cover over the anchor bar and to develop the specified pullout resistance. If caving conditions are encountered in the drillhole, the Contractor shall use cased or augercast drilling methods to support the sides of the drillhole. Water, drilling mud, or other fluids used to assist in cuttings removal shall not be allowed. Uncased drillholes shall be observed for cleanliness prior to insertion of the anchor.
- (4) Anchor bars shall be inserted into the drillhole to the required length without difficulty and in such a manner as to prevent damage to the drillhole. Anchor bars that cannot be fully inserted to the design depth shall be removed from the drillhole and the drillhole shall be cleaned sufficiently to allow unobstructed installation of the bar.
- (5) The anchor shall be installed in a local depression with an approximate relative depth shown on the Plans.
- (6) Anchor bar couplers may be used in accordance with the manufacturer's recommendation as required.

(d) Grouting.

- (1) Grout equipment shall produce a uniformly mixed grout free of lumpy and undispersed cement. A positive displacement grout pump shall be used. The pump shall be equipped with a pressure gauge that can measure at least twice but no more than three times the intended grout pressure. The grouting equipment shall be sized to enable the entire anchor bar to be grouted in one continuous operation. The mixer shall be capable of continuously agitating the grout during usage.

- (2) Grouting prior to insertion of the anchor bar may be allowed by the Engineer provided the anchor bar is less than 7.5 feet long, neat cement grout is used, a stabilized grout level is achieved (as described below), and the anchor bar is immediately inserted through the grout to the specified length without difficulty. No portion of the anchor hole shall be left open for more than 1 hour prior to grouting unless approved otherwise by the Engineer. The grout shall be injected at the lowest point of each drillhole through a tremie pipe with the drillhole filled in one continuous operation. Grout pressures shall be controlled to prevent excessive ground heave or fracturing. Once the hole is full, the grout level shall be observed for five minutes. If the grout level does not drop by more than one inch in five minutes, insert the anchor. If the grout drops more than one inch, re-fill the hole to the level desired. If grout continues to drop for more than fifteen minutes, thicken grout mix as directed by the Engineer. The anchor should only be inserted once the grout level has stabilized. If the grout has reached first set before the grout level has stabilized, the grout should be allowed to set and then the hole should be re-drilled at the direction of the Engineer. The quantity of grout and grouting pressures shall be recorded for each anchor.
- (3) Anchors more than than 7.5 feet long shall be inserted prior to grouting and cement grout shall be placed using a 0.75 inch diameter polyethylene (or similar) permanent grout tube attached to the anchor. The grout tube shall have three openings cut into the lower 4.0 foot bond zone to allow free flow of grout. If the grout tube bottom opening becomes clogged, grout shall be placed by pumping grout into the grout tube.
- (4) A grout sock may be used to reduce grout loss as determined by the Contractor based on drilling conditions encountered.
- (5) During casing removal for drill holes advanced by either cased or augercast methods, the grout surface within the casing shall be continually monitored for maintenance of "head" sufficient to offset the external groundwater/soil pressure.
- (6) Anchor grout shall be tested in accordance with ASTM C 1107. The work shall be performed by VTrans and at a frequency of no less than one test for every ten anchors and at a minimum frequency of every third grouting day.
- (7) The Engineer shall verify that the Contractor is using the approved grout mix on a daily basis. Any deviations from the approved mix will require additional testing.

- (e) Tolerances. The anchors shall not extend beyond the limits shown of the Plans unless approved otherwise by the Engineer. Anchor bars shall be centered within 1 inch of the center of the drillhole. Individual anchors shall be positioned no more than one foot from the design spacing shown on the Plans. Anchor inclination shall be within plus or minus 3 degrees of that shown on the Plans. Anchors that encounter unanticipated obstructions during drilling shall be relocated by the Contractor with the approval of the Engineer. Anchors that do not satisfy the specified tolerances due to the Contractor's installation methods shall be replaced to the Engineer's satisfaction at no additional cost to VTrans.
- (f) Anchor Testing. Anchor testing shall be performed in accordance with part (f) Rock Anchor Testing of CONSTRUCTION REQUIREMENTS of ROCK ANCHORS of Section 900.

51. WIRE MESH.

(a) Materials.

- (1) Mesh. Diamond pattern high-tensile steel wire mesh made from 3 mm (0.125 inch) (high strength wire with a minimum tensile strength of 1770 N/mm<sup>2</sup> (256,000 psi) or an equivalent system successfully used for similar stabilization projects as approved by the Engineer shall be used. Wire mesh shall be provided with corrosion protection with zinc coating as specified by the manufacturer. Mesh size shall be of a size to retain the stone materials to be placed on the slope as indicated in the Plans.
- (2) Fasteners. Compression claws or other approved fasteners meeting manufacturer's specifications and approval by the Engineer shall be used to fasten the wire mesh panels together. Compression claws and fasteners shall be hot-dipped galvanized for corrosion protection in accordance with the manufacturer's requirements.
- (3) Spike Plates. Diamond-shaped spike plates recommended by the WMSS manufacturer shall be used to hold the mesh firmly against the soil. Spike plates shall be hot-dipped galvanized for corrosion protection in accordance with the manufacturer's requirements.
- (4) Boundary Ropes. Boundary ropes shall be used as called for in the design. Boundary rope shall be galvanized steel wire rope with minimum breaking force and corrosion protection requirements as shown on the Plans.
- (5) Miscellaneous Materials. Miscellaneous materials such as wire rope clips, thimbles, or any other connectors needed for the design.

(b) Installation.

- (1) The WMSS shall be installed after placement of anchors and fill/stone courses following the manufacturer's guidelines. The top and sides of the mesh shall be secured as recommended by the manufacturer. Horizontal and vertical connectors shall be as recommended by the manufacturer.
- (2) Recess ground around the anchor as shown on the Plans.
- (3) Spike plates must fit well between the mesh and be pressed firmly in the ground.
- (4) Following installation of the spike plates, the nuts on the anchors should be tightened to the prestress level or tightening torque levels shown on the Plans using methods recommended by the manufacturer.

52. METHOD OF MEASUREMENT. The quantity of Special Provision (Soil Anchor) to be measured for payment will be the number of meters (linear feet) of anchor installed in the complete and accepted work, as obtained from the Contractor's daily field reports approved by the Engineer.

The quantity of Special Provision (Wire Mesh Slope Stabilization System) to be measured for payment will be the number of square meters (square feet) of wire mesh installed in the complete and accepted work.

53. BASIS OF PAYMENT. The accepted quantity of Special Provision (Soil Anchor) will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for furnishing, drilling, installing, and grouting the soil anchor and for furnishing all labor, tools, equipment, and incidentals to complete the work.

Payment for any soil anchor testing will be paid under Contract item 900.620 Special Provision (Rock Anchor Testing).

The accepted quantity of Special Provision (Wire Mesh Slope Stabilization System) will be paid for at the Contract unit price per square meter (square foot). Payment will be full compensation for furnishing and installing the specified materials for a complete in place wire mesh slope stabilization system in accordance with the Contract Documents, including all required submittals and with the exception of soil anchors and anchor testing, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Soil Anchor)	Linear Foot
900.670 Special Provision (Wire Mesh Slope Stabilization System)	Square Foot

TRAFFIC CONTROL

54. DESCRIPTION. This work shall consist of establishing and maintaining traffic control measures to protect the traveling public and construction operations as indicated in the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 641 of the Standard Specifications.

55. SUBMITTALS. The Contractor shall submit to the Engineer for approval a site-specific traffic control plan in accordance with Subsection 105.03. The traffic control plan shall conform to the requirements of the MUTCD and all applicable Agency Standard Drawings. Where conflicts exist, the MUTCD will govern. Each phase of construction shall be included in the submitted traffic control plan. The Contractor shall allow the Agency 7 calendar days to review and approve the proposed traffic control plan before it is to be implemented.

56. TRAFFIC CONTROL DEVICES. Temporary traffic barrier shall meet the requirements of Section 621. Traffic control devices shall meet the requirements of Section 641. Temporary pavement markings and removal of existing pavement markings shall meet the requirements of Section 646. Temporary traffic signal systems shall meet the requirements of Section 678.

57. METHOD OF MEASUREMENT. The quantity of Special Provision (Traffic Control, All-Inclusive) to be measured for payment will be on a lump sum basis for providing traffic control in the complete and accepted work.

58. BASIS OF PAYMENT. The accepted quantity of Special Provision Traffic Control, All-Inclusive) will be paid for at the Contract lump sum price.

Partial payments will be made as follows:

- (a) The first 15% of the Contract lump sum price will be paid upon approval of the Contractor's traffic control plan.
- (b) The remaining 85% of the Contract lump sum price will be paid on a prorated basis for the estimated duration of the Contract work remaining.

Payment will be full compensation for preparing, implementing, inspecting, maintaining, and removing the applicable traffic control plan and required traffic control devices, including but not limited to temporary traffic barrier, temporary pavement markings, temporary traffic signal systems, and signing; and for furnishing all labor, tools, materials, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Traffic Control, All-Inclusive)	Lump Sum

INCENTIVE/DISINCENTIVE (I/D)

59. INCENTIVE/DISINCENTIVE (I/D), is hereby made a new Section of the Specifications as follows:

The payment of monies for performance under the Incentive/Disincentive (I/D) specifications contained in these Special Provisions shall be as follows:

1. For the incentive payment as described in part (c) of Special Provision No. 6, the Contractor will be paid in the next bi-weekly estimate in which the Contractor has satisfactorily met the requirements of I/D.
2. For the disincentive penalties as described in part (c) of Special Provision No. 6, the Engineer will deduct the amount due the Agency from the monies due the Contractor on the next bi-weekly estimate.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.650 Special Provision (Incentive/Disincentive) (N.A.B.I.)	Lump Unit

BITUMINOUS CONCRETE PAVEMENT, SMALL QUANTITY

60. DESCRIPTION. This work shall consist of constructing one or more courses of bituminous mixture on a prepared foundation in accordance with these specifications and the specific requirements of the type of surface being placed, and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and the appropriate provisions of Section 406 or Section 490 of the Standard Specifications.

61. APPLICABILITY. This specification applies to Contracts where the total quantity of bituminous concrete pavement to be paid for under this item is less than or equal to 2000 metric tons (tons) or the total roadway length, including approaches, is 0.80 kilometers (0.50 miles) or less.

62. MATERIALS. Materials shall meet the requirements of the following Subsections:

Performance-Graded Asphalt Binder.....	702.02
Emulsified Asphalt, RS-1.....	702.04
Aggregate for Marshall Bituminous Concrete Pavement...	704.10(a)
Aggregate for Superpave Bituminous Concrete Pavement..	704.10(b)

Aggregate shall meet requirements relating to Section 490 or 406, where so specified.

The grade of PG asphalt binder used to produce bituminous concrete pavement shall be 58-28. Substitutions will be accepted based on availability where the upper end temperature value is greater than 58°C (136°F) and/or the lower end is less than -28°C (-18°F).

63. DESIGN MIX TYPES. Design mix types may be substituted based on mix availability. Allowable mix type substitutions will be accepted on a one to one thickness relationship, except as listed in Tables A and B below.

TABLE A - ALLOWABLE 40 MM (1½") MIX TYPE IVS SUBSTITUTIONS<sup>(1)</sup>

Design ESALs (millions)	Design	Allowable Substitution	
		490.30 Superpave Bituminous Concrete Pavement	406.25 Bituminous Concrete Pavement*
< 0.3	TYPE IVS	TYPE III	TYPE III
0.3 to < 10	TYPE IVS	TYPE III	-
> 10	TYPE IVS	-	-

<sup>(1)</sup>These table substitutions do not apply to bridge deck paving.  
 \*Per Section 406.

TABLE B - ALLOWABLE 90 MM (3½") MIX TYPE IIS SUBSTITUTIONS

Design ESALs (millions)	Design	Allowable Substitution	
		490.30 Superpave Bituminous Concrete Pavement	406.25 Bituminous Concrete Pavement*
< 0.3	TYPE IIS	TYPE I	TYPE I
0.3 to < 10	TYPE IIS	TYPE I	-
> 10	TYPE IIS	-	-

\*Per Section 406

64. COMPOSITION OF MIXTURE.

- (a) Gradation. Gradation shall meet the requirements of Section 406 or 490, as appropriate.
- (b) Design Criteria. Design Criteria shall meet the requirements of Section 406 or 490, as appropriate.
- (c) Mix Design. Standard mix design will be in accordance with Subsection 490.03 with an n value of 65 gyrations. Allowable substitutions based on pre-existing approved mix designs and/or n values for intended Contract suppliers are listed in Table C below. A request for substitutions must be submitted in writing to the Engineer a minimum of 10 working days prior to production. Any substitutions from the standard mix design or mix types as detailed in the Plans shall not result in any increase in cost to the Agency.

TABLE C - ALLOWABLE SPECIFICATION SUBSTITUTIONS

Design ESALs (millions)	Acceptable Specification Substitution		
	Superpave Bituminous Concrete Pavement (Gyrations)	Bituminous Concrete Pavement* (75 Blow)	Med. Duty Bituminous Concrete Pavement* (50 Blow)
< 0.3	50	✓	✓
0.3 to < 10	65 <sup>(1)</sup>	✓	-
10 to < 30	80	-	-
> 30	125	-	-

<sup>(1)</sup>Standard mix design specification.  
 \*Per Section 406

(d) Control of Mixtures.

The plant shall be operated so that no intentional deviations are made from the job-mix formula. The gradation of the actual mixture shall not vary from the job-mix formula by more than the following tolerances:

TABLE D - PRODUCTION TESTING TOLERANCES AND SPECIFICATION LIMITS

PRODUCTION TESTING TOLERANCES			SPECIFICATION LIMITS
Aggregate larger than 2.36 mm (No. 8) sieve	±	6.0 %	9.0 %
Aggregate passing the 2.36 mm (No. 8) sieve and larger than the 75 µm (No. 200) sieve	±	4.0 %	6.0 %
Aggregate passing 75 µm (No. 200) sieve	±	1.0 %	1.5 %
Temperature of Mixture <sup>(3)</sup>	±	11 °C (20 °F)	15 C (30 F)
Air Voids	=	4.0 ± 1.0%	4.0 ± 1.5%
VMA	=	JMF <sup>(1)</sup> ± 1.0%	JMF <sup>(1)</sup> ± 1.5%
VFA <sup>(4)</sup>	=	JMF <sup>(1)</sup> ± 5.0% <sup>(2)</sup>	JMF <sup>(1)</sup> ± 7.0% <sup>(2)</sup>

<sup>(1)</sup> JMF stands for the most current Job-Mix Formula value as approved by the Engineer or the Engineer's designee.

<sup>(2)</sup> The VFA value shall not be allowed to exceed 80.0% at any time.

<sup>(3)</sup> Mix temperatures shall not exceed 180 °C (355 °F).

<sup>(4)</sup> The VFA requirements only apply to Superpave Bituminous Concrete Pavement.

(e) Quality Acceptance.

- (1) General. Acceptance sampling and testing will be conducted in accordance with the Agency's Quality Assurance Program as approved by FHWA. Bituminous concrete mixtures designated under these specifications will be sampled a minimum of once per day of production or 500 metric tons (tons) and evaluated by the Agency for each mix type (each mix design) in accordance with the following acceptance guidelines.
  - (2) Acceptance Guidelines. Temperature of the bituminous mixture shall be tested using the Verified Thermometer test method and PG Asphalt Binder content determined from the batch slip. Gradation shall be tested in accordance with AASHTO T 30. Mixture volumetric properties (air voids, VMA, and VFA) shall be calculated in accordance with Subsections 406.03(b) or 490.03(b), as appropriate.
  - (3) Non-Compliant Material.
    - a. Rejection by Contractor. The Contractor may, prior to sampling, elect to remove any defective material and replace it with new material at no expense to the Agency. Any such new material will be sampled, tested, and evaluated for acceptance.
    - b. For any non-compliant material outside the production testing tolerances but within the specification limits as identified in Table D, payment shall be assessed a mixture pay factor, PF(mix), of (-0.10).
    - c. For any non-compliant material outside the specification limits as identified in Table D, payment shall be assessed a mixture pay factor, PF(mix), of (-0.50), or can be removed and replaced at no cost to the Agency.
- (f) Boxed Samples. If Agency plant inspectors are not available for daily testing and inspection functions, then box samples will be taken by the Engineer at the project site to afford verification of mixture volumetrics/properties. Boxed samples will be processed and results reported to the Engineer within ten working days of being received at the Agency Central Laboratory in Berlin, Vermont. Gradation shall be tested in accordance with AASHTO T 30. Maximum Specific Gravity shall be tested in accordance with AASHTO T 209.

65. COMPACTION. Special Provision (Bituminous Concrete Pavement, Small Quantity) will be analyzed for density according to the procedure specified below.

The density of the compacted pavement shall be at least 92.0%, but not more than 97.0%, of the corresponding daily average maximum specific gravity for each mix type (each mix design) of bituminous mix placed during each day. For material that falls outside of this range, payment will be made by adjusting the daily production totals in accordance with Table E:

TABLE E - DENSITY PAY FACTORS

AVERAGE DENSITY	DENSITY PAY FACTOR, PF(d)
90.5% - 91.9%	- 0.100
92.0% - 97.0%	0.000
97.1% - 98.5%	- 0.100

When the Contract allows for a pay adjustment for mat density and the Agency elects to not take cores of any pavement course, the Density Pay Factor (PF(d)) will be considered equal to 0.000.

Bridges with a length equal to or greater than 6 meters (20 feet) will be cored for analyzing density of the bridge deck pavement. The minimum number of cores taken shall be 2, or as directed by the Engineer. Bridges with a length less than 6 meters (20 feet) will not be cored.

Bridge deck core areas shall be repaired to the satisfaction of the Engineer at no additional cost to the Agency.

The cores taken for acceptance testing will be the final cores taken for determination of densities.

When the Contract does not allow for a pay adjustment for mat density the Contractor shall, prior to performing any construction operations, submit to the Engineer for approval the proposed rolling pattern and compaction equipment to be used on the project. Random investigative cores will be taken by Agency personnel on the first day's production of any pavement course, with the exception of leveling course, to verify effectiveness of the proposed rolling pattern and equipment.

Pending results of the investigative cores, necessary adjustments to the proposed rolling pattern and/or equipment shall be made by the Contractor to achieve densities as directed by the Engineer.

66. METHOD OF MEASUREMENT. The quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) to be measured for payment will be the number of metric tons (tons) for a lot of mixture (each type) complete in place in the accepted work (Q) as determined from the weigh tickets.

The quantities of all applicable Pay Adjustments calculated for the project will be determined as specified below.

When applicable, and when the mixture pay factor, PF(mix), for a lot of Special Provision (Bituminous Concrete Pavement, Small Quantity) is less than 0.000, the measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) placed will be multiplied by such pay factor to determine a Mixture Pay Adjustment, (PA(mix)), to the accepted tonnage placed (Q) for that lot based on the Contract bid price (B), as follows:

$$PA(mix) = PF(mix) \times Q \times B$$

When boxed samples are taken to determine mix properties, test results will determine PF(mix) as outlined in COMPOSITION OF MIXTURE, Quality Acceptance, Non-Compliant Material of this Section.

When applicable, and when the density pay factor, PF(d), for a lot of Special Provision (Bituminous Concrete Pavement, Small Quantity) is less than 0.000, the measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) placed that day will be multiplied by such pay factor to determine a Mat Density Pay Adjustment, (PA(d)), to the accepted tonnage placed (Q) for that lot based on the Contract bid price (B), as follows:

$$PA(d) = PF(d) \times Q \times B$$

67. BASIS OF PAYMENT. The measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) will be paid for at the Contract unit price per metric ton (ton). Payment shall be full compensation for furnishing, mixing, hauling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment for Pay Adjustments shall be debited against the Contract prices (Lump Units) bid for the Pay Adjustment items.

The cost of repairing bridge deck core areas will not be paid for separately, but will be considered incidental to Special Provision (Bituminous Concrete Pavement, Small Quantity).

The costs of furnishing testing facilities and supplies at the plant will be considered included in the Contract unit price of Special Provision (Bituminous Concrete Pavement, Small Quantity).

The costs of obtaining, furnishing, transporting, and providing the straightedges required by Subsection 406.16 or Subsection 490.16, as appropriate, will be paid for under the appropriate Section 631 pay item included in the Contract.

The costs associated with obtaining samples for acceptance testing will be incidental to the cost of Special Provision (Bituminous Concrete Pavement, Small Quantity).

When not specified as items in the Contract, the costs of cleaning and filling joints and cracks, sweeping and cleaning existing paved surfaces, the emulsified asphalt applied to tack these surfaces, and tacking of manholes, curbing, gutters, and other contact surfaces will not be paid for directly, but will be incidental to Special Provision (Bituminous Concrete Pavement, Small Quantity).

Special Provision (Bituminous Concrete Pavement, Small Quantity) mixture approved by the Engineer for use in correcting deficiencies in the base course constructed as part of the Contract will not be paid for as Special Provision (Bituminous Concrete Pavement, Small Quantity), but will be incidental to the Contract item for the specified type of base course.

Special Provision (Bituminous Concrete Pavement, Small Quantity) mixture used to correct deficiencies in an existing pavement or to adjust the grade of a bituminous concrete surface completed under the Contract will be paid for at the Contract unit price for Special Provision (Bituminous Concrete Pavement, Small Quantity).

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.650 Special Provision (Mat Density Pay Adjustment, Small Quantity)(N.A.B.I.)	Lump Unit
900.650 Special Provision (Mixture Pay Adjustment) (N.A.B.I.)	Lump Unit
900.680 Special Provision (Bituminous Concrete Pavement, Small Quantity)	Ton

GEOMEMBRANE LINER

68. DESCRIPTION. This work shall consist of furnishing and installing a geomembrane liner at the locations indicated in the Plans and as directed by the Engineer.

69. MATERIALS. Geomembrane shall be textured, high-density polyethylene geomembrane.

(a) Resin. Resin shall be new first quality, compounded polyethylene resin that is manufactured specifically for producing geomembrane. At no time shall the manufacturer intermix resin types. The resin shall be virgin material with no more than 10% rework. If rework is used, it must be a similar HDPE as the parent material.

No post consumer resin (PCR) of any type shall be added to the formulation.

(b) Geomembrane.

(1) Geomembrane shall be free of holes, pinholes, bubbles, blisters, excessive contamination by foreign matter, and nicks or cuts on roll edges.

(2) Geomembrane shall meet the requirements of Table 2. Samples shall be taken and tested by the manufacturer at a frequency of 1 sample per 4645 square meters (50,000 square feet), unless otherwise noted, to assure conformance with the requirements.

- (3) The Contractor shall furnish the geomembrane manufacturer's certified test results attesting that the geomembrane and all factory seams meet the requirements stated in these specifications.

A Type D Certification shall be furnished in accordance with Subsection 700.02, including minimum average roll values for each type of geomembrane used.

TABLE 2 - MINIMUM VALUES FOR COEXTRUDED TEXTURED HDPE GEOMEMBRANE

Property	Test Method	Values
Nominal Thickness <sup>1</sup> mm (mil)	ASTM D5994	1.0 (40)
Density, g/cm <sup>3</sup> (lb/in <sup>3</sup> )	ASTM D1505	0.940 (0.034)
Asperity Height, mm (mil)	GRI GM-12	See Note 3
Carbon Black Content, %	ASTM D1603	2.0-3.0
Carbon Black Dispersion	ASTM D5596	See Note 4
Tensile Properties (each direction) <sup>2</sup>		
Strength @ Yield, g/cm (lb/in)	ASTM D6693; 2 ipm	15,002 (84)
Elongation @ Yield, %	33.0 mm (1.3 in) gauge length	2143 (12)
Strength @ Break, g/cm (lb/in)	50.8 mm (2.0 in) gauge length	10,716 (60)
Elongation @ Break, %		100
Tear Resistance, N (lb)	ASTM D1004	124.6 (28)
Puncture Resistance, N (lb)	ASTM D4833	266.9 (60)

- To be measured per roll. Minimum average = 0.97 mm (38 mils), lowest individual for 8 out of 10 values = 0.91 mm (36 mils), lowest individual for any of the values = 0.86 mm (34 mils).
- The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variation of test results. Therefore, these tensile properties are minimum average roll values.

3. 0.25 mm (10 mil) average. 8 of 10 readings > 0.18 mm (7 mils). Lowest individual > 0.13 mm (5 mils).
4. Only near spherical agglomerates are considered. Nine of ten views shall be Category 1 or 2. No more than one view Category 3.

70. SUBMITTALS.

- (a) Prior to Material Delivery. No material shall be delivered to the site until the material and performance documentation and certifications have been received and reviewed by the Engineer. Documentation shall include quality control test results on the manufactured materials.

71. MATERIAL LABELING, DELIVERY, STORAGE, AND HANDLING.

- (a) Labeling. Each roll of geomembrane delivered to the site shall be labeled by the manufacturer. The label shall clearly state the manufacturer's name, product identification, thickness, length, width, and roll number. The label shall be found on either of the end caps, an inside edge of the core, and outside the core.
- (b) Delivery. The rolls shall be packaged and shipped by appropriate means to prevent damage to the material and to facilitate off-loading.
- (c) Storage. The Contractor shall provide a suitable storage site which will protect the geomembrane from punctures, abrasions, excessive moisture, and dirt. The on-site storage location for the geomembrane material should be level, smooth, elevated, and dry. The storage place should be protected from theft and vandalism, and if possible should be adjacent to the area to be lined to facilitate installation and minimize handling.
- (d) Handling. The materials are to be handled so as to prevent damage. Instructions for moving rolls shall be provided by the manufacturer upon request.

72. CONSTRUCTION REQUIREMENTS.

- (a) Geomembrane Installation Preparation.
  - (1) The Contractor and the Engineer shall approve the subgrade prior to geomembrane installation. No geomembrane shall be placed on unsuitable subgrade. No stones or sharp objects shall be present on the surface to be lined. Documentation of subgrade acceptance shall be provided to the Engineer prior to liner deployment.
  - (2) Surface moisture shall not be excessively wet or dry or in any condition which will impede proper installation. Under no condition shall the geomembrane be placed over standing water on the subgrade. Dewatering will be incidental to the installation.

(3) The geomembrane shall be installed without seams.

(4) Deployment.

- a. Visually inspect the geomembrane during deployment. Textured geomembrane shall generally have uniform texturing appearance. It shall be free from agglomerated texturing material and such defects that would affect the specified properties of the geomembrane. Such defects or suspect areas shall be marked and repaired, if necessary.
- b. Unroll the geomembrane panels using methods that will not damage the geomembrane and will protect the underlying surface from damage (i.e. spreader bar-protected equipment bucket). No equipment used shall be allowed to damage the geomembrane by handling, trafficking, leakage of hydrocarbons, or other means.
- c. Do not allow heavy vehicular traffic directly on the geomembrane. Rubber-tired ATV's and trucks are acceptable if wheel contact is less than 34 KPa (5 psi).
- d. The method used to place the geomembrane shall minimize wrinkles (especially differential wrinkles between adjacent panels or sheets).
- e. Adequate loading (such as sand bags, tires, or similar items that will not damage the geomembrane) shall be placed on the geomembrane to prevent uplift in case of high winds. Continuous loading is recommended along edges to minimize risk of wind flowing under the geomembrane.
- f. All penetrations (i.e. catch basin) through the geomembrane shall be sealed with a polyisoprene gasket (or approved equal) and batten strip as shown in the Contract Documents.
- g. Sufficient material (slack) shall be provided to allow for geomembrane expansion and contraction.

(5) Field Seaming.

- a. Field seaming of the geomembrane shall not be permitted.

(6) Field Quality Control.

- a. The Contractor and the Engineer shall visually inspect in place the geomembrane for holes, blemishes, pores, penetrations, or other detrimental defects.
- b. No repairs shall be made until the contractor submits and the engineer approves a repair plan for the damaged areas. The plan shall include details on how each area will be repaired and non-destructively tested to ensure geomembrane integrity. The geomembrane shall not be covered at locations which have been repaired until test results with passing values are available.
- c. The geomembrane shall be replaced in its entirety when the total damage area exceeds three square feet. Repair of a maximum two damaged areas will be permitted. If the number of damaged areas exceeds two, the entire geomembrane shall be replaced.
- d. Non-Destructive Testing.
  1. Vacuum Test.
    - i. The equipment shall consist of the following:
      - a. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft gasket attached to the bottom or valve assembly, and a vacuum gauge.
      - b. A vacuum pump assembly.
      - c. A soapy solution.
    - ii. The test procedure is completed as follows:
      - a. Apply soapy solution to the seam.
      - b. Place vacuum box assembly over the entire wetted seam area ensuring that a leak tight seal is created.
      - c. Apply a vacuum of at least 34.5 KPa (5 psig).

- d. Examine the extrusion seam through the viewing window for the presence of soap bubbles in rapid succession for a minimum of ten seconds. The presence of soap bubbles in rapid succession is indicative of a leak.
  - e. All areas where soap bubbles appear in rapid succession shall be marked, repaired, and retested. Repairs to be completed in accordance with these provisions.
2. The Contractor shall complete vacuum tests on all extrusion welds (i.e. patches, pipe boots, etc). Vacuum testing shall conform to ASTM D 5641 and be completed as specified. In addition, the Contractor shall repair and test all repairs resulting from any unsatisfactory geomembrane or seam area which failed the vacuum testing.
3. Air Pressure Test.
- i. The equipment shall consist of the following:
    - a. An air pump or tank equipped with pressure gauge capable of generating and sustaining pressure over 206.8 KPa (30 psig).
    - b. A sharp, hollow needle, or other approved pressure feed device, equipped with a pressure gauge.
    - c. Utility knife with hook blade, hot air gun, or other device and clamp to seal the ends of the air channel. Utility knife will also be used to puncture opposite end of seam after testing.
  - ii. The test procedure is completed as follows:
    - a. Delineate seam to be tested by making cuts through the seam at both ends with the hook blade utility knife.
    - b. Seal both ends of seam to be tested, insert air needle into the air channel, and pressurize to at least 241.3 KPa (35 psig).

- c. Allow pressure in air channel to stabilize, at no lower than 206.8 (30 psig). Once stabilized, pressure in air channel can be reduced to a minimum of 206.8 (30 psig) to start the test. Test period is a minimum of five minutes.
  - d. If the pressure loss is greater than 20.7 KPa (3 psig) in five minutes or does not stabilize after five minutes, locate faulty area where leak is occurring, repair, and retest.
  - e. If the pressure loss is less than or equal to the 20.7 KPa (3 psig) within the five minute test period, puncture the opposite end of seam to release the air, confirming that the entire seam length had been tested. If air is not released once channel has been punctured a blockage is present. Locate faulty area where the blockage is and retest seam on both sides of blockage. A pressure gauge at both ends of the seam will also be acceptable.
  - f. Remove needle or other approved pressure feed device and seal penetration holes by extrusion welding.
  - g. All leaks, holes made by the needle, or other damage resulting from the testing procedure shall be repaired in accordance with these provisions.
4. The Contractor shall complete air pressure tests on all field seams constructed using a double seam fusion wedge welder. The double seam fusion wedge welder creates two fusion welds separated by a channel. This channel is used for air pressure testing the field seam. Air pressure testing shall conform to ASTM D 5820 and be completed as specified. In addition, the Contractor shall repair and test all repairs resulting from any unsatisfactory geomembrane or seam area which failed the air pressure testing.

(7) Repair Procedures.

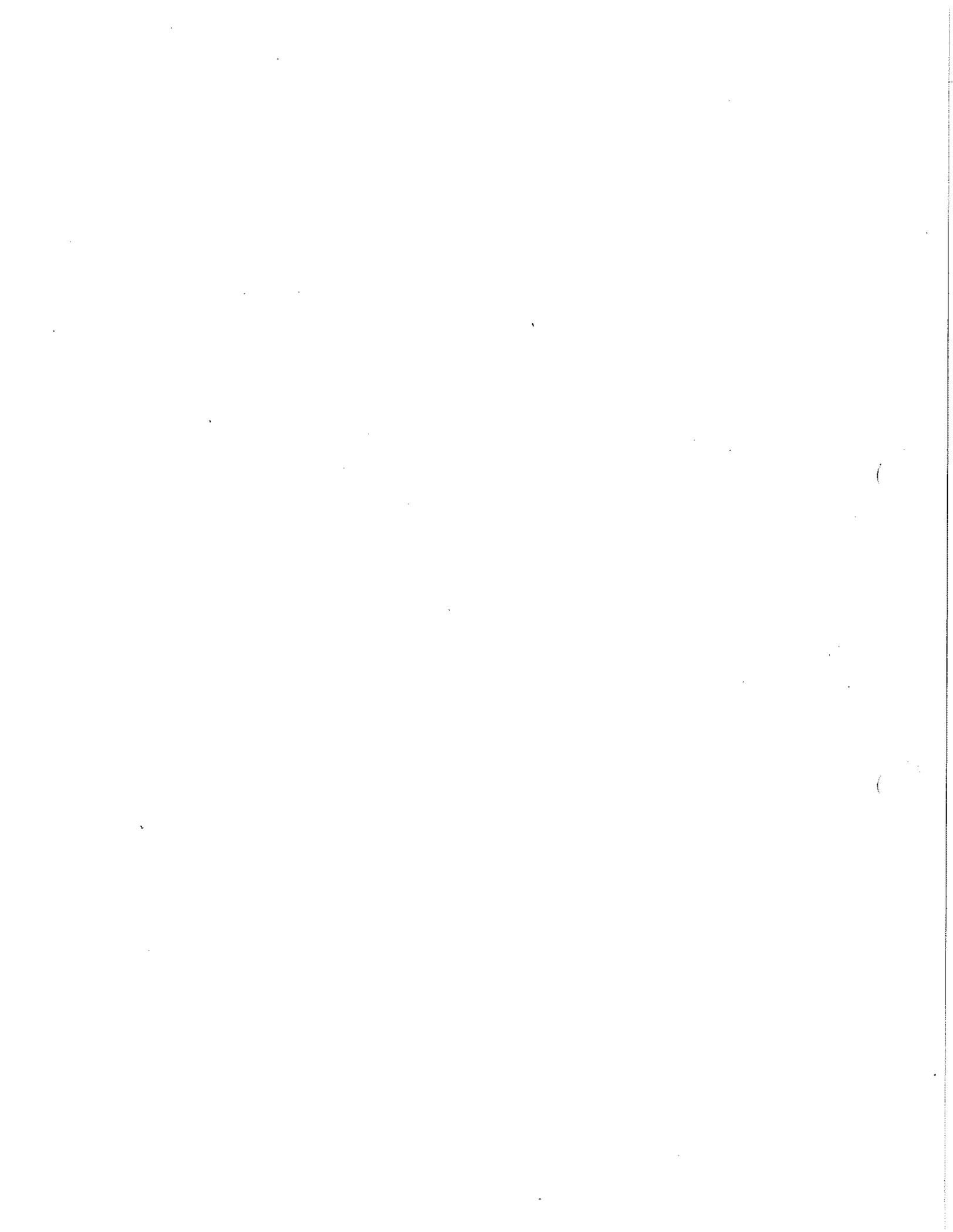
- a. Remove damaged geomembrane and replace with acceptable geomembrane materials if damage cannot be satisfactorily repaired.
- b. The Contractor shall be responsible for repair of damaged or defective areas and shall provide a written plan for repair. Procedures available include the following:
  1. Patching. Used to repair large holes, tears, undispersed raw materials, and contamination by foreign matter.
  2. Abrading and Re-welding. Used to repair small seam sections.
  3. Spot Welding. Used to repair pinholes, other localized flaws (minor), or where geomembrane thickness has been reduced.
  4. Capping. Used to repair large lengths of failed seams.
  5. Flap Welding. Used to extrusion weld the flap (excess outer portion) of a fusion weld in lieu of a full cap.
- c. Surfaces of the geomembrane which are to be repaired by extrusion welds shall be lightly abraded with disc grinder or equivalent to assure cleanliness,
- d. All geomembrane surfaces shall be clean and dry at the time of repair.
- e. Extend patches or caps at least 152 mm (6 inches) for extrusion weld and 102 mm (4 inches) for wedge weld beyond the edge of the defect. Round all corners of patch material.
- f. Non-destructively test each repair using methods specified in these provisions.

73. METHOD OF MEASUREMENT. The quantity of Special Provision (Geomembrane Liner) to be measured for payment will be the number of square meters (square yards) placed in the complete and accepted work. Slope measurements will be used in computing the area. Measurement will not be made for material used for repairs, seams, or overlaps. Measurement will not be made for material used to replace an installation of geomembrane that has become damaged, destroyed, lost, washed away, or otherwise ineffective unless authorized by the Engineer.

74. BASIS OF PAYMENT. The accepted quantity of Special Provision (Geomembrane Liner) will be paid for at the Contract unit price per square meter (square yard). Payment will be full compensation for furnishing, transporting, storing, handling, maintaining, placing, and removing the materials specified; for making required submittals; for providing required testing, monitoring, and inspection services; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.675 Special Provision (Geomembrane Liner)	Square Yard



Minimum Labor and Truck Rates  
Under Title 19, Vermont Statutes  
Annotated Section 18, as amended

April 3, 1997  
Sheet 1 of 1

**STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
MONTPELIER**

FOR OTHER THAN FEDERAL-AID. In accordance with the provisions of Title 19, VSA, Section 18, the following minimum rate for labor shall apply to this project:

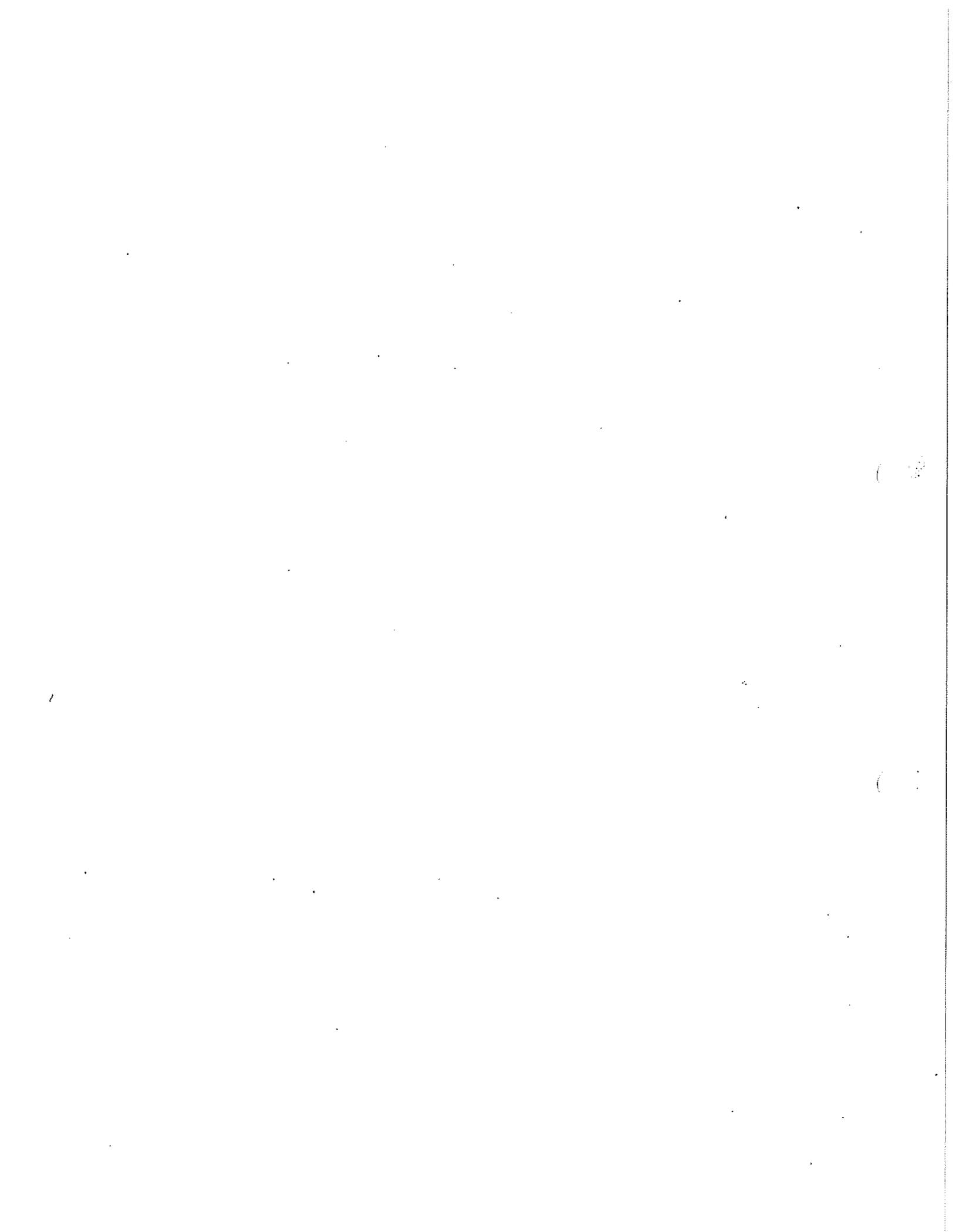
The minimum wage for common labor will not be less than the State or Federal minimum wage, whichever is higher.

ON FEDERAL-AID PROJECTS ONLY.

The minimum rates for labor for Federal-Aid Projects shall be those set in the Wage Determination Decision of the U.S. Secretary of Labor for each project in accordance with the Federal-Aid Highway Act of 1956. When such wage rates are required they shall be included in the proposal. In the event these rates are lower than the Vermont rates, the Vermont rates shall prevail.

TRUCK RATES. In accordance with the provisions of Title 19, VSA, Section 18, the following minimum rates for trucks shall apply to this project:

<u>Trucks, not Including Driver Water Level Body Capacity</u>	<u>Minimum Rates Per YD per Hr.</u>
Trucks, Equipment Loaded	\$1.65



State of Vermont  
Agency of Transportation

March 2011  
CA-110

## DISADVANTAGED BUSINESS ENTERPRISE (DBE) POLICY CONTRACT REQUIREMENTS

**Disadvantaged Business Enterprise (DBE) Policy.** It shall be the policy of the Vermont Agency of Transportation (VTrans) to ensure nondiscriminatory opportunity for Disadvantaged Business Enterprises (DBEs) to participate in the performance of all contracts and subcontracts financed with Federal funds as specified by the regulations of the United States Department of Transportation (USDOT), Federal Highway Administration and as set forth below.

1. **Policy.** It is the policy of USDOT that DBEs as defined in 49 Code of Federal Regulation (CFR) Part 26 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds. Consequently, the DBE requirements of 49 CFR Part 26 and 23 CFR, Chapter 1, Part 230, Subpart b apply to this contract.
2. **DBE Obligation.** The State and its Contractors agree to ensure that DBEs as defined in 49 CFR Part 26, have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds. **Each subcontract the prime contractor signs with a subcontractor must include this assurance:** *The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of USDOT-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 VTrans deems appropriate.*
3. **Sanctions for Noncompliance.** The Contractor is hereby advised that failure of the Contractor, or any Subcontractor performing work under this contract, to carry out the requirements set forth in paragraphs 1 and 2 above shall constitute a breach of contract and after the notification of the Vermont Agency of Transportation, Secretary of Transportation, may result in termination of this contract by the State or such remedy as the State deems necessary.
4. **Inclusion in Subcontracts.** The Contractor shall insert in each of its subcontracts this Disadvantaged Business Enterprise (DBE) Policy and also a clause requiring its subcontractors to include this same Policy in any lower tier subcontracts which they may enter into, together with a clause requiring the inclusion of the Policy in any further subcontract that may in turn be made. This Policy shall not be incorporated by reference.

**Disadvantaged Business Enterprise (DBE) Program Goals.** The Vermont Agency of Transportation (VTrans) is required to set an overall DBE goal for participation in all transportation related Federal-aid projects. The goal is determined following guidelines set forth in 49 CFR 26.45, and based on the availability of ready, willing and able DBEs who submitted bids and quotes for transportation related projects, compared as a percentage of all available contractors who submitted bids and quotes for transportation related projects during the same time period. The DBE goal may be adjusted to take into account other factors impacting DBE utilization, in an effort to narrowly tailor the overall DBE goal. The detailed goal setting methodology and current overall DBE goal may be viewed on the VTrans website at: <http://www.aot.state.vt.us/CivilRights/DBEGoals.htm> .

VTrans currently utilizes a race/gender neutral policy to fulfill its overall DBE goals, and relies on the voluntary participation of contractors to utilize certified DBEs on every project sufficient to obtain the Agency's overall DBE goal. In order for this practice to continue, contractors must be proactive and solicit bids and quotes from certified DBEs for use when submitting their own bids, and employ certified DBEs when participating on transportation related projects. Otherwise, VTrans may have to implement specified contract goals on projects to ensure the overall DBE goals are met. VTrans may include specific DBE contract goals in certain cases to ensure DBE participation, if failure to obtain the project DBE goal would negatively impact the Agency's overall DBE goal because of the size of the contract.

**Disadvantaged Business Enterprise (DBE) Definition.** A DBE is defined as a business that is owned and controlled by one or more socially and economically disadvantaged person(s). For the purposes of this definition:

- (1) "Socially and economically disadvantaged person" means an individual who is a citizen or lawful permanent resident of the United States and who is a Woman, Black, Hispanic, Portuguese, Native American, Asian American, or a member of another group, or an individual found to be disadvantaged by the Small Business Administration pursuant to Section 3 of the Small Business Act.
- (2) "Owned and controlled" means a business which is:
  - a. A sole proprietorship legitimately owned and controlled by an individual who is a disadvantaged person.
  - b. A partnership, joint venture or limited liability company in which at least 51% of the beneficial ownership interests legitimately is held by a disadvantaged person(s).
  - c. A corporation or other entity in which at least 51% of the voting interest and 51% of the beneficial ownership interests legitimately are held by a disadvantaged person(s).

The disadvantaged group owner(s) or stockholder(s) must possess control over management, interest in capital, and interest in earnings commensurate with percentage of ownership. Disadvantaged participation in a joint venture must also be based on the sharing of real earnings, as above. If the disadvantaged group ownership interests are real, substantial and continuing and not created solely to meet the requirements of the program, a firm is considered a bona fide DBE.

**Certified DBE Directory.** The current Vermont Unified Disadvantaged Business Enterprise (DBE) Directory is available online at: <http://www.aot.state.vt.us/CivilRights/DBEDirectory.htm>. This directory contains all currently certified DBEs available for work in Vermont, and is updated continuously. Only firms listed in this directory are eligible for DBE credit on Vermont Federal-aid projects. If you have questions about DBE certification, or do not have access to the Internet, please call the DBE Program Manager at (802) 828-5858 for assistance.

**Counting DBE Participation Towards Project Goals.** In order for payments made to DBE contractors to be counted toward DBE goals, the DBE contractors must perform a commercially useful function (CUF). The DBE must be responsible for execution of the work of the contract and must carry out its responsibilities by actually performing, managing, and supervising the work involved, consistent with standard industry practices.

This means that:

- The DBE must also be responsible for ordering its own materials and supplies, determining quantity and quality, negotiating price, installing (where applicable) and paying for the material itself;
- The DBE must perform work commensurate with the amount of its contract;
- The DBE's contribution cannot be that of an extra participant or a conduit through which funds are passed in order to obtain the appearance of DBE participation;
- The DBE must exercise responsibility for at least fifty percent of the total cost of its contract with its own workforce;
- None of the DBE's work can be subcontracted back to the prime contractor, nor can the DBE employ the prime's or other subcontractor's supervisors currently working on the project;
- The DBE's labor force must be separate and apart from that of the prime contractor or other subcontractors on the project. Transferring crews between primes, subcontractors, and DBE contractors is not acceptable;
- The DBE owner must hold necessary professional or craft license(s) or certification(s) for the type of work he/she performs on the project;
- The DBE may rent or lease, at competitive rates, equipment needed on the project from customary leasing sources or from other subcontractors on the project.

**Allowable credit for payments made to DBEs for work performed.** A contractor may take credit for payments made to a certified DBE that satisfies CUF requirements at the following rate:

- A DBE Prime Contractor: Count 100% of the value of the work performed by own forces, equipment and materials towards the DBE goals.
- An approved DBE subcontractor: Count 100% of the value of work performed by the DBE's own forces, equipment and materials, excluding the following:
  - The cost of materials/supplies purchased from a non-DBE Prime Contractor.
  - The value of work provided by non-DBE lower tier subcontractors, including non-DBE trucking to deliver asphalt to a DBE contractor.
- A DBE owner-operator of construction equipment: Count 100% of expenditures committed.
- A DBE manufacturer: Count 100% of expenditures committed. The manufacturer must be a firm that operates or maintains a factory or establishment that produces on the premises the materials or supplies obtained by the Contractor.
- A regular DBE dealer/supplier: Count 60% of expenditures committed. A regular dealer/supplier is defined as 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. A person may be a dealer in such bulk items as petroleum products, steel, cement, gravel, stone or asphalt without owning, operating or maintaining a place of business, if the person both owns and operates distribution equipment for the products, by the means of a long term agreement, and not by a contract by contract basis.
- A DBE broker: Count for DBE credit only the fees or commissions charged for assistance in the procurement, and, fees and transportation charges for the delivery of materials or supplies required at the job site, but not the cost of materials procured. A broker is defined as any person(s) or firm who arranges or expedites transactions for materials or supplies, and does not take physical possession of the materials or supplies at their place of business for resale.
- A DBE renter of construction equipment to a contractor: Count 20% of expenditures committed, with or without operator.

- A bona fide DBE service provider: Count 100% of reasonable fees or commissions. Eligible services include professional, technical, consultant, or managerial, services and assistance in the procurement of essential personnel, facilities, equipment, materials or supplies required for the performance of the contract. Eligible services also include agencies providing bonding and insurance specifically required for the performance of the contract.
- A trucking, hauling or delivery operation: Count 100% of expenditures committed when trucks are owned, operated, licensed and insured by the DBE and used on the contract and, if applicable, includes the cost of the materials and supplies. 100% of expenditures committed when the DBE leases trucks from another DBE firm including an owner-operator. 100% of reasonable fees, or commissions, the DBE receives as a result of a lease arrangement for trucks from a non-DBE, including an owner-operator.
- Any combination of the above.

**Removal of Approved DBE From Transportation Related Project.** Contractors may not terminate for convenience, any approved DBE subcontractor and perform the work with their own forces, without prior written consent from the VTrans DBE Program Manager or VTrans Chief of Civil Rights.

**Federal-aid projects which specify a DBE contract goal.** The provisions of the Vermont Agency of Transportation Supplemental Specification – Disadvantaged Business Enterprise (DBE) Utilization (CA 160) shall apply to all VTrans Federal-aid projects which specify a DBE contract goal.

**Compliance With Prompt Payment Statute.** In accordance with Vermont's Prompt Payment Act and VTrans Standard Specifications for Construction, Section 107.01(g), the Contractor shall fully comply with the provisions of 9 V.S.A. Chapter 102, also referred to as Act No. 74 of 1991 or the Prompt Payment Act, as amended.

**Subcontractor Payments.** In accordance with VTrans Standard Specifications for Construction, Section 107.01(h), on all federal-aid and state funded contracts, the Contractor, during the life of the Contract and on a monthly basis, shall submit electronically, a listing of payments to subcontractors on the form specified by the State and made available at: <http://apps.vtrans.vermont.gov/db/>. Electronic reports shall be filed with the Agency Office of Civil Rights by an authorized representative and received in the Agency Office of Civil Rights on or before the tenth working day after month end. Contractors without access to the internet shall obtain and submit manual reports to the Agency Office of Civil Rights. Manual reports shall be signed by an authorized representative, sent to the Agency Office of Civil Rights, and postmarked on or before the tenth working day after month end. There shall be no direct compensation allowed the Contractor for this work, but the cost thereof shall be included in the general cost of the work. In accordance with 9 V.S.A. Section 4003, notwithstanding any contrary agreement, payments made to subcontractors after seven days from receipt of a corresponding progress payment by the State to the Contractor, or seven days after receipt of a subcontractor's invoice, whichever is later, violate this agreement. Violations shall be reported to the Agency Office of Civil Rights for review. Failure to resolve disputes in a timely manner may result in a complaint made to the Agency Pre-qualification Committee. In this Committee's judgment, appropriate penalties may be involved for failure to comply with this specification. Penalties may include suspension, reduction or revocation of the Contractor's pre-qualification rating. This clause shall be included in the prime Contractor's Contract made with all of its subcontractors.

General Decision Number: VT120046 04/13/2012 VT46

Superseded General Decision Number: VT20100074

State: Vermont

Construction Type: Highway

County: Franklin County in Vermont.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels; building structures in rest areas; railroad construction; bascule, suspension & spandrel arch bridges; bridges designed for commercial navigation; bridges involving marine construction; and other major bridges)

Modification Number	Publication Date
0	01/06/2012
1	04/13/2012

\* SUVT2011-031 09/14/2011

	Rates	Fringes
CARPENTER (Form Work Only).....	\$ 19.21	5.00
IRONWORKER, STRUCTURAL.....	\$ 21.17	0.00
LABORER: Common or General.....	\$ 13.49	0.24
LABORER: Flagger.....	\$ 11.35	0.00
LABORER: Traffic Control-Cone Setter.....	\$ 14.34	5.77
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 17.10	0.00
OPERATOR: Broom.....	\$ 15.33	0.00
OPERATOR: Cold Planer/Milling Machine.....	\$ 23.60	0.00
OPERATOR: Excavator.....	\$ 20.50	0.67
OPERATOR: Loader.....	\$ 19.05	0.00
OPERATOR: Paver.....	\$ 16.90	0.38
OPERATOR: Roller (All Types)....	\$ 16.06	0.00
OPERATOR: Screed.....	\$ 19.84	5.82
PAINTER (Parking Lot and Highway Striping Only).....	\$ 16.33	3.62
TRAFFIC SIGNALIZATION: Traffic Signal Installation.....	\$ 19.73	0.00

TRUCK DRIVER, Includes All		
Dump Trucks.....	\$ 15.96	0.00

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters, PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rate.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change

until a new survey is conducted.

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

SUPPLEMENTAL SPECIFICATION  
ASPHALT PRICE ADJUSTMENT

GENERAL REQUIREMENTS AND CONDITIONS

- (a) This specification contains price adjustment provisions for asphalt cement and emulsified asphalt used on Vermont Agency of Transportation (Agency) construction projects and produced under Sections 303, 404, 406, 415, and 490 of the Standard Specifications, or as otherwise designated in the Contract Documents. This price adjustment clause is being inserted in this Contract to provide for either additional compensation to the Contractor or a payment to the Agency, depending upon an increase or decrease in the average price of asphalt cement during the construction of this project.
- (b) Emulsified asphalt shall be subjected to a correction factor of 0.45, applied to the quantity of material supplied. This corrected quantity shall be used for Asphalt Price Adjustment as specified and computed herein.
- (c) These provisions apply to this Contract only as specified in the procedures provided herein. No further asphalt cement and/or emulsified asphalt price adjustments will be allowed under this Contract.
- (d) It is understood by the Contractor that a price adjustment increase may cause the Agency to decrease the quantities of the Contract pay items subject to adjustment under these provisions. Provisions providing for decreased quantities and item cancellation in this paragraph are separate and take precedence, notwithstanding any other provisions of this Contract.
- (e) No price adjustment will be allowed beyond the Contract Completion Date or any applicable interim completion dates.
- (f) Any increase in the total Contract amount due to price adjustment under these provisions will not be justification for an extension of time under Subsection 108.11.
- (g) The Contractor hereby agrees that its bid prices for this Contract include no allowances for any contingencies to cover increased costs for which adjustment is provided herein.

PRICE ADJUSTMENT PROCEDURES

- (1) Prior to advertising for bids, an Index Price for asphalt cement will be established by the Agency upon consideration of the New York State DOT average monthly price for asphalt cement, or other monthly index deemed appropriate by the Director of Finance and Administration. The Index Price will be set monthly on or about the last day of the month. The Contract Index Price will be the most recent Index Price set by the Agency at the time of advertising for bids. This price will be as specified in the Special Provisions and will be the base from which price adjustments are computed.
- (2) For the duration of the Contract, Posted Prices for a metric ton (ton) of asphalt cement will be established monthly by the Agency. The Posted Prices will be established in the same manner as the Index Price.

- (3) A Price Adjustment will be paid or credited for asphalt cement only when the Posted Price of asphalt cement increases or decreases over its respective Index Price.
- (4) The Price Adjustment will be based upon the quantity of asphalt cement (QAC) and quantity of emulsified asphalt (QEA) incorporated in the work, determined as follows:
  - a. Batch Plants. QAC is determined using the cumulative actual binder content for each applicable item as reported on the batch ticket, excluding any percent of asphalt cement from Recycled Asphalt Pavement (RAP).
  - b. Drum-Mix Plants. QAC is determined based upon the metric tons (tons) of mix placed, multiplied by the actual binder content reported on the demand tickets, as verified by Agency personnel. In the event of multiple binder contents, the accepted quantity of mix at each binder content shall be determined, and the total QAC used shall be calculated accordingly. The accumulated asphalt cement total on the plant automation may be checked and verified by Agency personnel for each mix.
  - c. Emulsified Asphalt. QEA is as determined in accordance with Subsection 404.11.

(5) The Price Adjustment to be paid shall be computed as follows:

$$PA = [(QAC + (ACEA \times 0.001 \times QEA)) \times (PP - IP)] \text{ [Metric]}$$

$$PA = [(QAC + (ACEA \times 0.05 \times QEA)) \times (PP - IP)] \text{ [English]}$$

where:

- PA = Price Adjustment (LU in \$)
- IP = Index Price (\$/metric ton) or (\$/ton)
- PP = Posted Price on date of work (\$/metric ton) or (\$/ton)
- QAC = Quantity of Asphalt Cement (metric tons) or (tons)
- QEA = Quantity of Emulsified Asphalt (kilograms) or (CWT)
- ACEA = Asphalt Content of Emulsified Asphalt as follows:

Emulsified Asphalt Type	ACEA
CSS-1h	0.57
MS-1	0.55
RS-1	0.55
CRS-1p	0.63
CSS-1h Fog	0.28

- (6) The Contract bid prices for the applicable pay items will be paid separately under the Contract. The price adjustment will be calculated and paid in the same bi-weekly estimate as the applicable Contract work.
- (7) Payments for Price Adjustment, Asphalt Cement shall be debited or credited against the Contract price (Lump Unit) bid for Price Adjustment, Asphalt Cement.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
406.50 Price Adjustment, Asphalt Cement (N.A.B.I.)	Lump Unit

**Golder Associates Inc.**

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www.golder.com



November 5, 2008

Our Ref.: 073-86908

Vermont Agency of Transportation  
Materials and Research Section  
National Life Building  
Drawer 33  
Montpelier, VT 05633

Attn: Christopher C. Benda, P.E.

**RE: GEOTECHNICAL EVALUATION OF EMBANKMENT EROSION, BRIDGE 6,  
VT 207, HIGHGATE, VERMONT, VTRANS EA NO. BM08MRO-400**

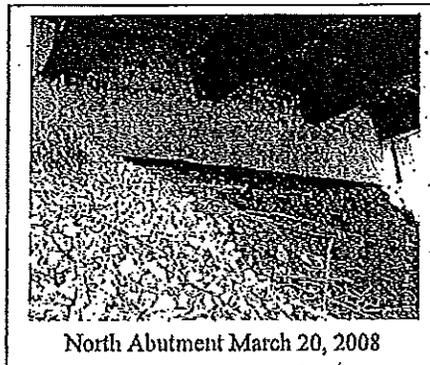
Dear Mr. Benda:

Golder Associates Inc. (Golder) is pleased to submit to the Vermont Agency of Transportation (VTrans) this report on our investigation and development of potential mitigation measures to address erosion occurring at the north abutment of the VT 207 Bridge over the Missisquoi River in Highgate, Vermont. Golder completed the project under our On-Call Geotechnical Engineering Services for Highway and Bridge Projects with VTrans (Contract No. 0984738).

**PROJECT BACKGROUND**

VTrans is concerned with the condition of the embankment supporting the abutment and erosion of soils beneath the abutment that has exposed the abutment piling. VTrans has implemented several repairs to limit loss of soil beneath the bridge abutment. According to VTrans personnel, the following timeline represents the events noticed during the life of the bridge to date:

- Constructed and put into service in September 1976.
- In 1990 VTrans armored the slopes below the north and south abutments with coarse stone rip-rap to reduce erosion.
- Circa 2002 some soil loss and sloughing was observed, and VTrans planted willows to help stabilize the slope. The willows did not take, and wooden deflection/protection boxes were installed to protect the bridge legs from damage due to sliding or falling debris.
- Circa 2004 the phone company excavated along the east side of the north abutment to install a new line. This activity apparently induced soil sloughing on the face of the embankment adjacent to the abutment, and the embankment was stabilized with sheet piling.



- In 2007 a significant amount of soil and stone armor material slid from below the abutment, destroying the protective boxes at the bridge legs, and fell to the river below.
- Of note was a statement made by Randall Reed that the entire hill to the north is "full of springs" and that when they cleaned out the plugged underdrain the water was "flowing pretty good."

Without a proper remedy, continuing soil erosion of the embankment soil may result in increased pile exposure and may impact the stability of the abutment.

#### INVESTIGATION OBJECTIVE

The objective of this investigation has been to develop an understanding of the groundwater and surface water drainage conditions around the abutment site to identify the cause of the existing slope problems and develop an approach for addressing these conditions and stabilizing the affected slope. To achieve this goal, Golder completed three tasks:

- A review of available geotechnical, construction and utilities installation data pertaining to the project;
- A field investigation to collect soil and groundwater elevation data and verify the locations, condition and outlets of surface and subsurface drainage structures; and
- An evaluation of slope stability and development of recommendations for improving site drainage and constructing slope repairs.



View from South -- note erosion and stone armor debris at toe of slope.

#### REVIEW OF PREVIOUS DOCUMENTS

To evaluate the potential effects of storm water and groundwater on the abutment slope, both natural and man-made surface and subsurface drainage conditions should be characterized. As such Golder reviewed the bridge as-built drawings (State of Vermont Department of Highways Projects RS 0297(4) SA and BRS 0297(6) SA Sheets 1, 13, 15, 16, 17, 20 and 21) provided by VTrans on July 22, 2008. From these as-built drawings, as shown in Figures 1 and 2, Golder observed the following on the north side of the bridge:

- From the abutment (station 12+19) to station 13+00, the existing subsurface includes a 4- to 10-ft thick layer of fill material described as "Granular Borrow."
- 6-inch diameter underdrains run on both sides of the north approach road at an approximate slope of 11 percent. According to VTrans, the underdrains were constructed to intercept groundwater flows along the approach road.

- On the east side of the road, the approximately 1,175-ft long underdrain runs from station 12+60 to station 24+35 approximately 7 feet (ft) below current road grade and daylight in the abutment slope behind and approximately 50 ft northeast of the bridge abutment. In addition, it appears that the northern most portion of the underdrain crosses the road and daylight into a stormwater ditch to the west of Highway 207 at approximately station 16+10.
- On the west side of the road, the approximately 750-ft long underdrain runs from station 16+25 to station 24+00, approximately 5 to 7 ft below current road grade and discharges into wetlands approximately 350 ft north of the bridge abutment and approximately 25 ft west of the roadway.

As part of our review, Golder reviewed a VTrans office memorandum dated May 17, 1991 from Robert Cauley, P.E., Material and Research Engineer, to Roy F. Nicolson P.E., Assistant Director, Construction and Maintenance (see Appendix A). The memorandum presents the findings of an investigation completed in 1991 using six borings (B 1 through B 6) on the embankment beneath the bridge deck. The locations of the borings are shown in Figures 2 and 3. According to the memorandum, the embankment material included boulders, cobbles and saturated soils. The saturated soil condition was attributed to separation of joints along a 6-inch diameter pipe that was believed to be connected to an outlet of a 15-inch diameter culvert.

Bridge as-built drawings do not show this 6-diameter pipe. Instead a 34-foot long 15-inch diameter pipe across an adjacent gravel drive is shown. Because the current survey does not show either of these pipes, but rather a 168-ft-long, 15-inch diameter at this location (see Figure 2 or 3), we suspect that the 168-foot pipe was installed following the recommendation for retrofit in the VTrans memorandum.

We understand from VTrans personnel that in 2004, a phone company excavated a trench for a new line along the east side of the road. Detailed information regarding this installation was not available for Golder to review.

#### FIELD INVESTIGATION

On May 28, 2008, Golder completed a field reconnaissance and finalized the four boring locations and depths. During our site tour we observed a driveway and a new runoff catch/detention basin immediately northeast of the north abutment.

Except for a scarp below the sheet pile repair on the east side of the abutment, most erosion appears to be shallow in nature and not due to a global or deep seated failure. The scarp below the sheet piling appeared to be sub-vertical. Underneath the bridge deck, we observed two 2- to 3-ft thick horizontal bands of wet soil approximately 3 ft to 10 ft below the bottom of concrete pile cap. The wet bands were separated by an approximately 2 ft- thick drier layer soil layer (see Figure 3).

From July 14 to 17, 2008, Golder conducted a test boring program to investigate subsurface conditions and install piezometers to observe groundwater levels. We originally proposed a total of four borings and piezometers (GBH-1, GBH-2, GBH-3 and GBH-4) located adjacent to the abutment and along the east side of the road (as shown on Figure 2). Based on field observations, we completed three additional borings to install shallow and deep piezometer couplets to better understand the groundwater conditions. Borings GBH-2A and GBH-4A were located near GBH-2 and GBH-4, respectively to form the cluster piezometers to look for an upward or downward

groundwater gradient. Under the bridge deck near the abutment, boring GBH-5 was drilled using a hand auger.

The test borings and piezometers were drilled and installed by VTrans drillers with observation and logging by a Golder soil scientist. The boring logs and piezometer installation logs are included in Appendix B. Collected soil samples were tested for moisture content and grain size distribution by the VTrans materials laboratory (testing to identify the  $D_{10}$  particle size). Laboratory test results are included in Appendix C. Soil descriptions provided in the boring logs reflect the descriptions provided in the laboratory test results. Following the drilling program, a topographic survey was completed by CLD Engineers to map the current ground surface conditions, piezometer locations and the exposed portions of the drainage pipes. The survey and piezometer elevations are included in Figure 1. The vertical datum for the survey and the elevation stated in this report is NAVD 88. The locations of the borings/piezometers are shown in Figure 2.

### SUBSURFACE CONDITIONS

Using the information from the previous and the current investigations, Golder developed an interpretive subsurface profile along the centerline of the road showing interpreted subsurface conditions (Figure 3). As shown in Figure 3, the uppermost stratum near the north abutment consists of a highly permeable granular fill layer from the abutment extending northward to approximately station 12+80 and a natural sand and gravel layer from approximately station 12+80 to approximately station 14+35. Beneath this layer is a low permeability soil layer consisting of sandy silt/silty clay/clayey silt underlain by bedrock. The granular fill soil layer depth varies from approximately 10 to 12 ft near the abutment to approximately 7 to 8 ft near station 14+35.

Figure 3 shows the interpreted bedrock profile along the centerline of the road. The interpreted bedrock profile is based on boring information from investigations completed in 1975, 1991, and 2008. Golder noticed that the top of the bedrock elevation in boring B8 from a 1975 preconstruction survey is roughly 10 feet higher than the bedrock elevation indicated in 1991 survey. Because bedrock is not currently exposed at the location of boring B8, we assumed the boring collar elevation could have been incorrectly labeled and ignored this data point when developing the profile provided in Figure 3.

In the west to east direction (across the road), the subsurface conditions were reviewed using information from borings GBH-1, GBH-2, B27 and B28, all of which are located within 25 ft of the north abutment. The pre-construction ground surface indicated in a 1975 survey, the current ground surface, and the bottom of granular fill layers were approximately horizontal across the road.

Groundwater levels in the piezometers are monitored by VTrans on a bi-monthly basis and after severe storms. Groundwater data collected to date is provided in Appendix D. The groundwater levels for the period from July to August 2008 do not show significant variation in any of the piezometers. As shown on Figure 3, the water table is approximately at EL.193 ft to EL.196 ft (17 to 20 ft below ground surface (bgs)) adjacent to the abutment and about EL.218 ft (7 ft bgs) at approximately station 14+30. The near-surface wet soil bands observed below the bridge deck during the site reconnaissance suggest that elevated groundwater conditions may have existed at the time of our May 28, 2008 visit. To confirm this observation, we recommend that the groundwater level monitoring be continued, especially following high precipitation events to verify the suspected high water tables. The water levels at the piezometers GBH-4/GBH-4A indicate an upward groundwater gradient at this location.

## SLOPE STABILITY EVALUATION

Golder performed a slope stability analysis for the current embankment using the computer program SLIDE developed by Rocscience Inc. of Toronto, Ontario, Canada. The program uses a variety of limit-equilibrium methods to evaluate the stability of slopes in two-dimensions. We performed the analyses using circular failure surfaces and the Simplified Bishop Method. The effect of existing piles on slope stability was ignored in our analyses. The major input parameters to the program include slope geometry, soil layer configuration and water table profile. We used the cross-section shown in Figure 3 for the analysis with varying water table conditions. For this analysis, we modeled the subsurface with three layers – a fill layer (gravelly sand and sand); a layer that includes sandy silt, silty clay and clayey silt; and bedrock. In fill layer, the SPT blow counts varied from weight-of-the-rod to 15 with an average of 8. In the sandy silt/silty clay/clayey silt layer, the SPT blow counts varied from 6 to 54 with an average of 17. The soil parameters for these layers are assigned based on laboratory test results and the SPT blow counts (correlated to friction angle) as shown below.

Soil Layer	Wet Density (pcf)	Saturated Density (pcf)	Friction Angle (degrees)	Cohesion (psf)
Gravelly sand and sand	105	115	31	50
Sandy silty, silty clay, clayey silty	120	130	34	130
Bedrock	150	150	35 (assumed)	500 (assumed)

The analyses show that the factor of safety against slope failure (FS) is sensitive to high water table conditions. The calculation completed using a water table based on the current piezometer data (approximately at El 190 or 20 ft bgs) shows a FS of 1.11 for a shallow surficial failure. The FS remains at 1.11, if the water table rises to the bottom of the granular fill (approximately at El 200 ft or 10 ft bgs). However, if the water table rises further to the existing under-drain elevation, approximately El 203 ft or 7 ft bgs, the FS decreases to 0.781 for a shallow failure. The output files of the slope stability analysis is included in Appendix E.

A FS of 1.11 for the current slope indicates that the stability of the slope is relatively low even without high water table conditions and there is a sensitivity of the slope to water level fluctuations given the lower FS. High water table conditions could lead to either sloughing or a more deep-seated failure. Based on these analyses, we conclude that near the bridge abutment, the water level must be maintained approximately below El 190 or 10 ft. bgs to minimize adverse water table effects on the embankment stability.

## DISCUSSION

Based on the current site conditions, observation from the VTrans maintenance personnel and our slope stability analysis, we suspect that the instability of the soils on the face of the north abutment embankment is due to erosion and seasonal high water table conditions. The factors contributing to soil erosion appear to be:

1. Surface water flows from drainage and underdrain pipe outlets and/or flow from separated pipe joints; and/or
2. Groundwater seepage discharging on the face of the embankment, possibly accelerated by water table build up due to a clogged drain pipe or high precipitation conditions. High water

table condition both increases the seepage velocity and affects the stability of the soils by increasing soil pore pressures.

To develop remedial measures, the factors contributing to both high water velocity and high water table conditions must be identified. Apparently, some of the causes of erosion -- the underdrain pipe, joint separation/clog and the pipe outlet defects -- have been addressed by retrofitting pipe and outlet pipes. The potential for high water table conditions that can cause seepage-related erosion and slope instability is discussed below.

#### High Water Table

High water table conditions and attendant seepage and surface discharge on the embankment face may contribute to erosion solifluction and slope instability. Although not indicated by the water level data collected from the piezometers during the past two months, high groundwater table was evident from our observations of the wet soils on the face of the abutment slope made during our May 26, 2008 site visit. Continued water level monitoring is necessary to confirm the potential for such conditions. We searched for possible scenarios that might have caused the suspected high water table condition.

Our understanding of the underdrain layout is shown in Figure 1. The bridge as-built drawings show an existing underdrain system on the both sides of the road. On the east side of the road, the underdrain extends from the north abutment to Station 24+00. However on the west side of the road, it appears that there is no underdrain from the bridge to approximately station 16+25. In general, the details and the effectiveness of the under-drain system are not known. The high water table condition near the bridge abutment has been observed during and following severe precipitation events. Therefore it is likely that groundwater is not sufficiently intercepted by the existing underdrains, and flows through the granular soil layer accumulates behind the abutment and seeps through the face of the embankment. The possible deficiencies of the existing underdrain system may be:

- Incomplete spatial coverage; (i.e., with no underdrain on the west side of the road near the bridge, groundwater may enter the granular fill from the west);
- Insufficient trench depth; (i.e., groundwater maybe flowing below the underdrains pipes);
- Improper underdrain detail; (i.e., groundwater does not enter the underdrain and runs through the trench); and
- The telephone trench backfill provides a preferred seepage pathway due to a permeability contrast, and captures seasonal high runoff that cannot be captured completely by the underdrains.

For proper design of a remedy, the amount of groundwater flowing toward the abutment must be quantified based on a long-term groundwater monitoring program.

Because the details of the under-drain are unknown, we are proposing approaches to address the four possible deficiencies.

### Slope Instability

The 1991 investigation concluded that there had been soil loss as much as 4 feet beneath the bridge deck. A comparison of the 1991 survey to the current survey shows an additional soil loss varying in thickness from approximately 2 ft near the abutment and approximately 8 ft about 40 ft from the abutment. Based on the currently available information, it is difficult to pin-point whether the soil loss from the embankment is due to erosion or surficial slope instability (soilfluction). However, related to slope stability, our analysis suggests following:

- For the existing soil conditions, the FS of the embankment slope is driven by both the geometry of the slope and the water table elevation.
- Under low water table conditions (El 190 ft to El 200 ft) the FS is 1.11, and the stability of the embankment is mainly controlled by the slope geometry and not by water table.
- Under high water table conditions (approximately at El 203), the FS reduces from 1.11 to 0.781. We believe high groundwater has caused the failures in the past.

If the water table is maintained below approximately El 190 ft by some means, the slope will be stable with a FS of 1.11. To improve the FOS beyond 1.11, other slope stabilization methods are required in addition to water table control.

### REMEDIAL MEASURES

Based on the above discussion, Golder has developed a conceptual remedy to address the soil loss issues of the embankment. The remedy is shown conceptually on Figure 4 and includes installation of three components:

1. A groundwater cutoff trench across the road  
To depress the water table below the granular fill, VTrans can construct a groundwater cutoff trench approximately 15 ft north of the abutment. The cutoff trench will need to be constructed by excavating a V-shape trench near the abutment, across the road to a depth at least 3 ft below the existing fill and into the natural sandy silt/silty clay/clayey silt soils. The cutoff trench will consist of an impermeable high density polyethylene (HDPE) membrane liner, a 3-ft thick stone fill layer, geotextile filter layers, a 2-ft diameter collection pipe and a conveyance pipe.
2. An additional under-drain system on the west side of the road  
To capture the groundwater on west side of the road, where no under-drain system currently exists, VTrans can install an underdrain system from the abutment to station 16+25 with a suitable outlet location in the proposed cutoff trench. The invert of the under-drain collector pipe should be at least 2 ft below the bottom of granular fill layer.
3. Refurbish/restore existing underdrains  
Because improvements were noted when the existing underdrain outlet was cleaned, VTrans should consider cleaning the full length of the underdrains and repairing cracked or broken pipes where necessary.

4. A gabion slope stabilization system

To improve the factor of safety beyond 1.11, VTrans can stabilize the slope with a gabion stabilization system. As shown in Figure 4, the gabion stabilization system would include a gabion wall located, near the bridge leg, founded on and anchored to bedrock, a layer of stone fill from the gabion wall to the top of the slope and a continuous anchored-gabion mat overlaying the stone layer. The stone fill will be sandwiched between two geotextile filter fabric layers. The gabion wall will be designed to retain the stonefill and gabion mat. It will allow constructing a flatter, stable stonefill slope. The anchored gabion mat, in addition to enhancing stability of the soil slope, would be intended to protect against surface erosion and potential groundwater seepage. Geotextile filter is provided to prevent soil migration into the stone fill.

The measures proposed herein provide a concept that can be employed to prevent further soil movements at the embankment. The dimensions stated in this report and figures should not be used for construction. The components should be sized as part of the detailed design prior to construction.

**CLOSURE**

This report has been prepared for the use of VTrans for site specific investigation and remedy accordance with generally accepted professional engineering and geologic principles and practice. Golder makes no other warranty expressed or implied. The findings and recommendations are based on results of the field investigation, combined with interpolation of soil, bedrock and groundwater conditions encountered. If changes in the structures or location are planned from that described herein, or if subsurface conditions encountered during construction differ from those described in the boring logs, Golder should be notified so that we may review and verify or modify our conclusions and recommendations. We also recommend that Golder be provided the opportunity for a review of final design drawings and specifications to assess that the earth work and recommendations are properly interpreted and implemented.

We trust this report contains the information that VTrans presently requires. Golder appreciates the opportunity to be of service to VTrans and we look forward to working with you on this interesting project. If there is any point which requires further clarification, or if we can be of additional assistance, please contact us at (603) 668-0880.

Sincerely,

**GOLDER ASSOCIATES, INC.**

*Mahendra R. Thilliyar*

Mahendra Thilliyar, P.E.  
Senior Engineer

*Peter C. Conti*

Peter C. Conti, P.E.  
Program leader and Principal

*Peter C. Ingraham*

Peter C. Ingraham, P.E.  
Senior Geotechnical Consultant and Associate

MHT/drb

Attachments:

Figure 1: Topographic Survey and Under-Drain Layout  
Figure 2: Boring and Monitoring Well Layout  
Figure 3: Cross-Section A-A'  
Figure 4: Conceptual Stabilization Option

Appendix A: VTrans Memoranda  
Appendix B: Boring/Monitoring Well Logs  
Appendix C: Laboratory Test Results  
Appendix D: Groundwater Monitoring Data  
Appendix E: Slope Stability Analysis Results

**FIGURES**

PERMITS

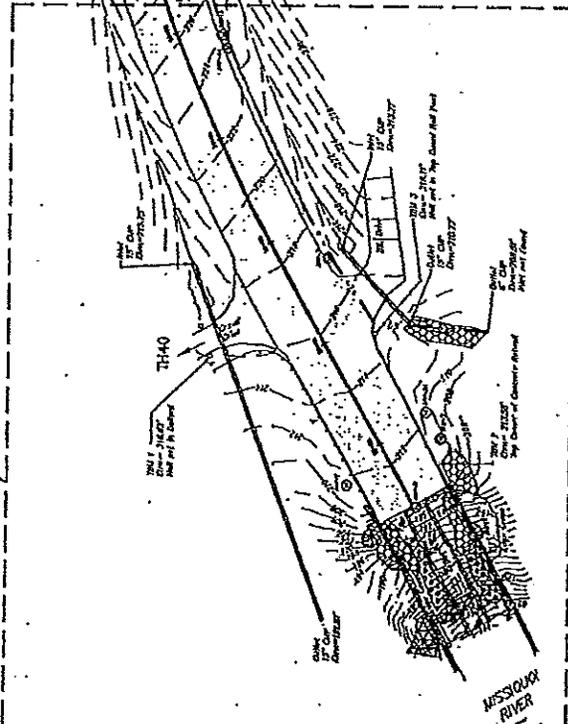
1	2432	2113
2	2113	2113
3	2113	2113
4	2113	2113
5	2113	2113
6	2113	2113

NOTE:  
 1) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING  
 CONDITIONS AND TO PROVIDE THE NECESSARY  
 INFORMATION FOR THE DESIGN AND CONSTRUCTION  
 OF THE UNDERDRAIN SYSTEM.  
 2) THE BASE PLAN IS THE ORIGINAL SURVEY WORKSHEET,  
 DATED 1975.  
 3) BASE OF DRAWING IS 1' ON 1" SCALE.  
 4) HORIZONTAL DISTANCE IS MEASURED BY THE VERTICAL DISTANCE.

**LEGEND**

- Existing Top
- Proposed
- Lower Level Road
- Open Trench
- Existing Bed
- SPW
- Sound Bed
- Underdrain (Open)
- Proposed Underdrain

SEE FIGURE 2

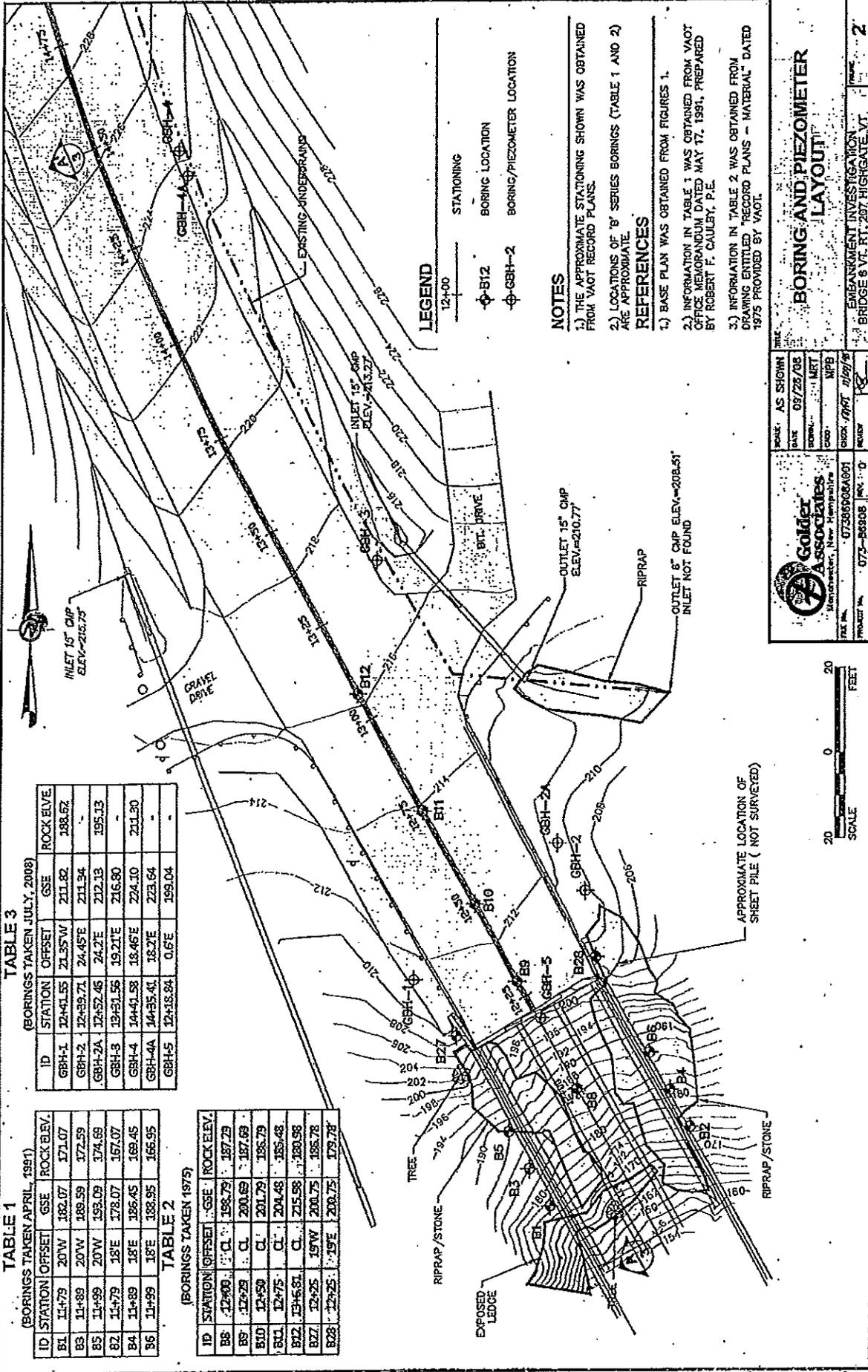


**REFERENCE**

- 1) BASE PLAN WAS PROVIDED BY CLD CONSULTING ENGINEERS, INC., TITLED "HIGHWAY 2007 AND MISSISSIPPI RIVER EMBANKMENT SURVEY WORKSHEET", DATED AUGUST 2008.
- 2) UNDERDRAIN LAYOUT WAS OBTAINED FROM DRAWINGS ENTITLED, "RECORD PLANS-MATERIAL" DATED 1975, PROVIDED BY VITRANS.



<p><b>Golden Associates</b>          Merrimack, New Hampshire</p>	<p>DATE: 08/28/08</p>	<p>SCALE: AS SHOWN</p>	<p>FILE NO.</p>
	<p>PROJECT: JRT</p>	<p>CONTRACT: KPB</p>	<p>DATE: 07/25/08</p>
<p>PROJECT NO.: 073-88908</p>	<p>REV: 0</p>	<p>DATE: 07/25/08</p>	<p>PAGE: 1</p>



**TABLE 1**  
(BORINGS TAKEN APRIL, 1991)

ID	STATION	OFFSET	GSE	ROCK ELEV.
B1	12+79	20W	182.07	171.07
B3	11+89	20W	188.59	172.59
B5	11+99	20W	193.09	174.69
B7	11+79	18E	178.07	167.07
B4	11+89	18E	186.45	169.45
B6	11+99	18E	183.95	166.95

**TABLE 2**  
(BORINGS TAKEN 1975)

ID	STATION	OFFSET	GSE	ROCK ELEV.
B8	12+00	CL	198.79	187.79
B9	12+29	CL	200.69	187.69
B10	12+50	CL	201.79	188.79
B11	12+75	CL	204.48	185.48
B22	13+63.1	CL	215.98	180.98
B27	12+25	19W	200.75	185.75
B28	12+25	19E	200.75	179.75

**TABLE 3**  
(BORINGS TAKEN JULY, 2008)

ID	STATION	OFFSET	GSE	ROCK ELEV.
GBH-1	12+41.55	21.35W	211.82	188.52
GBH-2	12+39.71	24.45E	211.94	-
GBH-3	12+52.46	24.2E	212.13	195.13
GBH-4	12+31.55	19.21E	216.80	-
GBH-5	14+41.58	18.46E	224.10	211.90
GBH-4A	14+35.41	18.2E	223.64	-
GBH-5	12+18.84	0.6E	199.04	-

**LEGEND**

- 12+00 STATIONING
- ⊕-B12 BORING LOCATION
- ⊕-GBH-2 BORING/PIEZOMETER LOCATION

**NOTES**

- 1) THE APPROXIMATE STATIONING SHOWN WAS OBTAINED FROM VDOT RECORD PLANS.
- 2) LOCATIONS OF 'B' SERIES BORINGS (TABLE 1 AND 2) ARE APPROXIMATE.

**REFERENCES**

- 1) BASE PLAN WAS OBTAINED FROM FIGURES 1.
- 2) INFORMATION IN TABLE 1 WAS OBTAINED FROM VDOT OFFICE MEMORANDUM DATED MAY 17, 1991, PREPARED BY ROBERT F. CAULBY, P.E.
- 3) INFORMATION IN TABLE 2 WAS OBTAINED FROM DRAWING ENTITLED "RECORD PLANS - MATERIAL" DATED 1975 PROVIDED BY VDOT.

**BORING AND PIEZOMETER LAYOUT**

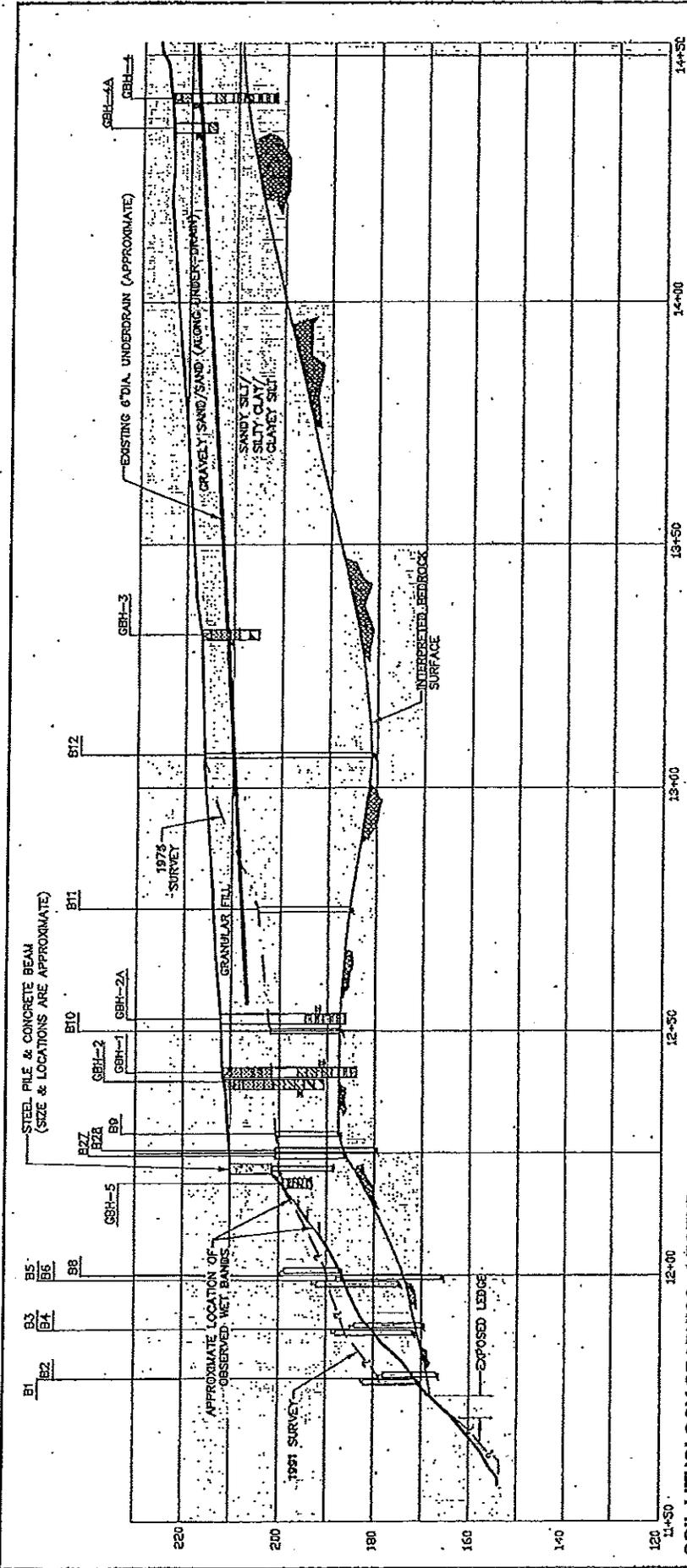
PROJECT NO. 073-86808  
 CHECKED BY: [Signature]  
 DATE: 09/28/98  
 DRAWN BY: [Signature]  
 DATE: 09/28/98

EMBAVMENT INVESTIGATION  
 BRIDGE 6 V.L. RT. 287, HIGHGATE, VT.

2

**Golden Associates**  
 Geotechnical Engineers  
 773-86808  
 07386908A001

SCALE  
 0 20 40 FEET



**SOIL LITHOLOGY GRAPHICS LEGEND**

- 2008 SURVEY
- 1981 SURVEY
- ASSUMED PROFILES
- 1975 SURVEY

**NOTES**

- 1) SEE FIGURE 2 FOR LOCATION OF CROSS SECTION.
- 2) INFORMATION FROM THE BORINGS ARE PROJECTED TO CENTERLINE OF THE ROAD TO CREATE THIS PROFILE.
- 3) UNDER-DRAIN LOCATION / DEPTH WERE OBTAINED FROM DRAWINGS ENTITLED "RECORD PLANS - MATERIAL" DATED 1975, PROVIDED BY VTRANS.

**A SECTION A-A**

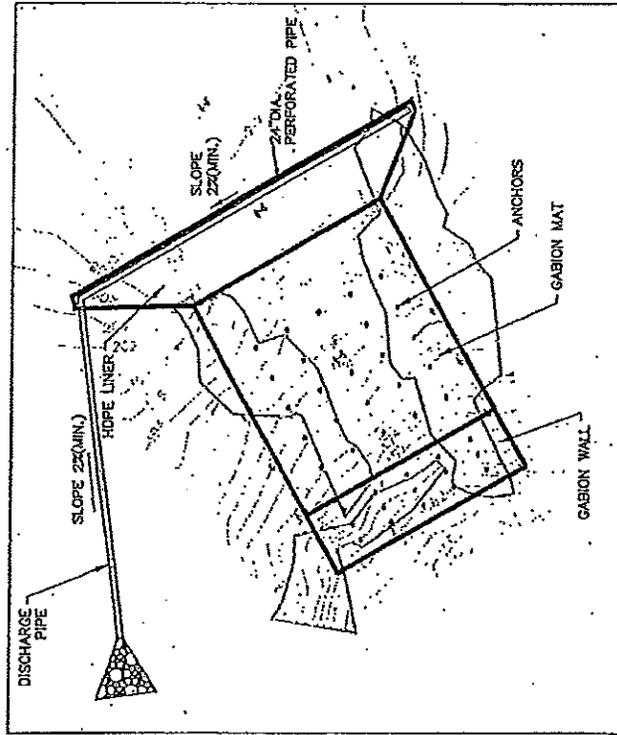
**Goldier Associates**  
 Monroeville, New Hampshire  
 A.L.S. No. 07388900A001  
 PROJECT No. 073-06908

DATE: AS SHOWN  
 DATE: 07/25/08  
 DRAWN BY: MPT  
 CHECKED BY: MPT  
 PROJECT No. 073-06908

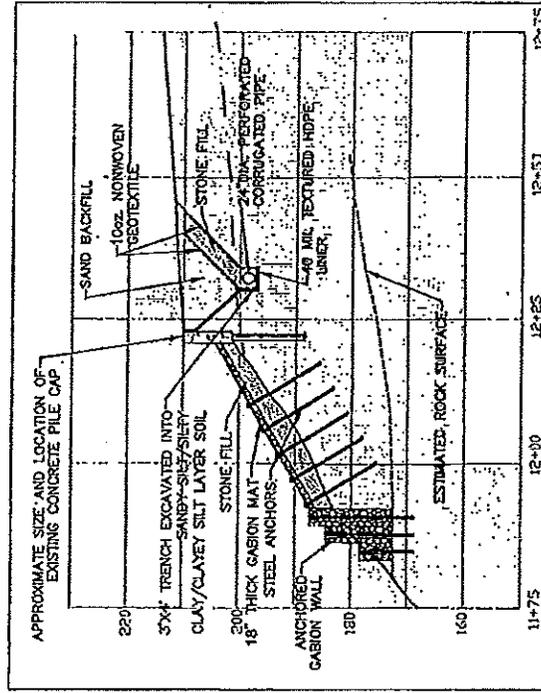
**CROSS-SECTION A-A**

EMBANKMENT INVESTIGATION  
 BRIDGE 6 VT.R.T. 207, HIGHWAY, VT

3



**A** CUTOFF TRENCH LAYOUT



**C** TRENCH/GABION STABILIZATION



**NOTES**

1.) DETAILS SHOWN ON THIS FIGURE ARE CONCEPTUAL AND SHALL NOT BE USED FOR CONSTRUCTION.



**Golden Associates, Inc.**  
Manufacturers, New Hampshire

DATE:	09/29/08
DESIGN:	MRT
CHECK:	MPS
PROJECT NO.:	07269907A003
DATE:	07/27/08
SCALE:	1/4" = 1'-0"

**CONCEPTUAL STABILIZATION OPTIONS**

VITRANS HIGHGATE, VT. **4**

APPENDIX A  
VTRANS MEMORANDA

*John* *Chris B* *WB* *WJ*

AGENCY OF TRANSPORTATION

STRUCTURES DIVISION

TO: R.F. Nicholson, Assistant Director of Construction & Maintenance  
FROM: Warren B. Tripp, Structures Engineer *WB. 577*  
DATE: June 6, 1991  
SUBJECT: Highgate VT 207, Br. 8

Regarding the recommendations from the Materials Division I have some reservations. I fully agree with eliminating any source of water which may be saturating the slope and causing it to be unstable. I do however have serious doubts about placing a blanket of stone fill 2 or 3 feet in thickness over the entire slope and expect it to stay there. If it stayed it would be fine but if it doesn't we will have a much more serious problem than we have now. We will be asking the impossible of a contractor to go in there and remove the existing earth and stone fill and then replace it with new stone. I would take a more cautious approach to this problem situation. I would first remove any source of surface water that could be contributing to the problem. I would then have a contractor attempt to remove as much of the sloughed material as possible so as to uncover the bearings of the slant legs and flatten the slope somewhat. I would then take a wait and see approach before loading the slope with a lot of stone fill. Possibly a short concrete retaining wall or stone fill key could be constructed behind the bearings once the slope has dried out.

Please keep us informed of you decisions for solving this problem.

If you wish to have a meeting to discuss this further, we will be available.

WBT:DEL:mrd  
cc: Materials & Research Division  
J. Bushey, DTA, District #8  
DEP/DEL  
Files



AGENCY OF TRANSPORTATION

*Chris*  
OFFICE MEMORANDUM

TO: Roy F. Nicholson, P.E., Ass't. Director, Construction & Maintenance Div.

FROM: Robert F. Cauley, P.E., Materials & Research Engineer

DATE: May 17, 1991 *RFC*

SUBJECT: Highgate, VT. 207 Over The Missisquoi River, Bridge No. 8

As requested, an embankment erosion problem at the north end of this bridge was investigated. The investigation included inspection of the area, review of the record plans, lengthy discussions with Construction personnel assigned to the project, and six boreholes drilled over the edge of the structure to determine a ledge profile along each fascia at the north end of the bridge. The area of concern is located between the north abutment and the northern footing and support for the legs of the superstructure. Embankment material, including boulders, cobbles and saturated soil, slid onto the bearing devices and around the concrete and steel supports at the legs of the frame. This undesirable condition has created a severe maintenance problem and considerable concern for the long term safety and durability of the structure and approach embankment.

The following sections outline the results of our investigation and present recommendations for remediation of the problem.

West Fascia

1. Boreholes B-1, B-3 and B-5 indicated that ledge is at an average elevation of 172' and appears to be in a horizontal plain. See Figure 1.
2. Borehole B-5 showed that the existing slope surface 20' from centerline is 4' below the original designed cut slope surface. This is a good indication of the amount of eroded material along the fascia of the bridge.
3. Field inspection of the area revealed that the slope is in a saturated condition. This is facilitated by flowing water onto the slope caused by separation at the joints of a 6" PVC pipe. The majority of the pipe is buried but it is believed that the 6" PVC pipe is connected to the outlet of a 15" culvert pipe which crosses TH 40 west of Vt. 207. It is reasonable to assume that water flowing in the ditch along Vt. 207, which is carried through the culvert pipe, is the source of surface water.

East Fascia

1. Boreholes B-2, B-4 and B-6 indicated that ledge is at an average elevation of 168' and is in a horizontal plain. Ledge at the east side drops about 5' from the west side. It appears that ledge is dipping easterly. See Figure 2.
2. The existing cut slope surface at STA 11+99 was found to be about 8' lower than the designed grade. Displaced rock and soil were found at the toe of the slope around the bearing devices of the structure pier legs.
3. The toe of the slope appears to be in a wet condition with the upper part of the slope saturated. This situation is aggravated by surface water discharged from a culvert pipe onto the slope. This culvert pipe crosses TH 40 at the east side of Vt. 207.

Construction records indicated that the final cut made in the ledge north of the pier footing was 1.5V to 1.0H. The original plans call for a nearly vertical bench. The steepend slope, combined with the wet soil, is the major contributor to the unstable condition of the slope.

RECOMMENDATIONS:

It is believed that the erosion problem is caused by surface water being discharged onto the slope, saturating the soil. The saturated soil has reduced strength, inhibiting its ability to resist driving forces higher on the slope, which creates a perpetual erosion problem. Therefore, it is recommended to:

1. Reconstruct and extend both culvert pipes crossing TH 40 to the east and west of Vt. 207. The pipes should outlet closer to the Missisquoi River so none of the surface water presently running onto the embankment can do so.
2. Flatten the existing slope from 1 horizontal to 1.5 vertical, to 1.1 horizontal to 1.0 vertical. To increase slope stability, a blanket of Type II stone fill keyed in at the toe of the slope where the embankment meets the ledge is required. A geotextile fabric meeting the requirements of Section 649.02, placed against the slope to prevent piping of fines, is recommended. See Figure 3.

Enclosed please find copies of six boreholes performed and three figures.

CCB:SAB:etn

Enclosures

cc: RFC/Lab File - CCB/SAB File - READ. FILE - CF

FIGURE NO-1  
 HIGHGATE BRIDGE  
 WEST FASCIA @ NORTH ABUTMENT.  
 SCALE 1" = 10'  
 DATE: 5-16-1991  
 SAG

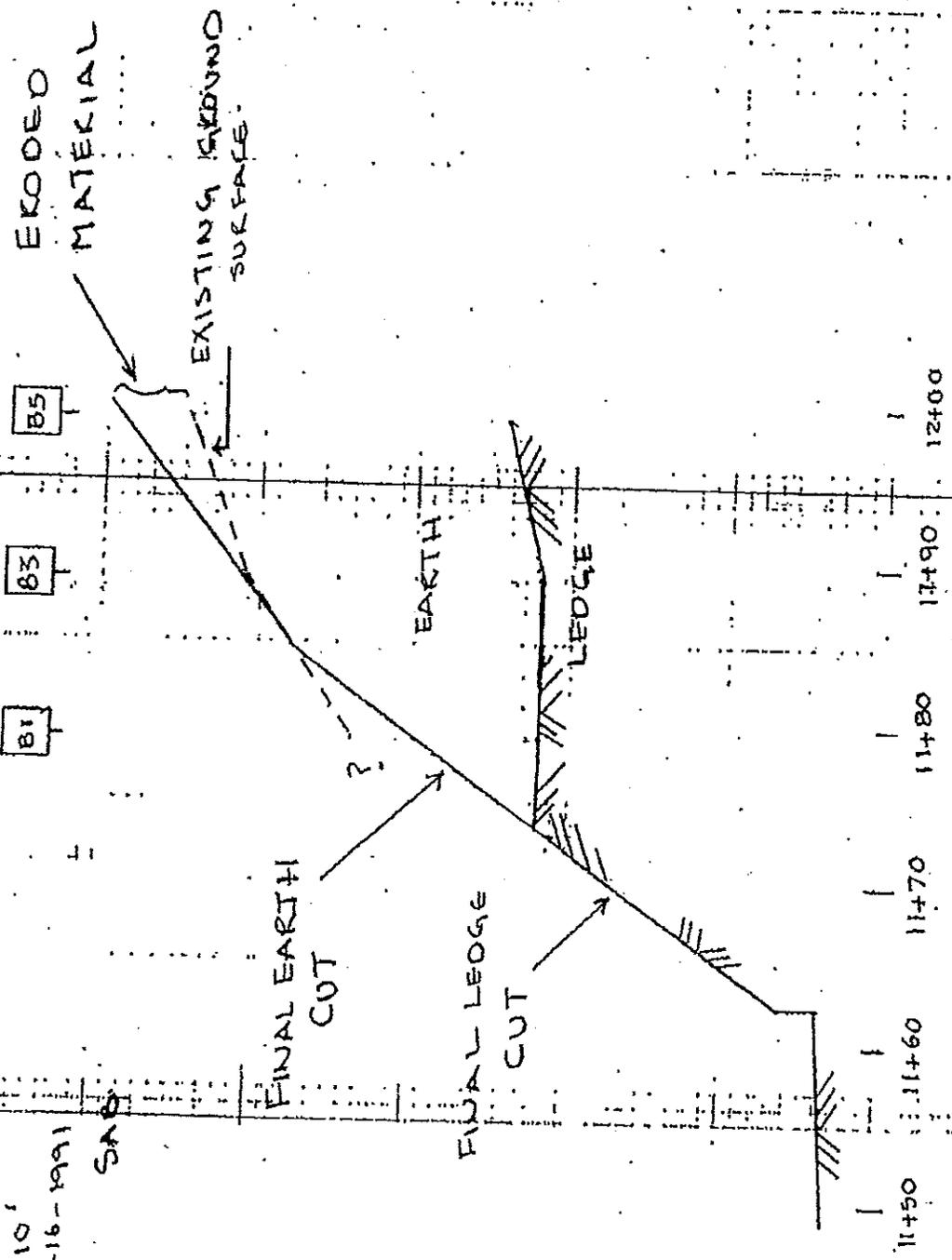
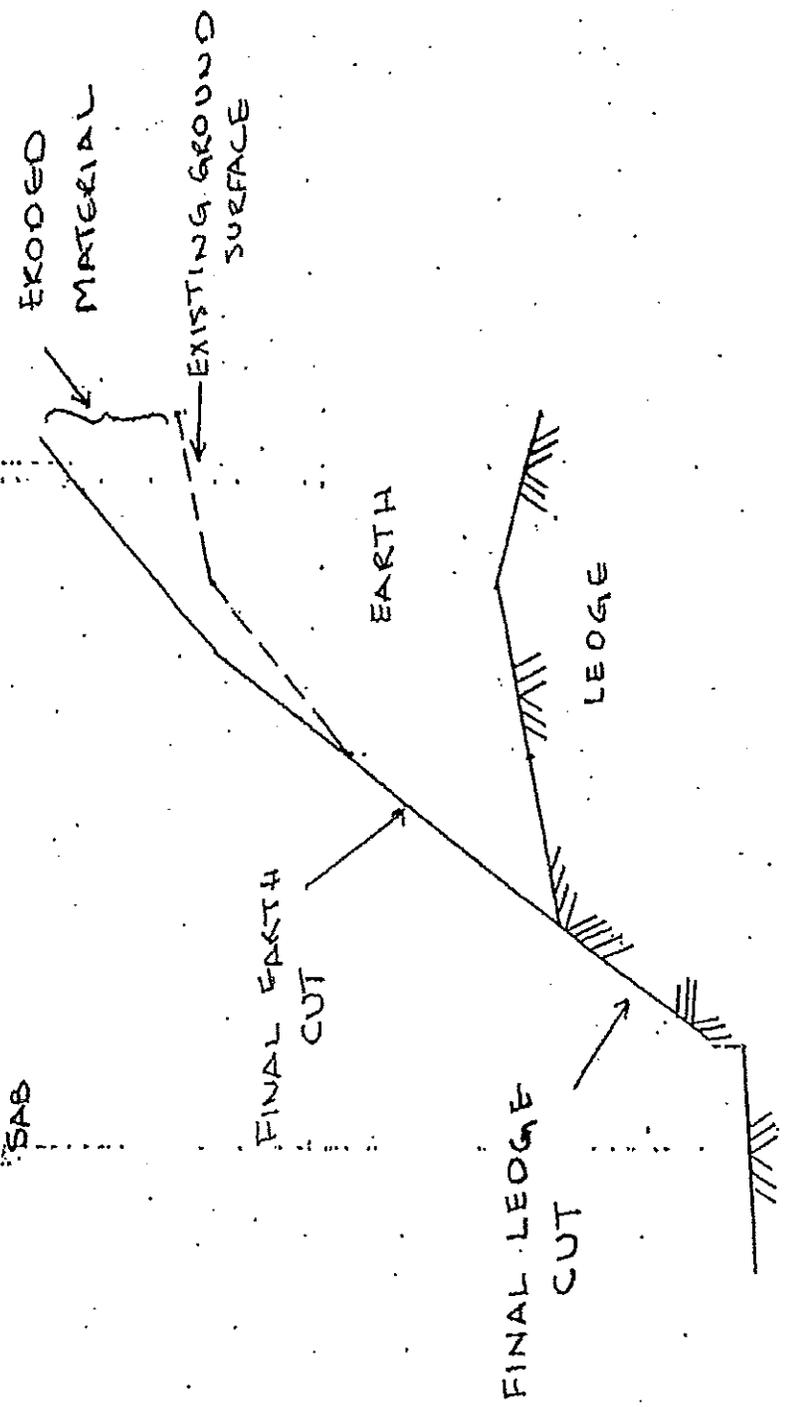


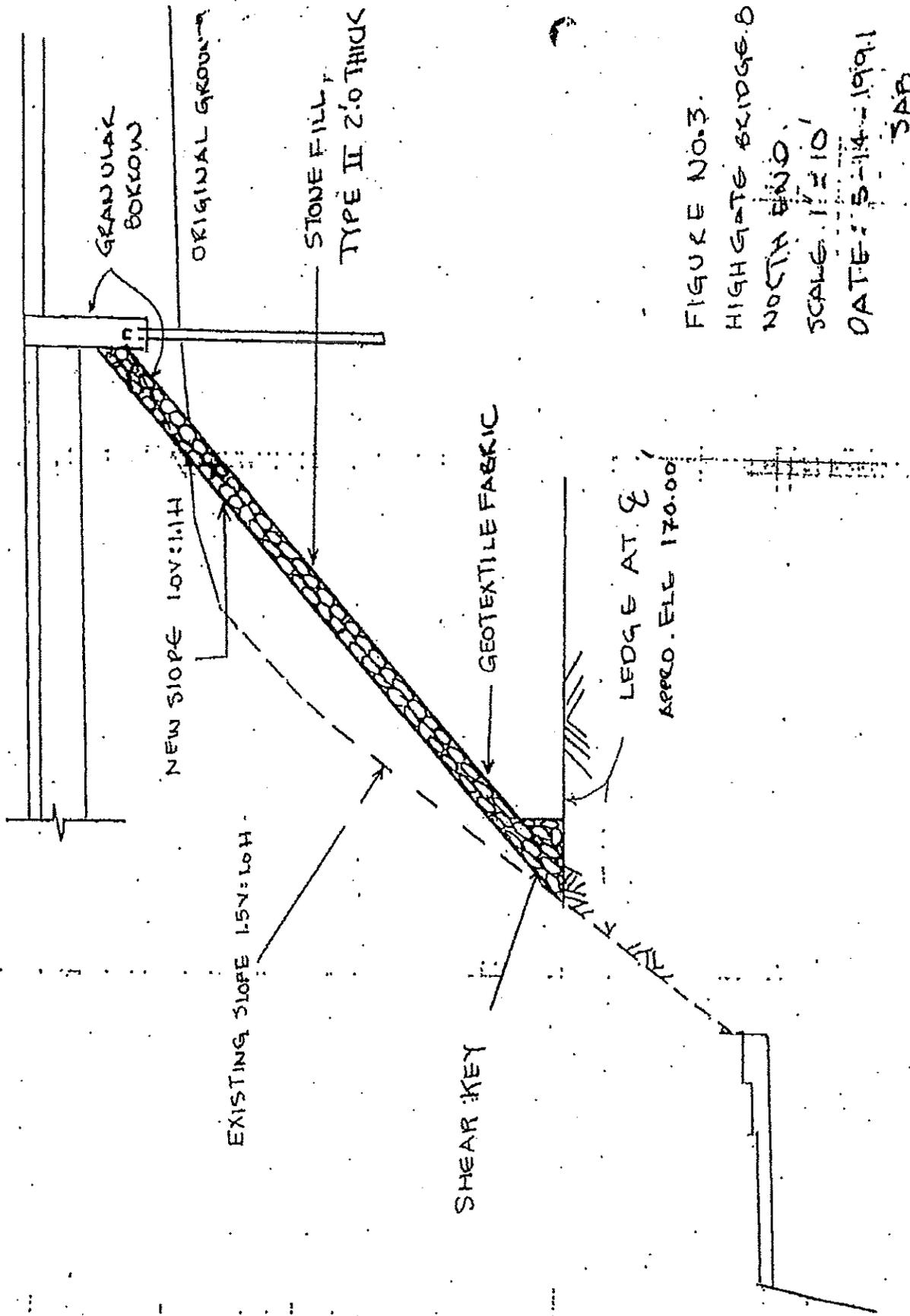
FIGURE NO. 2  
 HIGHGATE BELOUE 8  
 EAST FASCIA @ NORTH ABUTMENT.  
 SCALE 1" = 10'  
 DATE: 5-16-1991

87  
 84  
 86



11+50    11+60    11+70    11+80    11+90    12+00

210  
 200  
 190  
 180  
 170  
 160  
 150





BY: BAO DATE: 5/18/91  
CHKD. BY: BAO DATE: 5/18/91

SUBJECT: \_\_\_\_\_

SHEET NO. \_\_\_\_\_ OF \_\_\_\_\_  
JOB NO. \_\_\_\_\_

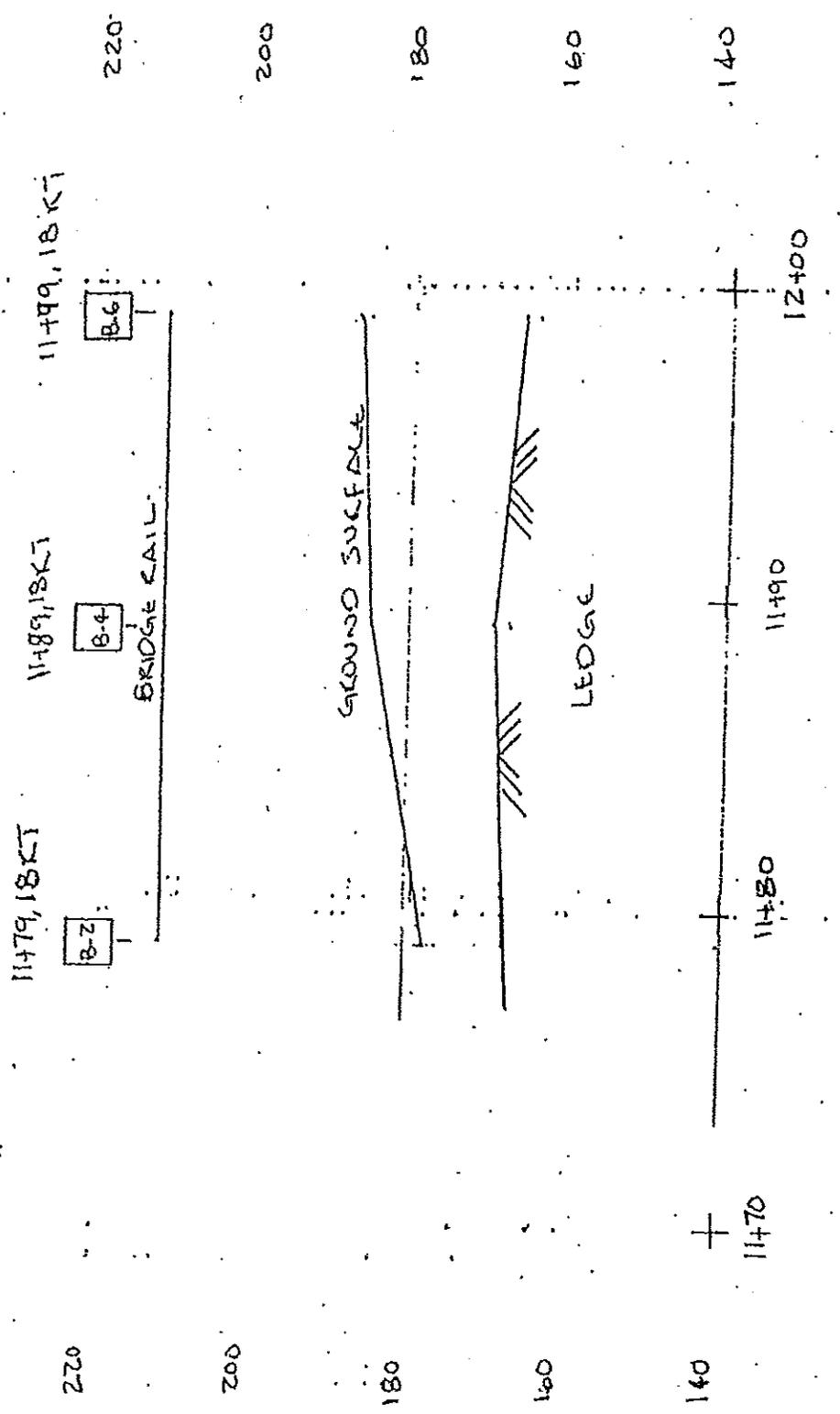


FIGURE NO. 2  
HIGHWAY BRIDGE &  
EAST FASCIA @ NORTH  
ABUTMENT.  
SCALE 1" = 20'  
DATE: 5-2-1991

Boring Crew  
 Crew Chief McGILLEN  
 Crew \_\_\_\_\_

STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH DIVISION  
 SUBSURFACE INFORMATION

Sheet 1 of 1  
 Date Started 4-16-91  
 Date Completed \_\_\_\_\_

PROJECT HIGHGATE BRIDGE 6 - VT 207 NO. BRS-0297(6)SA  
 STRUCTURE IDENTIFICATION BRIDGE No. 8 HOLE NO. B-1  
 STATION 11+79 OFFSET 20LT GROUND EL. 212.07 GW. EL. \_\_\_\_\_  
↳ TOP OF CONCRETE RAIL

DEPTH BELOW GND. SUR.	BLOWS ON CASING	BLOWS ON SAMPLER			N. Bls/Ft.	MOISTURE	COLOR	FIELD IDENTIFICATION AND REMARKS	LABORATORY CLASSIFICATION OF SOIL	
		0-6	6-12	12-18					LL	PI
								TOP OF SKID 2' ABOVE		
10										
20										
30								GROUND LL VLL 30.0		
40								BED ROCK AT 41.0 BXMOL 41.0 - 46.0 REC 3.6		

Boring Crew  
 Crew Chief MCGYLAN  
 Crew \_\_\_\_\_

STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH DIVISION  
 SUBSURFACE INFORMATION

Sheet 1 of 1  
 Date Started 4-18-91  
 Date Completed \_\_\_\_\_

PROJECT HIGHGATE BRIDGE B, VT 207 NO. BRS-0297(6) SA  
 STRUCTURE IDENTIFICATION BRIDGE NO. 8 HOLE NO. B-2  
 STATION 11+79 OFFSET 18 RT GROUND EL. 212.07 GW. EL. \_\_\_\_\_  
 ↳ TOP OF CONCRETE RAIL

DEPTH BELOW GND. SUR.	BLOWS ON CASING	BLOWS ON SAMPLER			N. Bls./FT.	MOISTURE	COLOR	FIELD IDENTIFICATION AND REMARKS	LABORATORY CLASSIFICATION OF SOIL	
		0 6	6 12	12 18					LL	PI
								TOP OF SKID 2' ABOVE BRIDGE RAIL		
10										
20										
30										
40								GROUND LEVEL AT 34.0'		
								BED ROCK AT 45.0' BX MDC 45.0-50.0 REC 4.8		

Boring Crew  
 Crew Chief McGYLNN  
 Crew \_\_\_\_\_

STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH DIVISION  
 SUBSURFACE INFORMATION

Sl. No. 1 of 1  
 Date Started 4-16-91  
 Date Completed \_\_\_\_\_

PROJECT HIGH GATE BRIDGE B, VT 207 NO. BRS-0297 (6)SA  
 STRUCTURE IDENTIFICATION BRIDGE NO. 8 HOLE NO. B-3  
 STATION 11+89 OFFSET 20 LT GROUND EL. 212.59 GW. EL. \_\_\_\_\_  
 ↳ TOP OF CONCRETE RAIL

DEPTH BELOW GND. SUR.	BLOWS ON CASING	BLOWS ON SAMPLER			N.Bls./FT.	MOISTURE	COLOR	FIELD IDENTIFICATION AND REMARKS	LABORATORY CLASSIFICATION OF SOIL	
		0-6	6-12	12-18					LL	PI
							TOP OF SH-10 2' ABOVE BRIDGE RAIL			
16										
20										
30							GROUND LEVEL AT 23.0'			
40							BED ROCK AT 40.0' BXMOC 40.0-45.0 REC 3.7'			

Boring Crew  
 Crew Chief McGYLNN  
 Crew \_\_\_\_\_

STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH DIVISION  
 SUBSURFACE INFORMATION

Sheet 1 of 2  
 Date Started 4-17-91  
 Date Completed \_\_\_\_\_

PROJECT HIGHGATE BRIDGE 8, VT 207 NO. BRS-0297(6)SA  
 STRUCTURE IDENTIFICATION BRIDGE No. 8 HOLE NO. B-4  
 STATION 11+89 OFFSET 18R1 GROUND EL. 212.45 GW. EL. \_\_\_\_\_  
 ↳ TOP OF CONCRETE RAIL

DEPTH BELOW GND. SUR.	BLOWS ON CASING	BLOWS ON SAMPLER			N, Bls/Ft.	MOISTURE	COLOR	FIELD IDENTIFICATION AND REMARKS	LABORATORY CLASSIFICATION OF SOIL	
		0-6	6-12	12-18					LL	PI
								TOP OF SKID 2' ABOVE BRIDGE RAIL		
10										
20										
30								GROUND LEVEL AT 26...		
40								8XMI AHEAD 39.0-43.0 BU'S		
								BED ROCK AT 43.0'		
								8XMDG 43.0'-48.0' REG 0.9 POOR REC. DUE TO CORE BARREL PLUGGING AND CORE GRINDING UP.		



Boring Crew  
 Crew Chief MCGY LUN  
 Crew \_\_\_\_\_

STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH DIVISION  
 SUBSURFACE INFORMATION

S. of \_\_\_\_\_ 1 of \_\_\_\_\_ 1  
 Date Started 4-15-91  
 Date Completed \_\_\_\_\_

PROJECT HIGH GATE BRIDGE 8, VT 207 NO. BRS-0297(6)SA  
 STRUCTURE IDENTIFICATION BRIDGE No. 8 HOLE NO. B-5  
 STATION 11+99 OFFSET 20.7 GROUND EL. 213.09 GW. EL. \_\_\_\_\_  
 ↳ TOP OF CONCRETE RAIL

DEPTH BELOW GND. SUR.	BLOWS ON CASING	BLOWS ON SAMPLER			N. Bls/ft.	MOISTURE	COLOR	FIELD IDENTIFICATION AND REMARKS	LABORATORY CLASSIFICATION OF SOIL	
		0-6	6-12	12-18					LL	PI
								TOP OF SKID 2' ABOVE BRIDGE RAIL		
0										
20								GROUND LEVEL AT 20.0'		
30										
40								BED ROCK 38.4'		
								BAM DC 38.4-42.4 REC 3.5'		
								BXMDL 42.4-45.9 REC 1.0'		

Boring Crew  
 Crew Chief MIC GYLLW  
 Crew \_\_\_\_\_

STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH DIVISION  
 SUBSURFACE INFORMATION

Sheet 1 of 1  
 Date Started 4-18-91  
 Date Completed \_\_\_\_\_

PROJECT HIGHGATE BRIDGE 8, VT 207 NO. BRS-0297 (6) SA  
 STRUCTURE IDENTIFICATION BRIDGE NO. 8 HOLE NO. B-6  
 STATION 11+97 OFFSET 18 RT GROUND EL. 212.95 GW. EL. \_\_\_\_\_

DEPTH BELOW GND. SUR.	BLOWS ON CASING	BLOWS ON SAMPLER			N, Bls/FT	MOISTURE	COLOR	FIELD IDENTIFICATION AND REMARKS	LABORATORY CLASSIFICATION OF SOIL	
		0-6	6-12	12-18					LL	PI
								TOP OF SMO 2' ABOVE BRIDGE RAIL		
10										
20										
30								GROUND LEVEL AT 24.5'		
40										
								BED ROCK AT 46.0'		
								BXMDC 46.0-52.0' REC 2.5		

AGENCY OF TRANSPORTATION

OFFICE MEMORANDUM

CONSTRUCTION AND MAINTENANCE DIVISION

*RLD*

TO: Chris Benda, F.E.  
Soils and Foundations Engineer *R.F.N.*

FROM: Roy F. Nicholson, Assistant Director of  
Construction and Maintenance

DATE: 26 February 91

SUBJECT: Highgate--Bridge #6  
VT 207 Over the Missisquoi River

In response to your memo of February 19, 1991, on the above-referenced, I thank you for your prompt attention to my request and approve your recommendation (number 4.).

This memo is to confirm our phone conversation of this date.

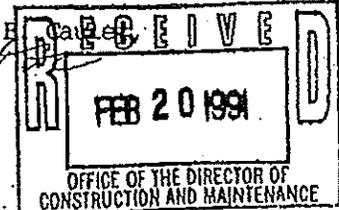
nrc

cc: Director Merchant  
Jack Clifford

AGENCY OF TRANSPORTATION

OFFICE MEMORANDUM

TO: Roy F. Nicholson, P.E., Ass't. Director, Construction & Maintenance Div.  
FROM: <sup>CB</sup> C. C. Benda, P.E., Soils & Foundations Engineer via Robert E. Gayer  
DATE: February 19, 1991  
SUBJECT: Highgate - Vt. 207 Over The Missisquoi River



As you requested in our phone conversation on February 14, 1991, I am listing the options and their drawbacks for determining the ledge profile at the north end of the bridge.

1. Drill with hand steel.  
This method will provide no information with regard to the quality of ledge, and boulders may be easily mistaken for bedrock. The original borings designate the ledge as brittle limestone; therefore, I believe we would be doing a disservice if we used handsteel.
2. Core through deck.  
In order to get a reasonable profile, a minimum of six borings would be required, three on each side of the bridge parallel to centerline. I don't need to elaborate on the effects of putting six holes in a 15 year old bridge deck.
3. Position skid drill rig on staging below the bridge.  
As you are aware, access, particularly on the east side, is very limited. Erecting staging, although possible, would not only be quite costly but extremely dangerous. The footing on frozen ground covered with snow is poor and the sloping ground makes mobilization hazardous. I don't feel we need to subject our personnel to the risks involved.
4. Drill over edge of structure using existing equipment in our fleet.  
This method will require the fabrication of a working platform and support system for the drill rig and drillers. The required fabrication could be done by Central Garage personnel and the costs spread among federally funded projects where the equipment could be used in the future. As the outrigging system will need to support close to two tons, the material and labor involved for this option may be as much as \$2,000.00.
5. Drill over edge with lightweight drill equipment rented from Mobil Drill Co.  
This alternative would require less fabrication time and materials to erect the support for the drillers and drilling apparatus but rental charges and capitol expenditures could not be easily distributed among other projects.
6. Contract the job to others.  
I know this option has been exercised before but, in the long run, my feeling is the quality of the information obtained will not be as good and the cost to the Agency will be greater.

Vt. Agency of Transportation  
Materials & Research Division  
Highgate, VT

February 19, 1991  
Page 2 of 2

I have reviewed these options with our boring crew supervisor and he and I prefer Number 4. This alternative would expedite the actual drilling operation and provide the safest working conditions for our crew.

Please let me know if you concur so that we can make the necessary arrangements to proceed.

RFC:CCB:etn

cc: RFC/Lab File  
CCB File  
READ. FILE  
Central Files

AGENCY OF TRANSPORTATION

OFFICE MEMORANDUM

TO: Jack Clifford, Chief of Technical Services

FROM: Christopher C. Benda, P.E., Soils & Foundations Engineer via  
 Robert F. Cauley, P.E., Materials & Research Engineer

DATE: August 27, 1991

SUBJECT: Highgate, Vt. 207 Over Missisquoi River, Bridge No. 8

Four monitoring wells placed on the subject project on August 1, 1991 were located as shown on the attached sketch. Additional auger borings taken on August 9, 1991 to help chart ground water flow were as follows:

<u>STATION</u>	<u>OFFSET</u>
13+05	17' Rt.
14+38	18' Lt.
14+88	18' Lt.

Groundwater table elevations measured on August 9, 1991 resulted in the following:

<u>MONITORING WELL NO.</u>	<u>STATION</u>	<u>OFFSET</u>	<u>DEPTH TO G.W.</u>
W1	13+41	19.5' Lt.	19.5
W2	12+43	14.5' Lt.	24.9
W3	13+38	17.5' Rt.	4.4
W4	12+41	13' Rt.	NO WATER

Groundwater was also detected at Station 13+05 at 17 feet right at a depth of 3 feet.

Our drilling supervisor, Dennis Gove, believes that, as a result of the auger borings taken, water may be flowing along the east side of the roadway in a path which follows the ditch dug for the telephone conduit. The water is outletting at the northeast corner of the bridge by the sheet piling where a significant amount of erosion has taken place.

RFC:CCB:etn

Attachment

cc: R. Nicholson  
 J. Bushey  
 RFC/Lab File  
 CCB File  
 READ. FILE  
 Central Files

Highgate

UT 207 OVER MISSISSIPPI

Borings and wells  
Stationed with Begin  
Bridge @ Sta. 12+19

Elevations taken using  
finished grade of 211.51  
@ Sta. 12+19.2

x Cove  
Raymond  
Powers

8/9/91

14+80  
2+50

0.0-2.0 S&G Brn. Moist  
2.0-4.0 S& " "  
4.0-10.0 C/Si Grey "  
10.0-30.0 SiCl " MTW  
✓ NLTD

14+38 10+0

0.0-6.0 S&G Brn Moist  
6.0-8.5 C/Si Grey "  
✓ TLOB

UT  
18'RT

UT  
18'RT

RT  
 17X 11733 1340S  
 0.0 - 5.0 C1Sa B17 MTW  
 ✓ NLTD 3.0 TGM

Water Levels 8/9/91

W1 19.5 13441  
 10478 19.5' RT LT  
 12443  
 W2 24.9 14776 15.5' RT LT  
 13438  
 W3 4.4 10487 17.5' RT  
 12441  
 W4 No Water 11477 13' RT

Sta. 12+19  
 F.G. 123622387 211.51

W1 Top of Pipe 3.81 22806  
 W2 " 10.43 21944  
 W3 " 4.59 21920  
 W4 " 10.73 213.14  
 11733 17LLF 7.90 215.97

From the Auger Hole drilled @ Sta. 11733 RT it appears that perhaps the ground water is following the ditch dug for the telephane cable on the left side (EAST) of the highway and coming out by the sheet piling by the front of the abut. You can see where the water has flowed down the bank!



**APPENDIX B**

**BORING/MONITORING WELL LOGS**



STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH SECTION  
 SUBSURFACE INFORMATION

BORING NUMBER: GBH-1  
 SHEET 1 of 1  
 DATE STARTED: 7/14/08  
 DATE COMPLETED: 7/14/08

PROJECT NAME: Highgate, VT-207, Bridge 6  
 SITE NAME: Highgate, Vermont  
 STATION: 12+41.55  
 OFFSET: 21.35'W  
 VTSPG: N 888103.40 ft E 1498046.56 ft

PROJECT NUMBER: 073-86908  
 SITE NUMBER: BM08MRO-400  
 GROUND ELEVATION: 211.82 ft  
 GROUNDWATER DEPTH: 24.45 ft 7/17/08  
 PROJECT PIN NUMBER:

BORING CREW: VTtrans  
 CREW CHIEF: Glen Porter  
 DRILLER: Glen Porter  
 LOGGER: Jess Alexander

BORING RIG: CME-B57  
 BORING TYPE: WASH BORE  
 SAMPLE TYPE: SPLIT BARREL  
 CHECKED BY:

DEPTH (ft)	SYMBOL	CLASSIFICATION OF MATERIALS (Description)	WELL DIAGRAM	BLOWS PER FOOT	M.O. (%)	GRAVEL (%)	SAND (%)	FINES (%)
Top of Well Elevation: 214.38 ft								
		A-1-b, GrSa, Rec. = 1.3 ft		6		30.6	50.6	18.0
		A-3, Sa, Rec. = 1.0 ft		8		17.4	73.2	9.4
5		A-3, Sa Sample Not Analyzed, Rec. = 0.0 ft		4				
		A-2-4, Sa, Rec. = 1.3 ft		14		16.0	68.4	15.5
		A-2-4, SiSa				9.6	60.6	29.8
		A-3, Sa, Rec. = 1.0 ft		15		14.7	76.5	9.8
10								
		A-4, SaSi, Rec. = 1.6 ft		12		10.8	23.7	65.5
		A-4, SaSi Pushed Shelby Tube., Rec. = 1.4 ft						
15								
		A-4, GrSi, Rec. = 1.4 ft		64		36.6	19.2	44.3
20								
		Gray, Weathered, SHALE., 23.2 ft - 27.0 ft						
25		Rec. = 1.4 ft		11				
		Hole stopped @ 27.0 ft						

JMS COPY HIGHGATE.GPJ VT.AOT.SDT 9/10/08



STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
MATERIALS & RESEARCH SECTION  
SUBSURFACE INFORMATION

BORING NUMBER: GBH-2  
SHEET 1 of 1  
DATE STARTED: 7/15/08  
DATE COMPLETED: 7/15/08

PROJECT NAME: Highgate, VT-207, Bridge 6  
SITE NAME: Highgate, Vermont  
STATION: 12+39.71  
OFFSET: 24.45'E  
VTSPG: N 886124.15 ft E 1498087.42 ft

PROJECT NUMBER: 073-86908  
SITE NUMBER: BM08MRO-400  
GROUND ELEVATION: 211.34 ft  
GROUNDWATER DEPTH: 19.9 ft 7/17/08.  
PROJECT PIN NUMBER:

BORING CREW : VTrans.  
CREW CHIEF: Glen Porter  
DRILLER: Glen Porter  
LOGGER: Jess Alexander

BORING RIG: CME-B57  
BORING TYPE: WASH BORE  
SAMPLE TYPE: SPLIT BARREL  
CHECKED BY:

DEPTH (ft)	SYMBOL	CLASSIFICATION OF MATERIALS (Description)	WELL DIAGRAM	BLOWS PER FOOT	M.C. (%)	GRAVEL (%)	SAND (%)	FINES (%)
Top of Well Elevation: 213.92 ft								
		A-2-4, SiGrSa, Rec. = 1.5 ft		5		24.2	64.9	20.9
		A-2-4, SiGrSa, Rec. = 0.0 ft, Pushed Gravel Piece.		6				
5		A-3, Sa, Rec. = 0.9 ft		0		13.9	78.3	7.8
		A-3, Sa, Rec. = 1.3 ft		7		17.4	74.8	7.8
		A-3, Sa, Rec. = 1.2 ft		14		11.8	79.5	8.8
10		A-4, SaSi, Rec. = 1.3 ft		5		0.3	46.2	53.5
		A-4, SaSi, Rec. = 1.5 ft		20		0.0	28.3	71.7
15		A-4, SaSi, Rec. = 1.6 ft		17		0.0	39.2	60.8
		A-6, SiCl, Rec. = 1.7 ft		7		0.0	0.8	99.2
		A-6, SiCl, Rec. = 2.0 ft				0.0	2.9	97.1
20		Hole stopped @ 20.0 ft						
25								



STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH SECTION  
 SUBSURFACE INFORMATION

BORING NUMBER: GBH-2A  
 SHEET 1 of 1  
 DATE STARTED: 7/17/08  
 DATE COMPLETED: 7/17/08

PROJECT NAME: Highgate, VT-207, Bridge 6  
 SITE NAME: Highgate, Vermont  
 STATION: 12+52.46  
 OFFSET: 24.2'E  
 VTSPG: N 888135.30 ft E 1498080.83 ft

PROJECT NUMBER: 073-86908  
 SITE NUMBER: BM08MRO-400  
 GROUND ELEVATION: 212.13 ft  
 GROUNDWATER DEPTH: NM  
 PROJECT PIN NUMBER:

BORING CREW: VTrans  
 CREW CHIEF: Glen Porter  
 DRILLER: Glen Porter  
 LOGGER: Jess Alexander

BORING RIG: CME-B57  
 BORING TYPE: WASH BORE  
 SAMPLE TYPE: SPLIT BARREL  
 CHECKED BY:

DEPTH (ft)	SYMBOL	CLASSIFICATION OF MATERIALS (Description)	WELL DIAGRAM	BLOWS PER FOOT	M.C. (%)	GRAVEL (%)	SAND (%)	FINES (%)
Top of Well Elevation: 214.71 ft								
0.0 - 17.0		No samples taken, Borehole advanced to well screen interval.						
17.0 - 24.8		Highly Fractured Weathered SHALE and SILT.						
24.8 - 25.0		Out of SHALE. A-1-b, SaGr, Rec. = 1.0 ft, Weathered SHALE.		50		50.5	29.5	20.0
25.0 - 28.0		Hole stopped @ 28.0 ft						

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STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH SECTION  
 SUBSURFACE INFORMATION

BORING NUMBER: GBH-3  
 SHEET 1 of 1  
 DATE STARTED: 7/15/08  
 DATE COMPLETED: 7/16/08

PROJECT NAME: Highgate, VT-207, Bridge 6  
 SITE NAME: Highgate, Vermont  
 STATION: 13+31.56  
 OFFSET: 19.21'E  
 VTSPG: N 888201.69 ft E 1498037.62 ft

PROJECT NUMBER: 073-86908  
 SITE NUMBER: BM08MRO-400  
 GROUND ELEVATION: 216.8 ft  
 GROUNDWATER DEPTH: 5.84 ft 7/17/08  
 PROJECT PIN NUMBER:

BORING CREW: VTrans  
 CREW CHIEF: Glen Porter  
 DRILLER: Glen Porter  
 LOGGER: Jess Alexander

BORING RIG: CME-B57  
 BORING TYPE: WASH BORE  
 SAMPLE TYPE: SPLIT BARREL  
 CHECKED BY:

DEPTH (ft)	SYMBOL	CLASSIFICATION OF MATERIALS (Description)	WELL DIAGRAM	BLOWS PER FOOT	M.C. (%)	GRAVEL (%)	SAND (%)	FINES (%)
		Top of Well Elevation: 216.85 ft						
		A-1-b, GrSa, Rec. = 1.2 ft		12		44.6	46.2	9.2
		A-3, Sa, Rec. = 1.0 ft		9		18.3	72.1	9.6
6		A-3, Sa, Rec. = 0.9 ft, Pushed Shelby Tube		4		9.5	84.8	5.8
		A-3, Sa, Rec. = 0.3 ft		0		6.6	87.5	5.9
		Rec. = 0.0 ft, 8.0 ft - 10.0 ft, No Recovery		2				
10		A-4, ClSI, Rec. = 2.0 ft, Pushed Shelby Tube						
		Hole stopped @ 12.0 ft						
15								
20								
25								

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STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH SECTION  
 SUBSURFACE INFORMATION

BORING NUMBER: GBH-4  
 SHEET 1 of 1  
 DATE STARTED: 7/16/08  
 DATE COMPLETED: 7/16/08

PROJECT NAME: Highgate, VT-207, Bridge 6  
 SITE NAME: Highgate, Vermont  
 STATION: 14+41.58  
 OFFSET: 18.46'E  
 VTSPG: N 888298.02 ft E 1497989.75 ft

PROJECT NUMBER: 073-86908  
 SITE NUMBER: BM08MRO-400  
 GROUND ELEVATION: 224.1 ft  
 GROUNDWATER DEPTH: 5.58 ft 7/17/08  
 PROJECT PIN NUMBER:

BORING CREW: VTrans  
 CREW CHIEF: Glen Porter  
 DRILLER: Glen Porter  
 LOGGER: Jess Alexander

BORING RIG: CME-B57  
 BORING TYPE: WASH BORE  
 SAMPLE TYPE: SPLIT BARREL  
 CHECKED BY:

DEPTH (ft)	SYMBOL	CLASSIFICATION OF MATERIALS (Description)	WELL DIAGRAM	BLOWS PER FOOT	M.O. (%)	GRAVEL (%)	SAND (%)	FINES (%)
Top of Well Elevation: 224.05 ft								
		A-1-b, GrSa, Rec. = 1.8 ft		14		40.8	49.1	10.0
		A-3, Sa, Rec. = 10.0 ft		10		14.0	75.7	10.3
5								
		A-4, ClSi, Rec. = 6.0 ft		6		0.0	1.1	98.9
10								
		SHALE Boulder, 12.8 ft - 14.8 ft						
15								
		A-2-4, SaSlGr, Rec. = 1.7 ft		22		37.0	28.2	34.8
		SHALE Ledge, 17.5 ft - 22.0 ft						
20								
		Hole stopped @ 22.0 ft						
25								

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STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH SECTION  
 SUBSURFACE INFORMATION

BORING NUMBER: GBH-4A  
 SHEET 1 of 1  
 DATE STARTED: 7/17/08  
 DATE COMPLETED: 7/17/08

PROJECT NAME: Highgate, VT-207, Bridge 6  
 SITE NAME: Highgate, Vermont  
 STATION: 14+35.41  
 OFFSET: 18.2'E  
 VTSPG: N 888292.23 ft E 1497991.86 ft

PROJECT NUMBER: 073-86908  
 SITE NUMBER: BM08MRO-400  
 GROUND ELEVATION: 223.64 ft  
 GROUNDWATER DEPTH: 5.61 ft 7/17/08  
 PROJECT PIN NUMBER:

BORING CREW: VTrans  
 CREW CHIEF: Glen Porter  
 DRILLER: Glen Porter  
 LOGGER: Jess Alexander

BORING RIG: CME-B57  
 BORING TYPE: WASH BORE  
 SAMPLE TYPE: SPLIT BARREL  
 CHECKED BY:

DEPTH (ft)	SYMBOL	CLASSIFICATION OF MATERIALS (Description)	WELL DIAGRAM	BLOWS PER FOOT	M.C. (%)	GRAVEL (%)	SAND (%)	FINES (%)
		Top of Well Elevation: 223.65 ft						
0.0 - 7.0		No samples taken. Borehole advanced to well screen interval.						
8.0 - 9.0		A-4, CISI, Rec. = 1.8 ft, Samples not lab analyzed.		2				
9.0 - 25.0		Hole stopped @ 9.0 ft						

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STATE OF VERMONT  
 AGENCY OF TRANSPORTATION  
 MATERIALS & RESEARCH SECTION  
 SUBSURFACE INFORMATION

BORING NUMBER: GBH-5  
 SHEET 1 of 1  
 DATE STARTED: 7/17/08  
 DATE COMPLETED: 7/17/08

PROJECT NAME: Highgate, VT-207, Bridge 6  
 SITE NAME: Highgate, Vermont  
 STATION: 12+18.84  
 OFFSET: 0.6'E  
 VTSPG: N 888094.29 ft E 1498076.79 ft

PROJECT NUMBER: 073-86908  
 SITE NUMBER: BM08MRO-400  
 GROUND ELEVATION: 199.04 ft  
 GROUNDWATER DEPTH: >6.0 7/17/08  
 PROJECT PIN NUMBER:

BORING CREW : VTrans  
 CREW CHIEF: Glen Porter  
 DRILLER: Jess Alexander  
 LOGGER: Jess Alexander

BORING RIG:  
 BORING TYPE: Post Hole Digger  
 SAMPLE TYPE: Composi  
 CHECKED BY:

DEPTH (ft)	SYMBOL	CLASSIFICATION OF MATERIALS (Description)	WELL DIAGRAM	BLOWS PER FOOT	M.C. (%)	GRAVEL (%)	SAND (%)	FINES (%)
5		A-2-4, SiSa No SPT samples taken				11.7	60.2	28.1
		A-4, SaSi No SPT samples taken				0.5	45.3	54.2
		A-6, SiCl No SPT samples taken				2.6	13.3	84.1
		A-6, SiCl No SPT samples taken				0.5	10.3	89.3
		A-6, SiCl No SPT samples taken				1.2	19.2	79.6
		Hole stopped @ 6.0 ft						
10								
16								
20								
25								

JIMS COPY HIGHGATE.GPJ VT.AGT.GDT 9/8/08

**APPENDIX C**  
**LABORATORY TEST RESULTS**



**LETTER OF TRANSMITTAL**

Program Development  
 Materials & Research Section  
 Phone (802)828-2561  
 Fax (802) 828-2792

TO:

Golder Associates 670 North Commercial Street, Suite 103 Manchester, New Hampshire 03101 Phone (603)668-0880 Fax (603)668-1199
---

DATE: 08/13/2008	JOB NO.: Highgate VT 207 Bridge 6
ATTENTION: Mahendra Thillyar, P.E.	
RE: Highgate Soil Test Results	

- We are sending you:  Attached  Under separate cover via the following items
- Shop Drawings  Prints  Plans  Samples  Specifications
- Copy of Letter  Change Order

COPIES	DATE	NO.	DISCRIPTION
1	8/6- 8/7/2008	32	Highgate Reports on Soil Samples

THESE ITEMS ARE TRANSMITTED as checked below:

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> For approval            | <input type="checkbox"/> Approved as submitted    | <input type="checkbox"/> Resubmit copies for approval     |
| <input checked="" type="checkbox"/> For your use | <input type="checkbox"/> Approved as noted        | <input type="checkbox"/> Submit copies for distribution   |
| <input type="checkbox"/> As requested            | <input type="checkbox"/> Returned for corrections | <input type="checkbox"/> Return Corrected prints          |
| <input type="checkbox"/> For review and comment  | <input type="checkbox"/>                          | <input type="checkbox"/> PRINTS RETURNED AFTER LOAN TO US |
| <input type="checkbox"/> FOR BID DUE             |   |   |

REMARKS: Hi Mahendra,

Attached the results of the laboratory testing conducted on the soil samples from Highgate.

Best Regards,  
 Chris

SIGNED

*Christopher C. Benda*  
 Christopher C. Benda, P.E.

COPY TO: File

Vermont Agency of Transportation  
Materials and Research Section  
1 National Life Drive  
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample :

Lab number: E080641

Corrected copy: N/A

Report Date: 8/6/2008 1:39:03 P

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled: 7/14/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GBH-1 Depth: 0 FT to: 2 FT

Field description:

Submitted by: GOLDER (JEA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-1

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	93.7%
4.75 mm (#4):	81.5%
2.00 mm (#10):	69.5%
850 µm (#20):	57.0%
425 µm (#40):	46.6%
250 µm (#60):	36.5%
150 µm (#100):	28.4%
75 µm (#200):	19.0%

Limits	
T-265 Moisture content:	2.3%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP

Moisture Density		
Test method:	T-180	Method:
Maximum density:		pcf
Optimum moisture:		
T-100 Specific Gravity:		
Gr: 30.5%	D2487: SM	
Su: 50.6%	M145: A-1-b	Gravelly Sand
Si: 19.0%		

Hydrometer Analysis

Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist

Vermont Agency of Transportation  
Materials and Research Section  
1 National Life Drive  
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample :

Lab number: E080642

Corrected copy: N/A

Report Date: 8/6/2008 1:39:03 P

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled: 7/14/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GBH-1 Depth: 2 FT to: 4 FT

Field description:

Submitted by: GOLDR (IEA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-2

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	98.2%
4.75 mm (#4):	92.0%
2.00 mm (#10):	82.6%
850 µm (#20):	69.7%
425 µm (#40):	55.6%
250 µm (#60):	37.6%
150 µm (#100):	21.4%
75 µm (#200):	9.4%

Limits

T-265 Moisture content: 7.2%

T-89 Liquid Limit:

T-90 Plastic Limit:

T-90 Plasticity Index: NP

Moisture Density

Test method: T-180 Method:

Maximum density: pcf

Optimum moisture:

T-100 Specific Gravity:

Gr: 17.4% D2487: SP-SM

Sa: 73.2% M145: A-3 Sand

Si: 9.4%

Hydrometer Analysis

Particles smaller % total sample

0.05 mm:

0.02 mm:

0.005 mm:

0.002 mm:

0.001 mm:

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist

TE

Vermont Agency of Transportation  
Materials and Research Section  
1 National Life Drive  
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080643

Corrected copy: N/A

Report Date: 8/6/2008 1:39:04 P

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled: 7/14/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station:                    Offset:                    Hole: GBH-1                    Depth: 6 FT to: 6.5 FT

Field description:

Submitted by: GOLDER (JBA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-4

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	98.2%
4.75 mm (#4):	91.3%
2.00 mm (#10):	84.0%
850 µm (#20):	73.5%
425 µm (#40):	60.9%
250 µm (#60):	44.1%
150 µm (#100):	29.3%
75 µm (#200):	15.5%

Limits	
T-265 Moisture content:	9.5%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180
Method:	
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gm	16.0%
D2487:	SM
Sa:	68.4%
M145:	A-2-4
Si:	15.5%
	Sand

Hydrometer Analysis

Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist TE

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 Materials and Research Section  
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Distribution list

Report on Soil Sample

Lab number: E080644

Corrected copy: N/A

Report Date: 8/6/2008 1:39:06 P

Project: HIGHGATE

Number: Missisquoi Br

Site: VT-207 BR-6

Date sampled: 7/14/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GBH-1 Depth: 6.5 FT to: 8 FT

Field description:

Submitted by: GOLDER (JBA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-4A

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	94.9%
9.5 mm (3/8"):	
4.75 mm (#4):	94.3%
2.00 mm (#10):	90.4%
850 µm (#20):	84.6%
425 µm (#40):	77.2%
250 µm (#60):	66.1%
150 µm (#100):	51.4%
75 µm (#200):	29.8%

Limits	
T-265 Moisture content:	7.1%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	9.6% D2487: SM
Sa:	60.5% M145: A-2-4 Silty Sand
Sl:	29.8%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist TE

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Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080645

Corrected copy: N/A

Report Date: 8/6/2008 1:39:06 P

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled: 7/14/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GBH-1 Depth: 10 FT to: 12 FT

Field description:

Submitted by: GOLDBER (IEA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-5

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	99.0%
4.75 mm (#4):	94.3%
2.00 mm (#10):	85.3%
850 µm (#20):	71.4%
425 µm (#40):	54.2%
250 µm (#60):	32.7%
150 µm (#100):	18.7%
75 µm (#200):	9.8%

Limits	
T-265 Moisture content:	7.2%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Text method:	T-180
Method:	
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	14.7% D2487: SP-SM
Su:	75.5% M145: A-3 Sand
Sl:	9.8%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist TE

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Distribution list

Report on Soil Sample

Lab number: E080646 Corrected copy: N/A Report Date: 8/7/2008 10:00:20 A  
 Project: HIGHGATE Number: Missisquoi Br. Site: VT-207 BR-6  
 Date sampled: 7/14/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE  
 Station: Offset: Hole: GBH-1 Depth: 15 FT to: 17 FT  
 Field description:  
 Submitted by: GOLDER (JEA) Address:  
 Sample type: SPLIT BARREL Quantity:  
 Sample source/Outside agency name:  
 Location used: Examined for: CLASSIFICATION  
 Comment: S-6

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	99.3%
4.75 mm (#4):	94.8%
2.00 mm (#10):	89.2%
850 µm (#20):	85.4%
425 µm (#40):	82.0%
250 µm (#60):	78.2%
150 µm (#100):	74.1%
75 µm (#200):	65.5%

Limits	
T-265 Moisture content:	17.1%
T-89 Liquid Limit:	21
T-90 Plastic Limit:	17
T-90 Plasticity Index:	4
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	2.772
G <sub>s</sub> :	10.8% D2487: CL-ML
S <sub>w</sub> :	23.7% M145: A-4 Sandy Silt
S <sub>l</sub> :	65.5%

Hydrometer Analysis	
Particle smaller	% total sample
0.05 mm:	57.2%
0.02 mm:	45.2%
0.005 mm:	20.2%
0.002 mm:	7.3%
0.001 mm:	5.4%

Comments:

Reviewed by: T. Eljassen, P.G., Transportation Geologist TE

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Distribution list

Report on Soil Sample

Lab number: E080646

Corrected copy: N/A

Report Date: 8/7/2008 10:00:36 A

Project: HIGHGATE

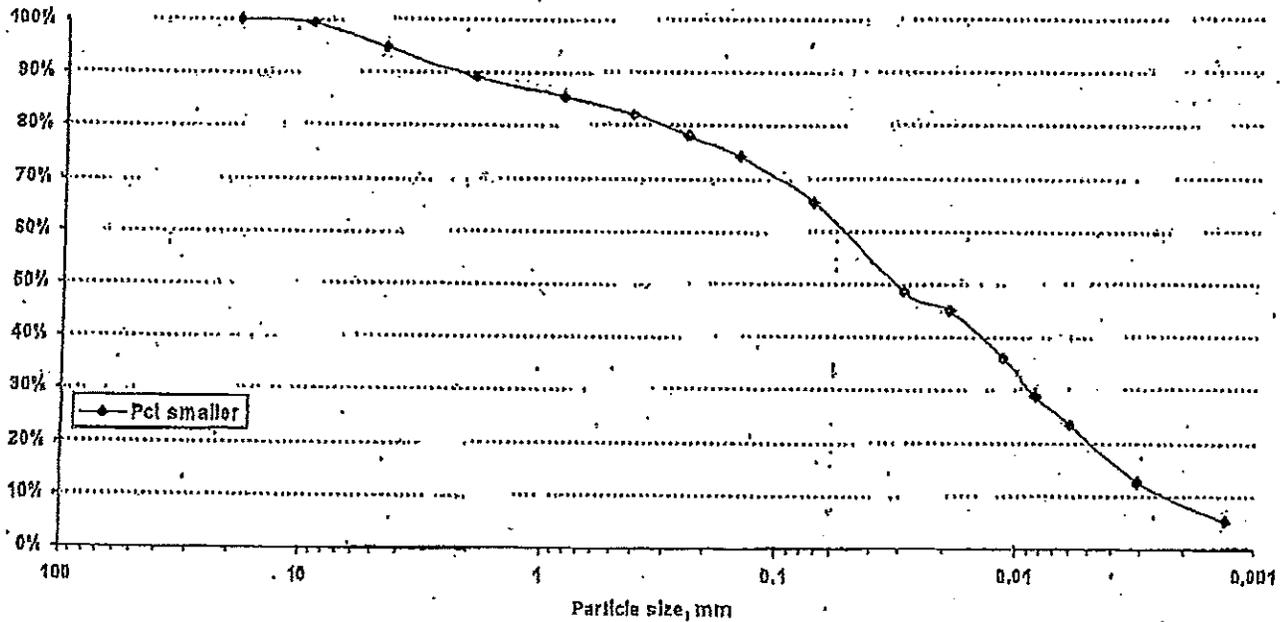
Number: Missisquoi Br.

Site: VT-207 BR-6

Hole: GBH-1

Depth: 15 FT - 17 FT

T-88 Particle size analysis



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Distribution list

Report on Soil Sample

Lab number: B080647

Corrected copy: N/A

Report Date: 8/6/2008 1:39:07 P

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled: 7/14/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GBH-J Depth: 20 FT to: 22 FT

Field description:

Submitted by: GOLDER (JEA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-8

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	85.7%
9.5 mm (3/8"):	79.0%
4.75 mm (#4):	69.2%
2.00 mm (#10):	63.5%
850 µm (#20):	58.2%
425 µm (#40):	54.6%
250 µm (#60):	51.7%
150 µm (#100):	48.8%
75 µm (#200):	44.3%

Limits	
T-265 Moisture content:	15.9%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
G <sub>s</sub> :	36.5% D2487: GM
S <sub>u</sub> :	19.2% M145: A-4
S <sub>t</sub> :	44.3%

Gravelly SIL

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: SAMPLE WAS TESTED FOR ATTERBURG LIMITS.

Reviewed by: T. Eliassen, P.G., Transportation Geologist

TE

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Distribution list

Report on Soil Sample

Lab number: BQ80648 Corrected copy: N/A Report Date: 8/6/2008 1:39:07 P  
Project: HUGHGATE Number: Missisquoi Br. Site: VT-207 BR-6

Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE  
Station: Offset: Hole: GBH-2 Depth: 0 FT to: 2 FT

Field description:

Submitted by: GOLDER (JEA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-1

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	91.4%
4.75 mm (#4):	83.2%
2.00 mm (#10):	75.8%
850 µm (#20):	66.2%
425 µm (#40):	55.6%
250 µm (#60):	42.6%
150 µm (#100):	31.8%
75 µm (#200):	20.9%

Limits	
T-265 Moisture content:	5.0%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 24.2%	D2487: SM
Sa: 54.9%	M145: A-2-4 Silty Gravely Sand
Sl: 20.9%	

Hydrometer Analysis	
Particles smaller	% total sample
0.075 mm:	
0.075 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: SAMPLE WAS TESTED FOR ATTERBURG LIMITS:

Reviewed by: T. Eliassen, P.G., Transportation Geologist TE

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Distribution list

Report on Soil Sample

Lab number: B080649 Corrected copy: N/A Report Date: 8/6/2008 1:39:08 P  
Project: HUGHGATE Number: Missisquoi Br. Site: VT-207 BR-6

Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE  
Station: Offset: Hole: GBH-2 Depth: 4 FT to: 6 FT

Field description:

Submitted by: GOLDER (JEA) Address:

Sample type: SPLIT BARREL Quantity:

Sample source/Outside agency name:

Location used: Examined for: CLASSIFICATION

Comment: S-3

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	98.4%
4.75 mm (#4):	94.2%
2.00 mm (#10):	86.1%
850 µm (#20):	74.5%
425 µm (#40):	57.2%
250 µm (#60):	32.4%
150 µm (#100):	16.6%
75 µm (#200):	7.8%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	11.3%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 13.9%	D2487: SP-SM
Sa: 78.3%	M145: A-3 Sand
Si: 7.8%	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist TE

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Distribution list

Report on Soil Sample

Lab number: E080650

Corrected copy: N/A

Report Date: 8/6/2008 1:39:08 P

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station:                      Offset:                      Hole: GBH-2                      Depth:                      6 FT to:                      8 FT

Field description:

Submitted by: GOLDBER (IEA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-4

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	98.2%
4.75 mm (#4):	93.0%
2.00 mm (#10):	82.6%
850 µm (#20):	68.8%
425 µm (#40):	53.1%
250 µm (#60):	31.5%
150 µm (#100):	17.2%
75 µm (#200):	7.8%

Limits	
T-265 Moisture content:	7.9%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180                      Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 17.4%	D2487: SP-SM
Sa: 74.8%	M145: A-3                      Sand
Si: 7.8%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist TE

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Distribution list

Report on Soil Sample

Lab number: E080651 Corrected copy: N/A Report Date: 8/6/2008 1:39:10 P

Project: HIGHGATE Number: Missisquoi Br. Site: VT-207 BR-6

Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GBH-2 Depth: 8 FT to: 10 FT

Field description:

Submitted by: GOLDER (JEA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-5

Test Results

Sieve Analysis	
T-88	% Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	99.7%
4.75 mm (#4):	94.8%
2.00 mm (#10):	88.2%
850 µm (#20):	76.3%
425 µm (#40):	60.1%
250 µm (#60):	34.9%
150 µm (#100):	16.4%
75 µm (#200):	8.8%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	10.3%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr:	11.8% D2487: SP-SM
Sa:	79.5% M145: A-3 Sand
Si:	8.8%

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TZ*



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Distribution list

Report on Soil Sample

Lab number: E080652

Corrected copy: N/A

Report Date: 8/7/2008 10:08:32 A

Project: HIGHGATE

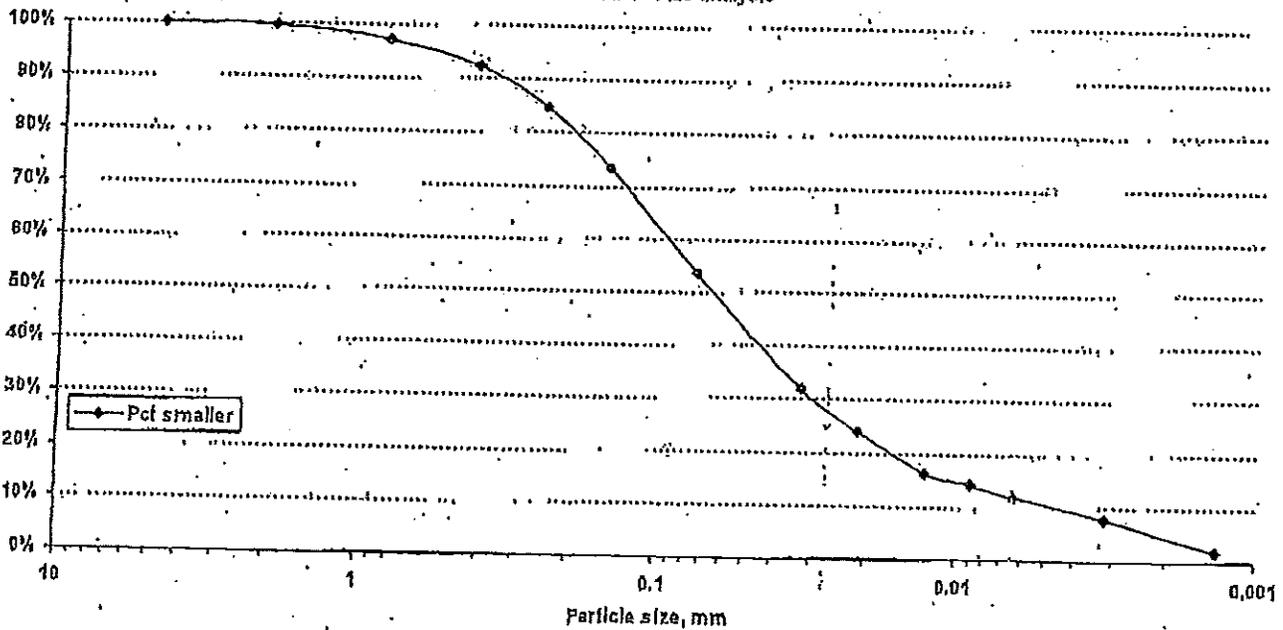
Number: Missisquoi Br.

Site: VT-207 BR-6

Hole: GBH-2

Depth: 10FT - 12FT

T-88 Particle size analysis



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Distribution list

## Report on Soil Sample

Lab number: E080653

Corrected copy: N/A

Report Date: 8/6/2008 1:39:10 P

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GBH-2 Depth: 12 FT to: 14 FT

Field description:

Submitted by: GOLDBER (JBA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-7

## Test Results

## Limits

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	
4.75 mm (#4):	100.0%
2.00 mm (#10):	100.0%
850 µm (#20):	
425 µm (#40):	99.7%
250 µm (#60):	98.8%
150 µm (#100):	95.2%
75 µm (#200):	71.7%

T-265 Moisture content: 18.7%

T-89 Liquid Limit:

T-90 Plastic Limit:

T-90 Plasticity Index: NP

## Moisture Density

Test method: T-180 Method:

Maximum density: pcf

Optimum moisture:

T-100 Specific Gravity:

Gr: 0.0% D2487: ML

Sa: 28.3% M145: A-4

Si: 71.7%

Sandy SU1

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: SAMPLE WAS TESTED FOR ATTERBURG LIMITS.

Reviewed by: T. Eljassen, P.G., Transportation Geologist TE

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Distribution list

Report on Soil Sample

Lab number: E080654

Corrected copy: N/A

Report Date: 8/6/2008 1:39:11 P

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6.

Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GBH-2 Depth: 14 FT to: 16 FT

Field description:

Submitted by: GOLDER (JBA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-8

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	
4.75 mm (#4):	100.0%
2.00 mm (#10):	100.0%
850 µm (#20):	
425 µm (#40):	99.9%
250 µm (#60):	99.2%
150 µm (#100):	93.0%
75 µm (#200):	60.8%

Hydrometer Analysis	Particles smaller % total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	20.3%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 0.0%	D2487: ML
Sa: 39.2%	M145: A-4 Sandy Silt
Si: 60.8%	

Comments: SAMPLE WAS TESTED FOR ATTERBURG LIMITS.

Reviewed by: T. Eliassen, P.G., Transportation Geologist TE

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Distribution list

Report on Soil Sample

Lab number: E080655      Corrected copy: N/A      Report Date: 8/7/2008 9:12:56 A  
 Project: HIGHGATE      Number: Missisquoi Br.      Site: VT-207 BR-6  
 Date sampled: 7/16/2008      Received: 8/4/2008      Tested: 8/4/2008      Tested by: J. TOUCHETTE  
 Station:      Offset:      Hole: GHB-2      Depth: 16 FT to: 18 FT  
 Field description:  
 Submitted by: GOLDR (JBA)      Address:  
 Sample type: SPLIT BARREL      Quantity:  
 Sample source/Outside agency name:  
 Location used:      Examined for: CLASSIFICATION  
 Comment: S-9

Test Results

T-88	Steve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	
4.75 mm (#4):	100.0%
2.00 mm (#10):	100.0%
850 µm (#20):	99.9%
425 µm (#40):	99.7%
250 µm (#60):	99.6%
150 µm (#100):	99.4%
75 µm (#200):	99.2%

Limits	
T-265 Moisture content:	22.0%
T-89 Liquid Limit:	33
T-90 Plastic Limit:	21
T-90 Plasticity Index:	12
Moisture Density	
Test method:	T-180      Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 0.0%	D2487: CL
Sa: 0.8%	M145: A-6      Silty Clay
Si: 99.2%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

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Distribution list

Report on Soil Sample

Lab number: E080676 Corrected copy: N/A Report Date: 8/11/2008 1:32:06 P  
 Project: HIGHGATE Number: Missisquoi Br. Site: VT-207 BR-6  
 Date sampled: 7/16/2008 Received: 8/7/2008 Tested: 8/7/2008 Tested by: J. TOUCHETTE  
 Station: Offset: Hole: GBH-2 Depth: 18 FT to: 20 FT  
 Field description:  
 Submitted by: GOLDER & WERNER Address:  
 Sample type: TUBE Quantity:  
 Sample source/Outside agency name:  
 Location used: Examined for: CLASSIFICATION  
 Comment: TUBE S-10

Test Results

T-88	Steve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	
4.75 mm (#4):	100.0%
2.00 mm (#10):	100.0%
850 µm (#20):	99.6%
425 µm (#40):	99.1%
250 µm (#60):	98.4%
150 µm (#100):	97.8%
75 µm (#200):	97.1%

Limits	
T-265 Moisture content:	29.0%
T-89 Liquid Limit:	36
T-90 Plastic Limit:	23
T-90 Plasticity Index:	13
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 0.0%	D2487: CL
Sa: 2.9%	M145: A-6 Silty Clay
Sl: 97.1%	

Hydrometer Analysis	
Particles smaller	% total sample
0.075 mm:	
0.02 mm:	
0.0075 mm:	
0.002 mm:	
0.001 mm:	

Comments: FIRST 10 INCHES OF SHELBY TUBE MATERIAL HAD LARGE VOIDS WITHIN SAMPLE. VOIDS WERE ALONG THE SIDES AND ALSO IN THE CENTER OF THE SAMPLE.

Reviewed by: T. Eliasson, P.G., Transportation Geologist TE

Vermont Agency of Transportation  
Materials and Research Section  
1 National Life Drive  
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080656

Corrected copy: N/A

Report Date: 8/7/2008 9:12:56 A

Project: HJGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled: 7/17/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GHB-2A Depth: 25 FT to: 26 FT

Field description:

Submitted by: GOLDBER (JEA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-1

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	88.7%
9.5 mm (3/8"):	73.0%
4.75 mm (#4):	60.3%
2.00 mm (#10):	49.5%
850 µm (#20):	40.1%
425 µm (#40):	34.4%
250 µm (#60):	30.3%
150 µm (#100):	26.1%
75 µm (#200):	20.0%

Limits	
T-265 Moisture content:	4.6%
T-89 Liquid Limit:	22
T-90 Plastic Limit:	16
T-90 Plasticity Index:	6
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 50.5%	D2487: SC-SM
Sr: 29.5%	M145: A-1-b Sandy Gravel
Si: 20.0%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: BROKEN ROCK WAS WITHIN SAMPLE.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation  
Materials and Research Section  
1 National Life Drive  
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080657 Corrected copy: N/A Report Date: 8/7/2008 9:12:57 A  
Project: HIGHOATE Number: Missisquoi Br. Site: VT-207 BR-6  
Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE  
Station: Offset: Hole: GHB-3 Depth: 0 FT to: 2 FT  
Field description:  
Submitted by: GOLDER (JBA) Address:  
Sample type: SPLIT BARREL Quantity:  
Sample source/Outside agency name:  
Location used: Examined for: CLASSIFICATION  
Comment: S-1

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	92.9%
9.5 mm (3/8"):	78.4%
4.75 mm (#4):	66.9%
2.00 mm (#10):	55.4%
850 µm (#20):	44.1%
425 µm (#40):	32.9%
250 µm (#60):	22.6%
150 µm (#100):	15.3%
75 µm (#200):	9.2%

Limits	
T-265 Moisture content:	3.5%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 44.6%	D2487: SP-SM
Sa: 46.2%	M145: A-1-U Gravelly Sand
Si: 9.2%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist

TE

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Distribution list

Report on Soil Sample

Lab number: E080658 Corrected copy: N/A Report Date: 8/7/2008 9:12:58 A  
Project: HIGHGATE Number: Missisquoi Br. Site: VT-207 BR-6  
Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE  
Station: Offset: Hole: GHB-3 Depth: 2 FT to: 4 FT  
Field description:  
Submitted by: GOLDBER (JEA) Address:  
Sample type: SPLIT BARREL Quantity:  
Sample source/Outside agency name:  
Location used: Examined for: CLASSIFICATION  
Comment: S-2

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	97.2%
9.5 mm (3/8"):	95.0%
4.75 mm (#4):	89.0%
2.00 mm (#10):	81.7%
850 µm (#20):	70.5%
425 µm (#40):	56.4%
250 µm (#60):	37.0%
150 µm (#100):	20.5%
75 µm (#200):	9.6%

Limits	
T-265 Moisture content:	8.4%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 18.3%	D2487: SP-SM
Su: 72.1%	M145: A-3 Sand
Sl: 9.6%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Ellassen, P.G., Transportation Geologist *TE*

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1 National Life Drive  
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080659

Corrected copy: N/A

Report Date: 8/7/2008 9:12:58 A

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GHB-3 Depth: 4 FT to: 6 FT

Field description:

Submitted by: GOLDR (JEA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-3

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	99.6%
4.75 mm (#4):	97.4%
2.00 mm (#10):	90.5%
850 µm (#20):	78.0%
425 µm (#40):	62.8%
250 µm (#60):	43.0%
150 µm (#100):	21.4%
75 µm (#200):	5.8%

Limits

T-265 Moisture content: 13.3%

T-89 Liquid Limit:

T-90 Plastic Limit:

T-90 Plasticity Index: NP

Moisture Density

Test method: T-180 Method:

Maximum density: pcf

Optimum moisture:

T-100 Specific Gravity:

G<sub>s</sub>: 9.5% D2487: SP-SM

S<sub>u</sub>: 84.8% M145: A-3 Sand

S<sub>i</sub>: 5.8%

Hydrometer Analysis

Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Ellassen, P.G., Transportation Geologist *TE*

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1 National Life Drive  
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Distribution list

Report on Soil Sample

Lab number: E080660 Corrected copy: N/A Report Date: 8/7/2008 9:12:59 A  
Project: HIGHQATE Number: Missisquoi Br. Site: VT-207 BR-6

Date sampled: 7/15/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE

Station: Offset: Hole: GHB-3 Depth: 6 FT to: 8 FT

Field description:

Submitted by: GOLDR (JBA)

Address:

Sample type: SPLIT BARREL

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-4

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	98.7%
4.75 mm (#4):	97.8%
2.00 mm (#10):	93.4%
850 µm (#20):	86.7%
425 µm (#40):	75.9%
250 µm (#60):	56.8%
150 µm (#100):	28.4%
75 µm (#200):	5.9%

Limits

T-265 Moisture content: 13.2%

T-89 Liquid Limit:

T-90 Plastic Limit:

T-90 Plasticity Index: NP

Moisture Density

Test method: T-180 Method:

Maximum density: pcf

Optimum moisture:

T-100 Specific Gravity:

G<sub>s</sub>: 6.6% D2487: SP-SM  
S<sub>a</sub>: 87.5% M145: A-3 Sand  
S<sub>t</sub>: 5.9%

Hydrometer Analysis

Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist

TE

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Distribution list

Report on Soil Sample

Lab number: E080661      Corrected copy: N/A      Report Date: 8/7/2008 9:12:59 A  
Project: HIGHGATE      Number: Missisquoi Br.      Site: VT-207 BR-6  
Date sampled: 7/16/2008    Received: 8/4/2008    Tested: 8/4/2008    Tested by: J. TOUCHETTE  
Station:      Offset:      Hole: GHB-4      Depth: 0 FT to: 2 FT  
Field description:  
Submitted by: GOLDER (JEA)      Address:  
Sample type: SPLIT BARREL      Quantity:  
Sample source/Outside agency name:  
Location used:      Examined for: CLASSIFICATION  
Comment: S-1

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	94.8%
9.5 mm (3/8"):	84.3%
4.75 mm (#4):	69.9%
2.00 mm (#10):	59.2%
850 µm (#20):	47.5%
425 µm (#40):	35.7%
250 µm (#60):	24.1%
150 µm (#100):	16.1%
75 µm (#200):	10.0%

Limits	
T-265 Moisture content:	2.1%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180      Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 40.8%	D2487: SP-SM
Sa: 49.1%	M145: A-1-E      Gravelly Sand
Si: 10.0%	

Hydrometer Analysis:

Particle smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist

TE

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Distribution list

Report on Soil Sample

Lab number: E080662      Corrected copy: N/A      Report Date: 8/7/2008 9:12:59 A  
 Project: HIGHGATE      Number: Missisquoi Br.      Site: VT-207 BR-6  
 Date sampled: 7/16/2008      Received: 8/4/2008      Tested: 8/4/2008      Tested by: J. TOUCHETTE  
 Station:      Offset:      Hole: GHB-4      Depth: 2 FT to: 4 FT  
 Field description:  
 Submitted by: GOLDER (JEA)      Address:  
 Sample type: SPLIT BARREL      Quantity:  
 Sample source/Outside agency name:  
 Location used:      Examined for: CLASSIFICATION  
 Comment: S-2

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	98.4%
4.75 mm (#4):	94.1%
2.00 mm (#10):	86.0%
850 µm (#20):	75.5%
425 µm (#40):	62.6%
250 µm (#60):	44.5%
150 µm (#100):	25.6%
75 µm (#200):	10.3%

Limits	
T-265 Moisture content:	8.4%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180      Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 14.0%	D2487: SP-SM
Sr: 75.7%	M145: A-3      Sand
Sl: 10.3%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist

TE

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Materials and Research Section  
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Distribution list

Report on Soil Sample

Lab number: B080663 Corrected copy: N/A Report Date: 8/7/2008 9:13:00 A  
Project: HIGHGATE Number: Missisquoi Br. Site: VT-207 BR-6

Date sampled: 7/16/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE  
Station: Offset: Hole: GHB-4 Depth: 9 FT to: 11 FT

Field description:

Submitted by: GOLDR (JEA) Address:

Sample type: SPLIT BARREL Quantity:

Sample source/Outside agency name:

Location used: Examined for: CLASSIFICATION

Comment: S-3

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	
4.75 mm (#4):	100.0%
2.00 mm (#10):	100.0%
850 µm (#20):	
425 µm (#40):	99.9%
250 µm (#60):	99.6%
150 µm (#100):	99.3%
75 µm (#200):	98.9%

Limits	
T-265 Moisture content:	26.0%
T-89 Liquid Limit:	30
T-90 Plastic Limit:	20
T-90 Plasticity Index:	10
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gm: 0.0%	D2487: CL
Sn: 1.1%	M145: A-4 Clayey Silt
Si: 98.9%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Ellissen, P.G., Transportation Geologist TE

Vermont Agency of Transportation  
 Materials and Research Section  
 1 National Life Drive  
 Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080664 Corrected copy: N/A Report Date: 8/7/2008 9:13:00 A  
 Project: HIGHGATE Number: Missisquoi Br. Site: VT-207 BR-6  
 Date sampled: 7/16/2008 Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE  
 Station: Offset: Hole: GHB-4 Depth: 15 FT to: 17 FT  
 Field description:  
 Submitted by: GOLDER (JEA) Address:  
 Sample type: SPLIT BARREL Quantity:  
 Sample source/Outside agency name:  
 Location used: Examined for: CLASSIFICATION  
 Comment: S-4

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	91.4%
9.5 mm (3/8"):	80.2%
4.75 mm (#4):	70.7%
2.00 mm (#10):	63.0%
850 µm (#20):	55.5%
425 µm (#40):	50.2%
250 µm (#60):	45.6%
150 µm (#100):	40.9%
75 µm (#200):	34.8%

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Limits	
T-265 Moisture content:	2.4%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180 Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 37.0%	D2487: SM
Su: 28.2%	M145: A-2-4 Sandy Silty Gravel
Sl: 34.8%	

Comments: SAMPLE WAS TESTED FOR ATTERBURG LIMITS.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TZ*

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1 National Life Drive  
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080665

Corrected copy: N/A

Report Date: 8/7/2008 9:13:01 A

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled:

Received: 8/4/2008

Tested: 8/4/2008

Tested by: J. TOUCHETTE

Station:

Offset:

Hole: GHB-5

Depth: 1 FT to: FT

Field description:

Submitted by: GOLDBER (JEA)

Address:

Sample type:

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-1

Test Results

Sieve Analysis

T-88

% Passing

Total Sample

75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	97.8%
4.75 mm (#4):	94.8%
2.00 mm (#10):	88.3%
850 µm (#20):	80.9%
425 µm (#40):	69.7%
250 µm (#60):	55.8%
150 µm (#100):	46.4%
75 µm (#200):	28.1%

Limits

T-265 Moisture content: 6.8%

T-89 Liquid Limit:

T-90 Plastic Limit:

T-90 Plasticity Index: NP

Moisture Density

Test method: T-180 Method:

Maximum density: pcf

Optimum moisture:

T-100 Specific Gravity:

Gr: 11.7% D2487: SM

Su: 60.2% M145: A-2-4 Silty Sand

Si: 28.1%

Hydrometer Analysis

Particles smaller % total sample

0.05 mm:

0.02 mm:

0.005 mm:

0.002 mm:

0.001 mm:

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist TE

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Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080666      Corrected copy: N/A      Report Date: 8/7/2008 9:13:01 A  
Project: HIGHGATE      Number: Missisquoi Br.      Site: VI-207 BR-6

Date sampled:      Received: 8/4/2008      Tested: 8/4/2008      Tested by: J. TOUCHETTE  
Station:      Offset:      Hole: GHB-5      Depth: 2 FT to:      FT

Field description:

Submitted by: GOLDR (JEA)

Address:

Sample type:

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-2

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	
4.75 mm (#4):	100.0%
2.00 mm (#10):	99.5%
850 µm (#20):	98.7%
425 µm (#40):	97.5%
250 µm (#60):	95.7%
150 µm (#100):	90.6%
75 µm (#200):	54.2%

Limits	
T-265 Moisture content:	15.2%
T-89 Liquid Limit:	
T-90 Plastic Limit:	
T-90 Plasticity Index:	NP
Moisture Density	
Test method:	T-180
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
Gr: 0.5%	D2487: ML
Sa: 45.3%	M145: A-4
St: 54.2%	Sandy Silt

Hydrometer Analysis	
Particle smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: SAMPLE WAS TESTED FOR ATTERBURG LIMITS.

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

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Distribution list

Report on Soil Sample

Lab number: B080667      Corrected copy: N/A      Report Date: 8/7/2008 9:13:01 A  
 Project: HIGHGATE      Number: Missisquoi Br.      Site: VT-207 BR-6  
 Date sampled:      Received: 8/4/2008      Tested: 8/4/2008      Tested by: J. TOUCHETTE  
 Station:      Offset:      Hole: GHB-5      Depth: 3 FT to: FT  
 Field description:  
 Submitted by: GOLDER (IEA)      Address:  
 Sample type:      Quantity:  
 Sample source/Outside agency name:  
 Location used:      Examined for: CLASSIFICATION  
 Comment: S-3

Test Results

T-88	Sieve Analysis % Passing Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	
4.75 mm (#4):	100.0%
2.00 mm (#10):	97.4%
850 µm (#20):	96.2%
425 µm (#40):	93.8%
250 µm (#60):	89.3%
150 µm (#100):	86.7%
75 µm (#200):	84.1%

Limits	
T-205 Moisture content:	15.4%
T-89 Liquid Limit:	36
T-90 Plastic Limit:	20
T-90 Plasticity Index:	16
Moisture Density	
Test method:	T-180      Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
G <sub>s</sub> : 2.65	D2487: CL
S <sub>u</sub> : 13.3%	M145: A-6      Silty Clay
S <sub>i</sub> : 84.1%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist *TE*

Vermont Agency of Transportation  
Materials and Research Section  
1 National Life Drive  
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Distribution list

Report on Soil Sample

Lab number: E080668

Corrected copy: N/A

Report Date: 8/7/2008 9:13:02 A

Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6

Date sampled:

Received: 8/4/2008

Tested: 8/4/2008

Tested by: J. TOUCHETTE

Station:

Offset:

Hole: GHB-5

Depth:

4 FT to:

5 FT

Field description:

Submitted by: GOLDR (JEA)

Address:

Sample type:

Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-4

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	
4.75 mm (#4):	100.0%
2.00 mm (#10):	99.5%
850 µm (#20):	98.5%
425 µm (#40):	96.5%
250 µm (#60):	93.4%
150 µm (#100):	91.2%
75 µm (#200):	89.3%

Limits	
T-265 Moisture content:	18.2%
T-89 Liquid Limit:	35
T-90 Plastic Limit:	21
T-90 Plasticity Index:	14

Moisture Density		
Test method:	T-180	Method:
Maximum density:		pcf
Optimum moisture:		
T-100 Specific Gravity:		
Gr:	0.5%	D2487: CL
Su:	10.3%	M145: A-6 Silty Clay
Sf:	89.3%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist

TZ

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Distribution list

Report on Soil Sample

Lab number: E080669 Corrected copy: N/A Report Date: 8/7/2008 9:13:02 A  
 Project: HIGHGATE Number: Missisquoi Br. Site: VT-207 BR-6

Date sampled: Received: 8/4/2008 Tested: 8/4/2008 Tested by: J. TOUCHETTE  
 Station: Offset: Hole: GHB-5 Depth: 5 FT to: FT

Field description:

Submitted by: GOLDER (JEA) Address:

Sample type: Quantity:

Sample source/Outside agency name:

Location used:

Examined for: CLASSIFICATION

Comment: S-5

Test Results

T-88	Sieve Analysis
	% Passing
	Total Sample
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	
9.5 mm (3/8"):	
4.75 mm (#4):	100.0%
2.00 mm (#10):	98.8%
850 µm (#20):	96.5%
425 µm (#40):	93.4%
250 µm (#60):	89.4%
150 µm (#100):	86.1%
75 µm (#200):	79.6%

	Limits
T-265 Moisture content:	11.0%
T-89 Liquid Limit:	33
T-90 Plastic Limit:	20
T-90 Plasticity Index:	13

Moisture Density	
Test method: T-180	Method:
Maximum density:	pcf
Optimum moisture:	
T-100 Specific Gravity:	
G <sub>s</sub> : 1.2%	D2487: CL
S <sub>u</sub> : 19.2%	M145: A-6 Silty Clay
S <sub>i</sub> : 79.6%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments:

Reviewed by: T. Ellason, P.G., Transportation Geologist *TE*

**Thilliyar, Mahendra**

---

**From:** Ewald, Callie [Callie.Ewald@state.vt.us]  
**Sent:** Wednesday, August 20, 2008 2:50 PM  
**To:** Thilliyar, Mahendra  
**Subject:** GBH3 - S6 Direct Shear Results  
**Attachments:** GBH3 - S6 - 397 psf.bmp; GBH3 - S6 - 794 psf.bmp; GBH3 - S6 - 1584 psf.bmp

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Enclosed are the direct shear results from GBH3 S6 Tube (10-12'). This test was initiated before the request was made to do only Triaxial tests. Here is a table of summarized results taken from the reports that are attached:

Normal Stress (psf)	Normal Stress (psi)	Max Shear Stress (psi)	Peak Friction Angle (deg.)	Initial Water Content (%)
397.00	2.76	2.85	46.0	28.50
794.10	5.50	4.36	38.4	30.16
1588.20	11.00	7.75	35.2	29.00

Callie Ewald  
Geotechnical Engineer  
VTrans - Materials and Research  
Phone: (802)-828-1235  
Fax: (802)-828-2792





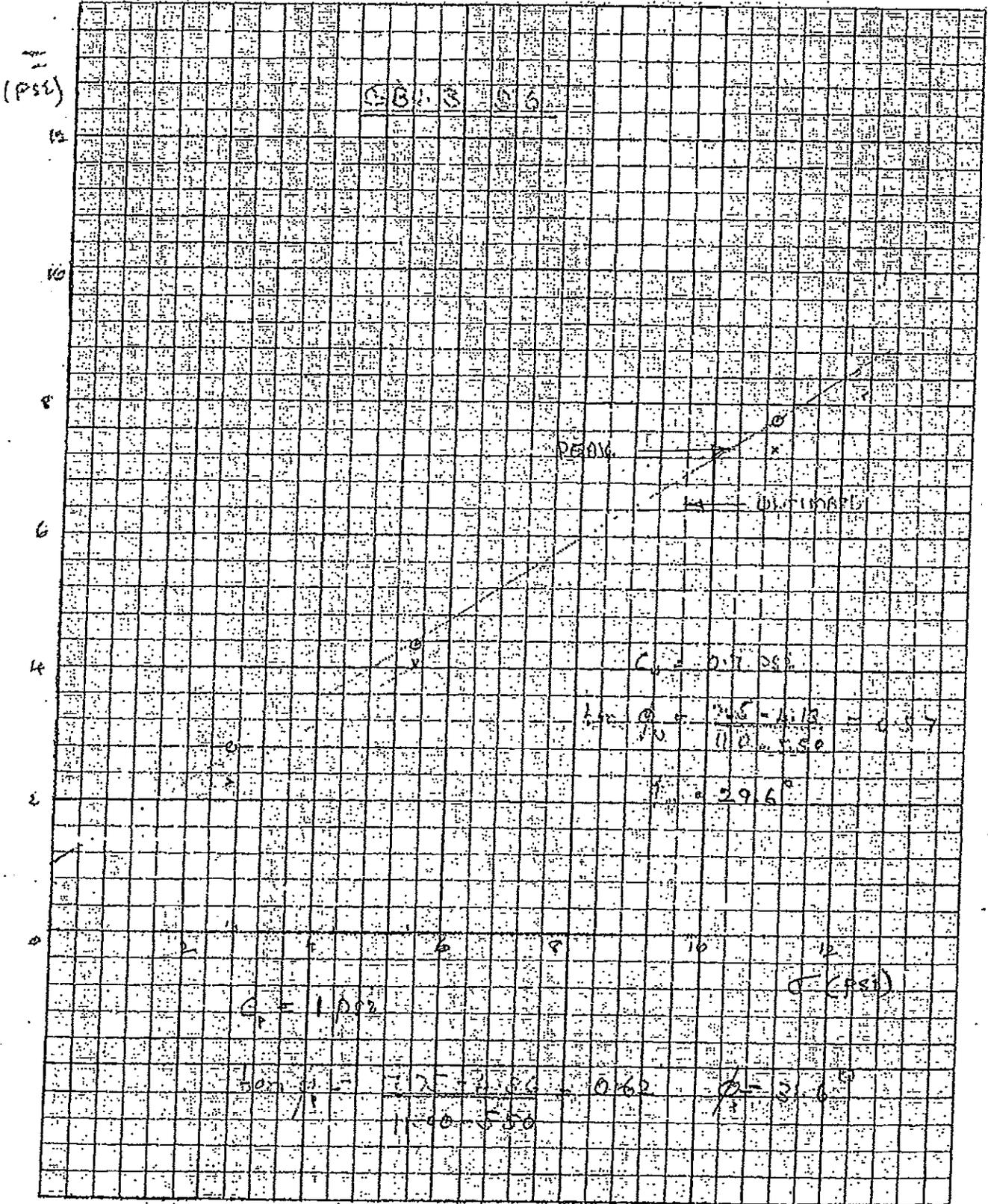
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1951  
1952



DATE	DESCRIPTION	AMOUNT	BALANCE
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# Golder Associates

SUBJECT		
Job No.	Made by <i>ATF</i>	Date <i>08-28-08</i>
Ref.	Checked	Sheet of
	Reviewed	



**Thilliyar, Mahendra**

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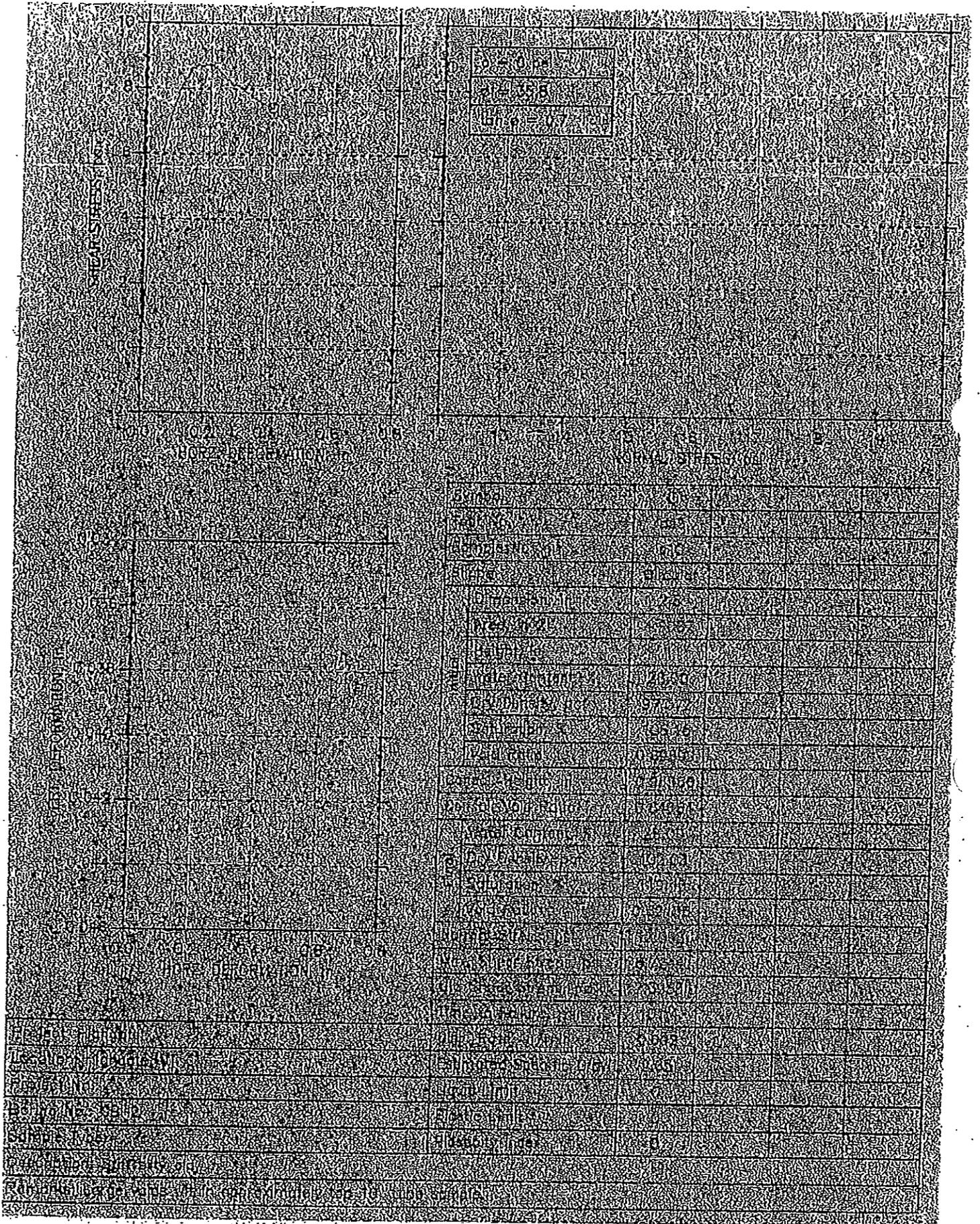
**From:** Ewald, Callie [Callie.Ewald@state.vt.us]  
**Sent:** Wednesday, August 13, 2008 8:38 AM  
**To:** Thilliyar, Mahendra  
**Cc:** Benda, Chris  
**Subject:** GBH2 S10 Direct Shear Results  
**Attachments:** GBH2 - S10 - 878 psf.bmp; GBH2 - S10 - 1742.4 psf.bmp; GBH2 - S10 - 3469 psf.bmp

Enclosed are the direct shear results from GBH2 S10 Tube (18-20').  
Here is a table of summarized results taken from the reports:

Normal Stress (psf)	Normal Stress (psi)	Max Shear Stress (psi)	Peak Friction Angle (deg.)	Initial Water Content (%)
878.000	6.120	5.443	41.7	30.16
1742.000	12.100	8.724	35.8	27.90
3470.000	24.089	17.039	35.3	28.45

If you have any questions, feel free to call. Thanks.

Callie Ewald  
Geotechnical Engineer  
VTrans Materials and Research  
Phone: (802)-828-1235  
Fax: (802)-828-2792







# Golder Associates

SUBJECT

Job No.  
Rel.

Made by  
Checked  
Reviewed

Date  
Sheet of

$E$  (PSI)

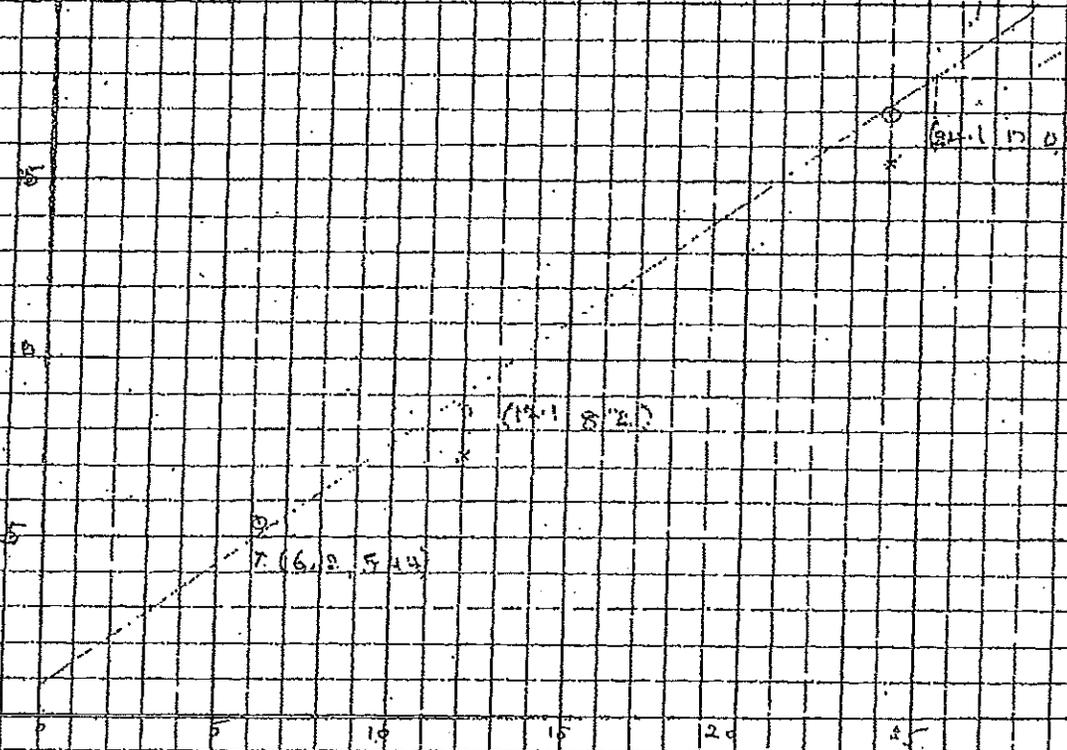
25  
20  
15  
10  
5  
0

GBN-3 S-10

A-6 SILTY CLAY CL

$S_c = 2.9\%$   $S_L = 37.1\%$

$LL = 36$   $PI = 9.3$   $AI = 13$



$C_p = 0.9 \text{ PSI}$

$\tan \phi_p = \frac{17}{25}$

$\phi_p = 34^\circ$

$C_v = 0$

$\tan \phi_v = \frac{17-0}{24-0} = 0.71$

$\phi_v = 35.2^\circ$

**Thilliyar, Mahendra**

---

**From:** Ewald, Callie [Callie.Ewald@state.vt.us]  
**Sent:** Friday, August 08, 2008 9:33 AM  
**To:** Thilliyar, Mahendra  
**Cc:** Benda, Chris  
**Subject:** Highgate, VT - Direct Shear  
**Attachments:** Direct Shear.xls; HighgateGBH5s2ds1.dat; HighgateGBH5s2ds2.dat;  
HighgateGBH5s2ds3.dat; GBH5 - S2 - 100 psf.bmp; GBH5 - S2 - 200 psf.bmp; GBH5 - S2 -  
500 psf.bmp

Hi Mahendra,

GBH-5 S2 direct shear testing is complete. Attached is a spreadsheet of results as well as the three reports in .dat format. I'm not sure if you have the software to open the reports, so I also sent them along as bitmap images. Let me know if you need anything else.

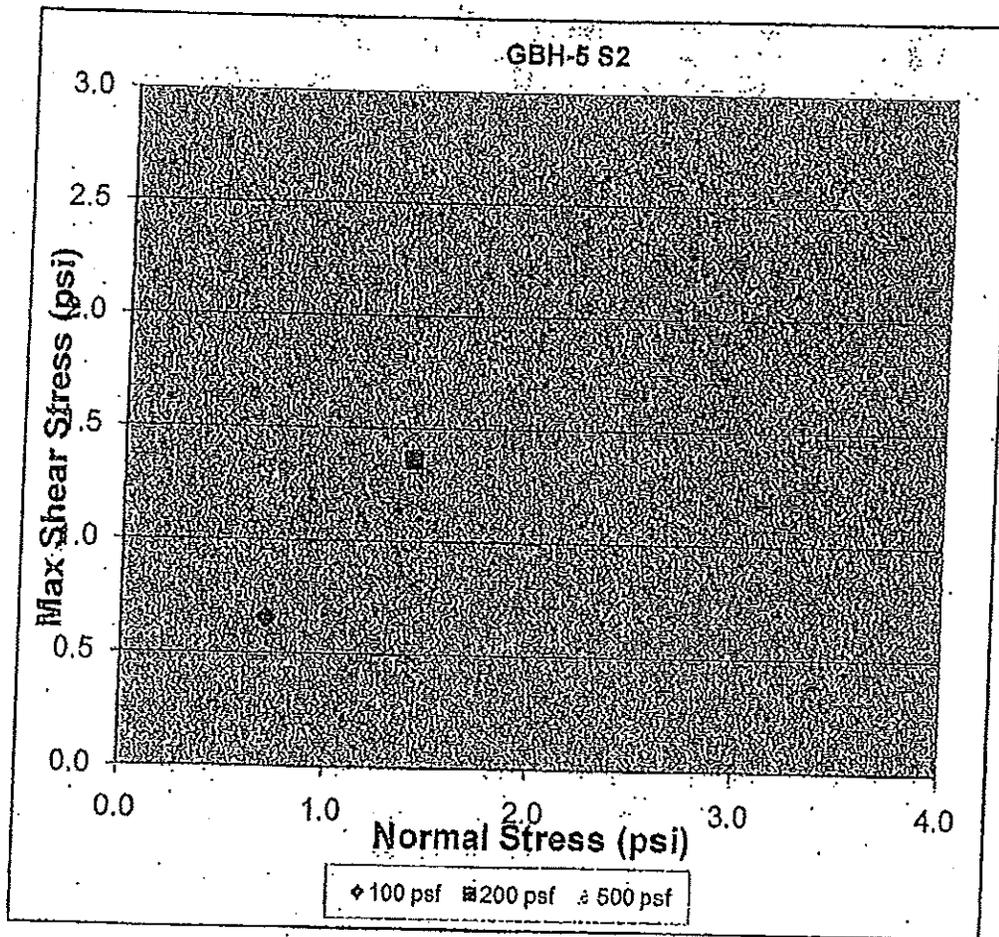
Thanks,  
Callie

Callie Ewald  
Geotechnical Engineer  
VTrans - Materials and Research  
Phone: (802)-828-1235  
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### Highgate 3-Point Direct Shear Results

GBH-5 S2 (100 pcf)

Normal Stress (psf)	Normal Stress (psi)	Max Shear Stress (psi)	Friction Angle
100.000	0.702	0.656	43.1
200.000	1.402	1.359	44.1
500.000	3.470	2.549	36.3









**Golder Associates**

SUBJECT

Job No.

Made by *WJL*

Date *07-25-08*

Rel.

Checked

Sheet *1* of *1*

Reviewed

$\sigma$   
(psf)

GBH-3 C-2

A-4 SANDY SILT (ML)

So. 45.3% S. 41.2%

MLL 17.1% L. 2.1%

(NP)

2

$\sigma = 480$

$\sigma$  (psf)

$$C_p = 0.39 \text{ psf}$$

$$\tan \phi = \frac{2.5 - 0.41}{3.5 - 0} = 0.6$$

$$\phi = 31^\circ$$

$$C_o = 0.26 \text{ psf}$$

$$\tan \phi_o = \frac{2.45 - 0.26}{3.5 - 0} = 0.63$$

$$\phi_o = 32.8^\circ$$



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 [ttd] 800-253-0191

Agency of Transportation

September 23, 2008

Golder Associates, Inc.  
 670 North Commercial Street  
 Suite 103  
 Manchester, New Hampshire, USA 03101

Attention: Peter Ingraham, P.E.

Subject: Highgate VT 207 Bridge  
 Laboratory Testing Results

Dear Mr. Ingraham:

Laboratory tests were conducted on several soil samples from Highgate, VT, as requested from Golder Associates Inc. This document summarizes the tests conducted, parameters used, and results of the tested specimens. Below is a summary of samples from respective boreholes and the test completed.

Boring	Sample No.	Depth (ft)	Testing Completed
GBH-2	S-10 Tube	18 - 20	3-point Direct Shear Test of soils Under Consolidated Drained Conditions, T 236-03
GBH-3	S-6 Tube	10 - 12	3-point Direct Shear Test of soils Under Consolidated Drained Conditions, T 236-03
GBH-5	S-2	2	3-point Direct Shear Test of soils Under Consolidated Drained Conditions, T 236-03
GBH-5	S-6 Tube	3.5 - 5.5	Consolidated, Undrained, Triaxial Compression Test on Cohesive Soils T 297-94

Table 1: Samples and Corresponding Tests Performed

Three 3-point direct shears were completed according to AASHTO T 236-03 under consolidation pressures provided by Golder. The specimens were consolidated in incremental steps until the testing pressure was reached. A strain rate was assigned based on material type and consolidation time. By testing three specimens for each sample at different consolidation pressures, the normal stress vs. shear stress can be graphed for all three points to find an overall friction angle of the soil. The peak friction angles in column 5 of the tables below is dependent on the given normal stress in column 1 and the



corresponding max shear stress in column 3 that resulted from the test. The parameters and results are displayed below in tables 2 through 4.

Normal Stress (psf)	Normal Stress (psi)	Max Shear Stress (psi)	Ultimate Shear Stress (psi)	Peak Friction Angle (deg.)	Initial Water Content (%)
878.000	6.120	5.44	4.56	41.7	30.16
1742.000	12.100	8.72	7.40	35.8	27.90
3470.000	24.089	17.04	15.58	35.3	28.45

Table 2: GBH-2 (S-10)

Normal Stress (psf)	Normal Stress (psi)	Max Shear Stress (psi)	Ultimate Shear Stress (psi)	Peak Friction Angle (deg.)	Initial Water Content (%)
397.00	2.76	2.85	2.30	46.0	28.50
794.10	5.50	4.36	4.14	38.4	30.16
1584.0	11.00	7.75	7.25	35.2	29.00

Table 3: GBH-3 (S-6)

Normal Stress (psf)	Normal Stress (psi)	Max Shear Stress (psi)	Ultimate Shear Stress (psi)	Peak Friction Angle (deg.)	Initial Water Content (%)
100.000	0.702	0.66	0.65	43.1	15.2
200.000	1.402	1.359	1.21	44.1	15.0
500.000	3.470	2.549	2.46	36.3	15.4

\* Disturbed Samples compacted to 100 pcf in shear box

Table 4: GBH-5 (S-2)

One triaxial test was performed on tube sample 6 from GBH-5. This test was performed according to AASHTO T 297-94, under three consolidation pressures provided by Golder. A summary of the conditions at failure for each specimen tested is shown below in table 5. When Mohr circles are drawn from the results, a friction angle of approximately 29 degrees is found for the sample. The group report for this series of tests can be found attached.

Specimen Details			
Specimen Reference	Consolidation Pressure (psi)	Effective Minor Principal Stress ( $\sigma_3'$ )	Effective Major Principal Stress ( $\sigma_1'$ )
A	0.69	0.69psi	6.44psi
B	1.18	2.40psi	14.63psi
C	2.7	10.52psi	34.88psi

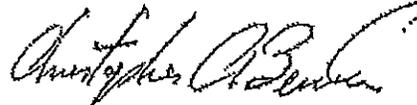
Table 5: GBH-5 (S-6)

Also attached you will find the remaining reports on each soil sample tested, including gradations, limits, and classifications. Soil reports not included were previously sent to Golder from Jim Touchette.

Sincerely,



Callie Ewald  
Geotechnical Engineer



Christopher C. Benda, P.E.  
Soils and Foundations Engineer

Attachments: Triaxial Group Report – 17 pages  
Soil Reports – 6 pages

cc: Electronic Read File/WEA  
Project File/CCB  
CEB

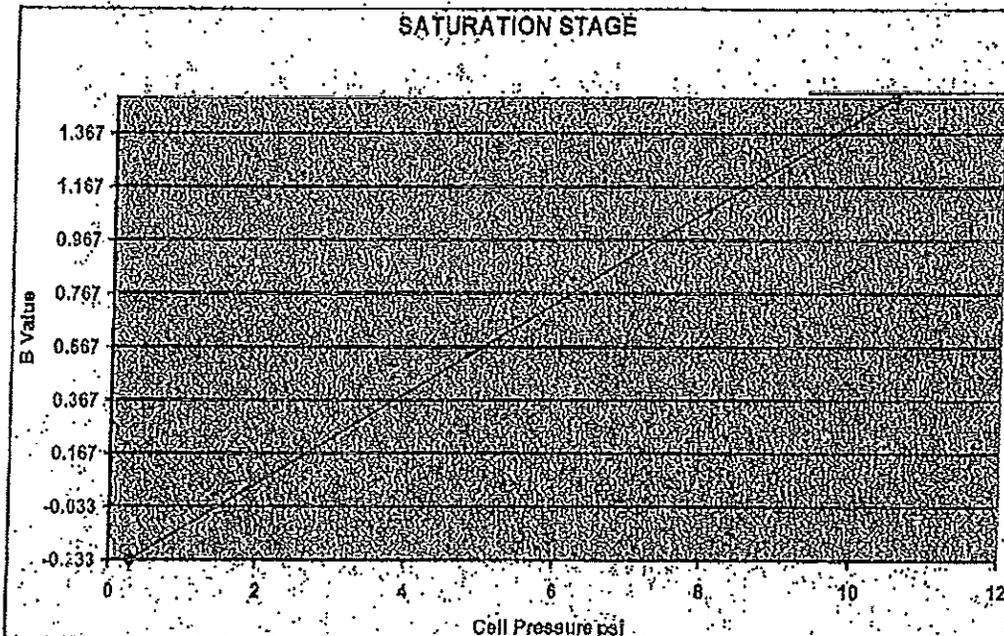
**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT/ACT	Lab Ref	
Project	HIGHWAY	Job	HIGHWAY
Drillhole	GBH 5	Sample	HIGHWAY

Test Details			
Standard	ASTM D4767 - 95 / AASHTO T297 - 94		
Sample Type	Undisturbed sample - open drive	Lab. Temperature	75.0 deg F
Sample Description	Cl gry-brn Moist	Particle Specific Gravity	2.65 (Assumed)
Mounting Method	Wet		
Variations from Procedure	None		

Specimen Details			
Specimen Reference	A	Description	
Depth within Sample	2.0000in	Orientation within Sample	
Initial Height	5.7330 in	Initial Diameter	2.8720 in
Preparation		Moisture Content	24.3 %
Bulk Density	124.35 lb/ft <sup>3</sup>	Initial Voids Ratio	0.653
Dry Unit Weight	100.09 lb/ft <sup>3</sup>	Initial Degree of Saturation	98.5%
Comments			

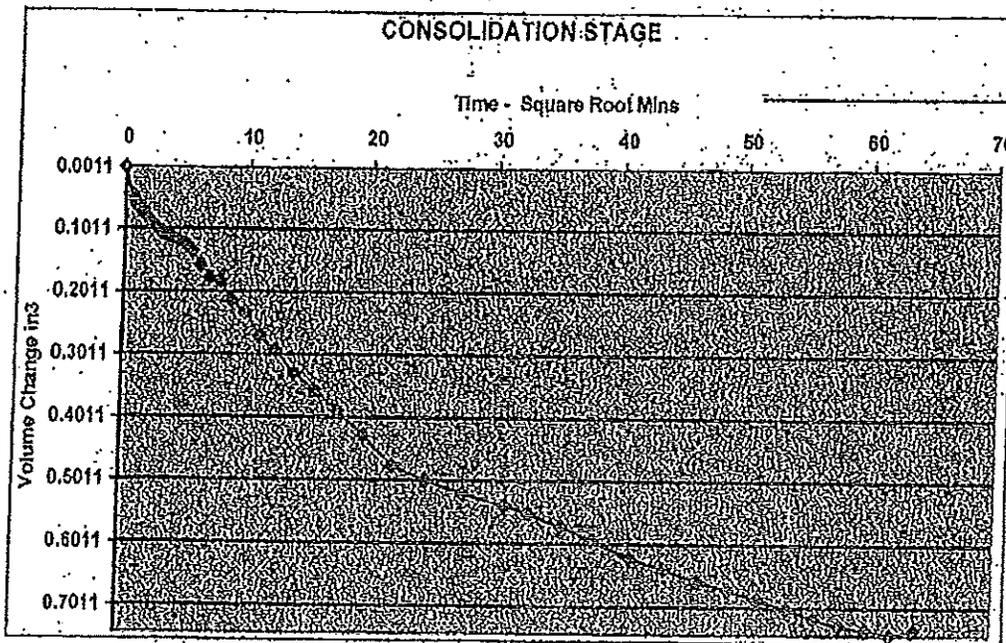


Saturation Method	Cell Pressure Increments	Cell Increments	0.23,12.80,psi
Final Cell Pressure	10.52psi	Back Increments	No Back Pressure Data
Final Pore Pressure	10.37psi	Final B Value	1.500

**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT AOT	Lab Rd.	
Project	HIGHWAY	Job	HIGHWAY
Borehole	GBH	Sample	HIGHWAY

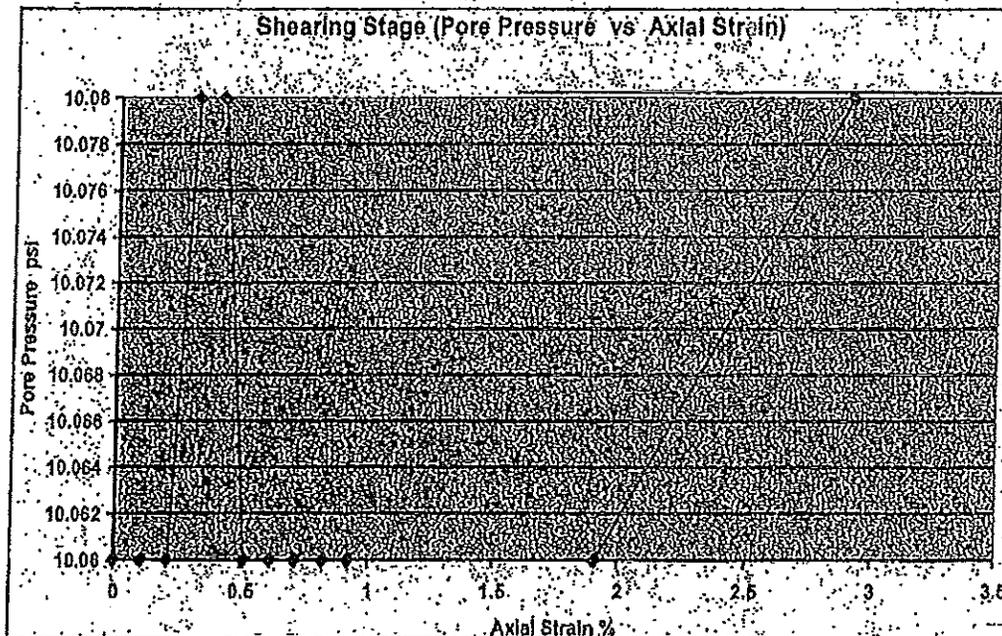
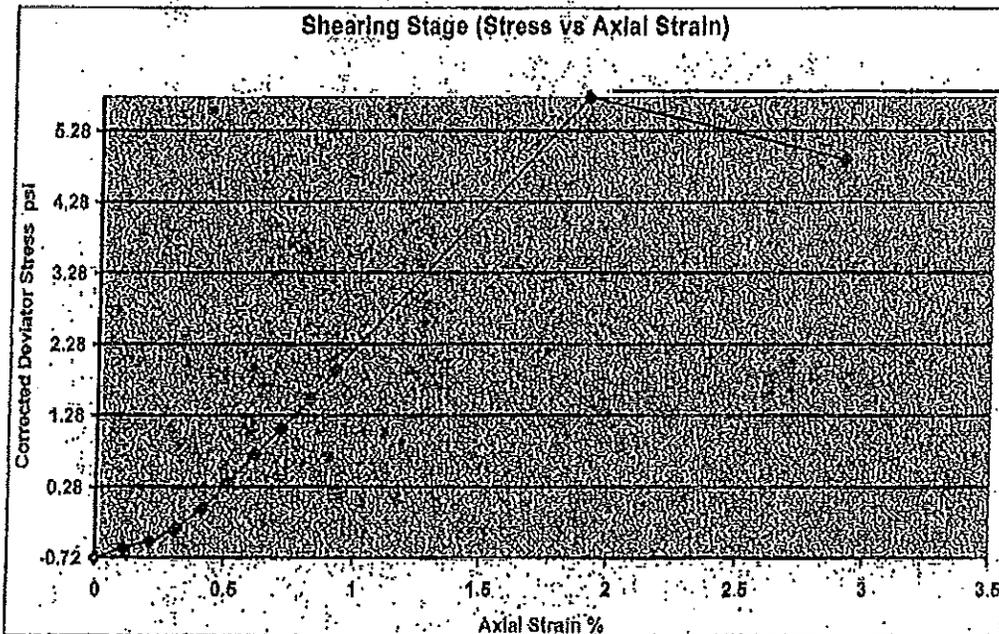


Cell Pressure	10.70psi	Back Pressure	10.0(psi)
Effective Pressure	0.69psi	Final Pore Pressure Dissipation	70.55%
Final Pore Pressure	10.13psi	Time to 50% Primary Consolidation	0.00 Min
Dry Unit Weight	102.11 lb/ft <sup>3</sup>	Cross sectional Area after consolidation (Method A)	6.39213 in <sup>2</sup>
Void Ratio	0.62	Saturation	111.4%
Moisture Content	26.1 %		

**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT AOT	Lab Ref.	
Project	HIGHWAY	Lot	HIGH501C
Location	GBH3	Sample	HIGH501C

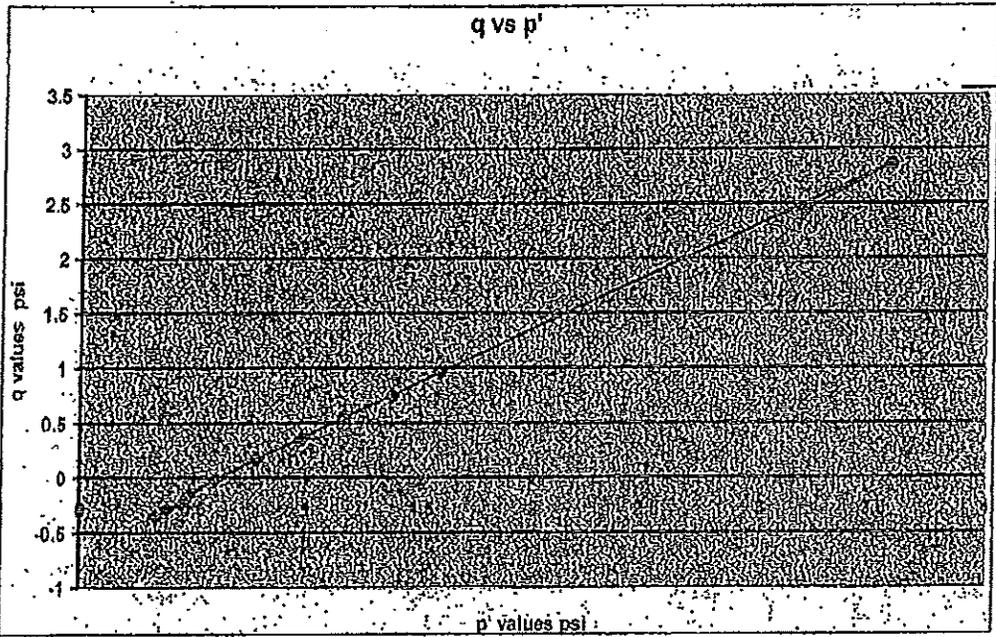


**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONTACT	Lab Ref	
Project	HIGHGATE	Job No	HIGHB501C
Material	GHF 3	Sample	HIGHB501C

Shear Conditions			
Rate of Strain	0.00 %/Min	Cell Pressure	10.75psi
Initial Pore Pressure	10.06psi	Effective Stress at Start of Stage	0.69psi

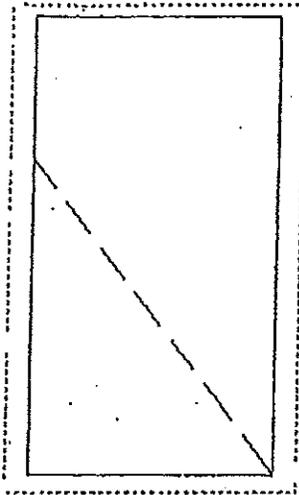


Conditions at Failure			
Failure Criterion	Maximum Deviator Stress		
Pore Pressure	10.06psi	Minor Effective Principal Stress	0.69psi
Deviator Stress	5.75psi	Major Effective Principal Stress	6.44psi
Axial Strain	1.91%	Final Moisture Content	26.1 %
Deviator Stress Correction	0.79psi		

**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT AOT	Lab Ref.	
Project	HIGHGATE	Job	HIGHB5U1C
Borehole	GBH5	Sample	HIGHB5U1C



Tested By and Date:	09/04/08 cna
Checked By and Date:	
Approved By and Date:	

Mode of Failure

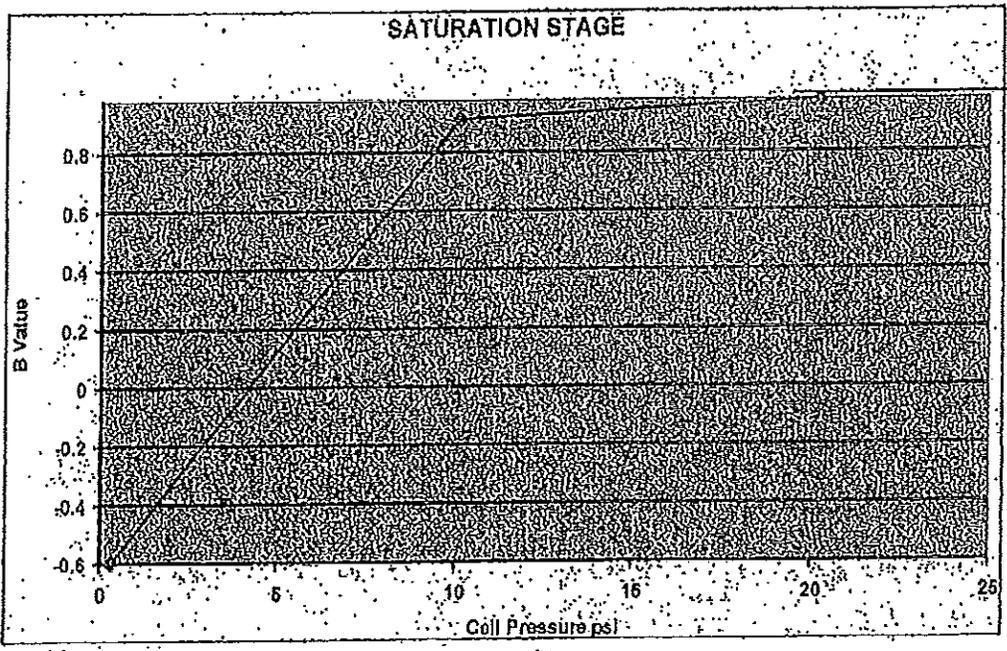
**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONTAOT	Lab Ref	
Project	HIGHCATE	Cell	HIGHB6U1C
Borehole	GBH 5	Sample	HIGHB6U1C

Test Details			
Standard	ASTM D4767 - 96 / AASHTO T287 - 94		
Sample Type	Undisturbed sample - open drive	Lab. Temperature	75.0 deg.F
Sample Description	Cl gry-brn Moist	Particle Specific Gravity	2.65 (Assumed)
Mounting Method	Wet		
Variations from Procedure	None		

Specimen Details			
Specimen Reference	B	Description	
Depth within Sample	8.0000in	Orientation within Sample	
Initial Height	5.8070 in	Initial Diameter	2.8730 in
Preparation		Moisture Content	25.6 %
Bulk Density	125.89 lb/ft <sup>3</sup>	Initial Voids Ratio	0.651
Dry Unit Weight	100.25 lb/ft <sup>3</sup>	Initial Degree of Saturation	104.3%
Comments			

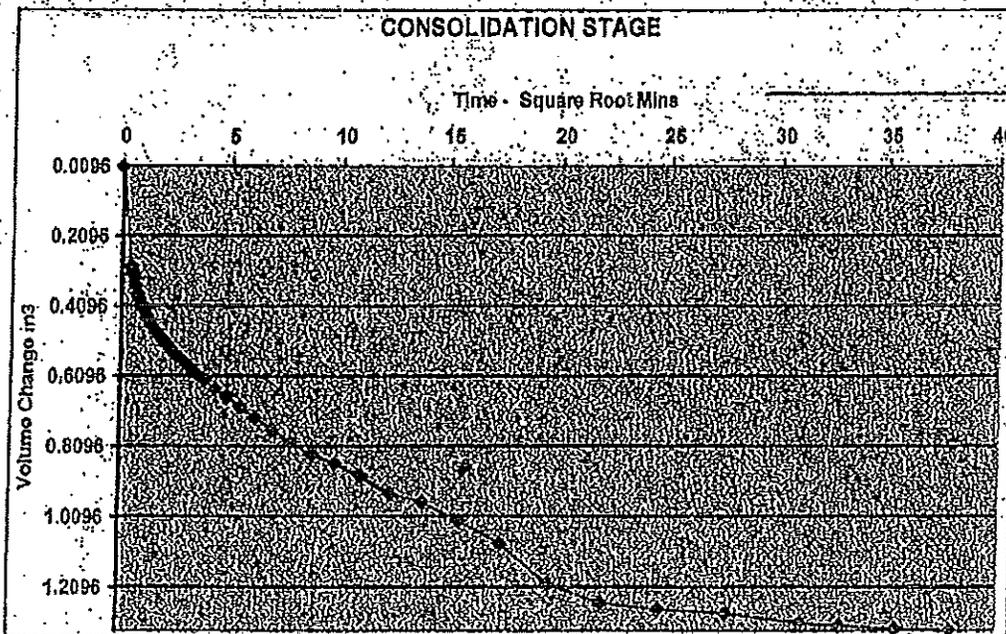


Saturation Method	Cell Pressure Increments	Cell Increments	0.26, 10.03, 4.39, psi
Final Cell Pressure	20.23psi	Back Increments	No Back Pressure Data
Final Pore Pressure	19.73psi	Final B Value	0.978

**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT AOT	Lab Ref	
Project	HIGHWAY 10	Job No	HIGH50 C
Borehole	GBH	Sample	HIGH50 C

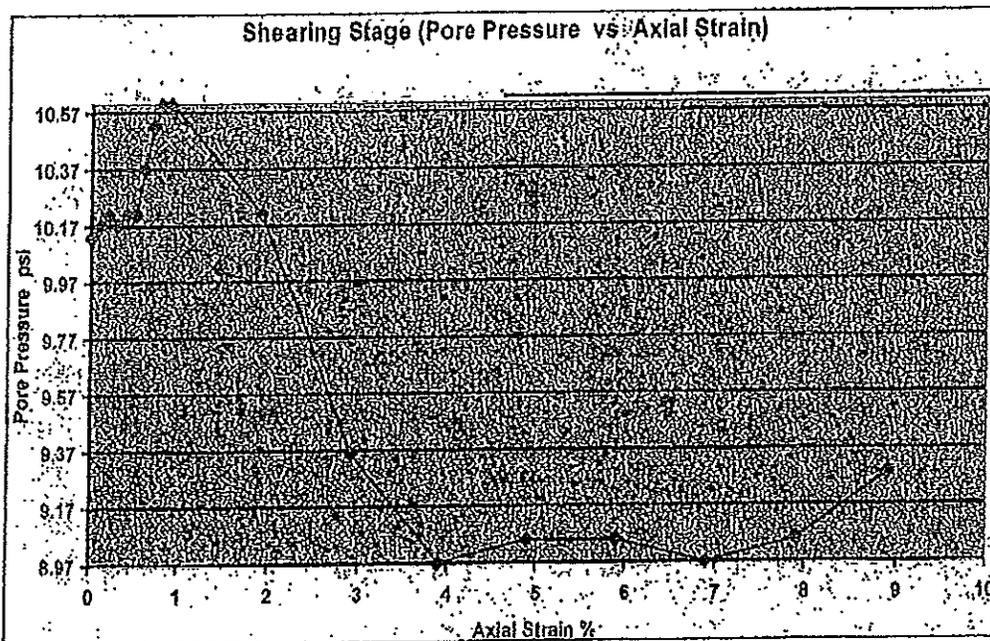
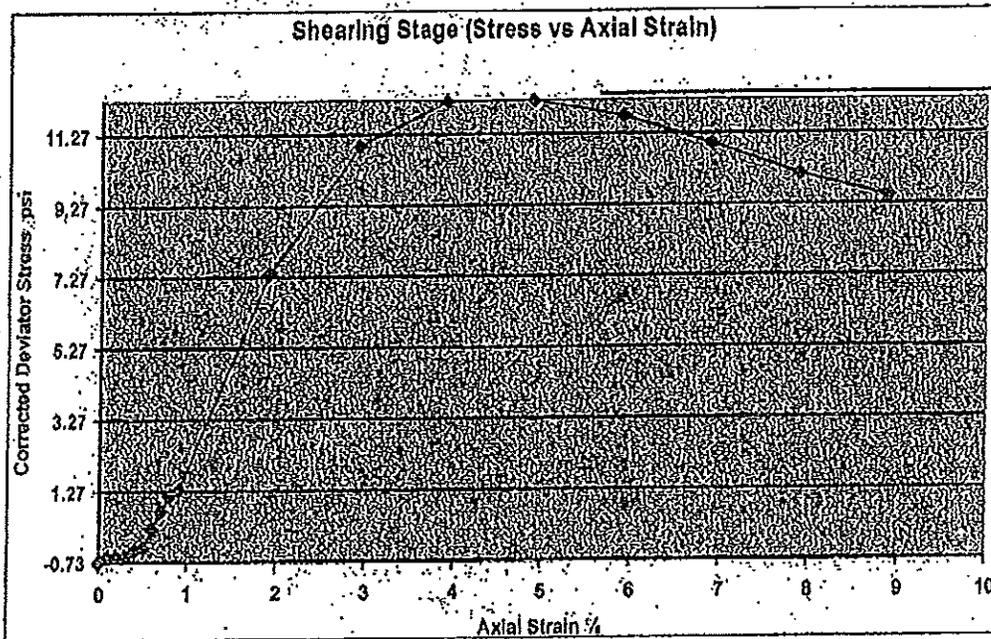


Cell Pressure	10.21psi	Back Pressure	9.77psi
Effective Pressure	0.44psi	Final Pore Pressure Dissipation	-198.08%
Final Pore Pressure	10.16psi	Time to 50% Primary Consolidation	0.15.Min
Dry Unit Weight	103.90 lb/ft <sup>3</sup>	Cross sectional Area after consolidation (Method A)	6.32903 in <sup>2</sup>
Void Ratio	0.59	Saturation	117.6%
Moisture Content	26.3 %		

**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT AOTS	Lab Ref	11112
Project	HIGHGATE	Job	HIGHB5U1C
Borehole	GBH1	Sample	HIGHB5U1C U

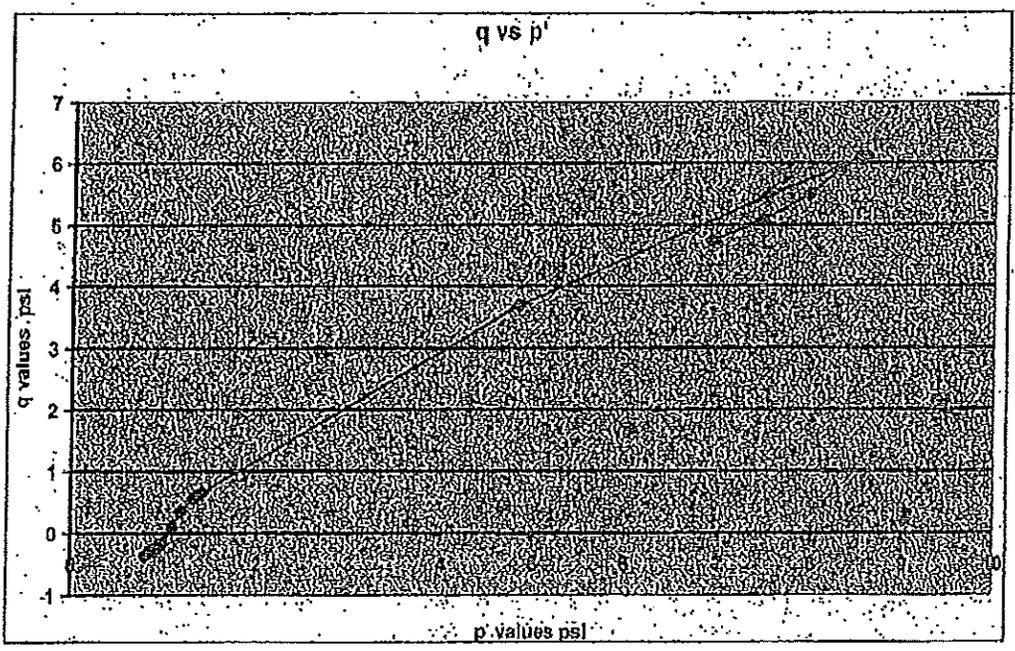


**Consolidated Undrained Triaxial Compression Test  
for Silts**



Client:	VERMONT AOT	Lab Ref:	
Project:	HIGHWAY	Job No.:	HICHSU16
Location:	GB	Sample:	HICHSU16

Shear Conditions			
Rate of Strain:	0.03 %/Min	Cell Pressure:	11.32psi
Initial Pore Pressure:	10.13psi	Effective Stress at Start of Stage:	1.18psi

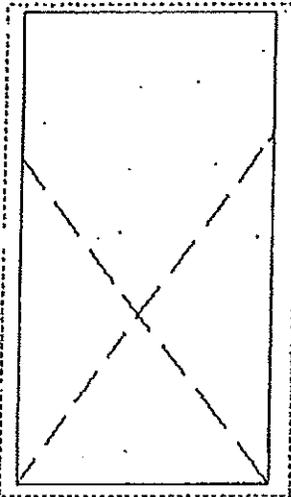


Conditions at Failure			
Failure Criterion	Maximum Deviator Stress		
Pore Pressure	9.05psi	Minor Effective Principal Stress	2.40psi
Deviator Stress	12.23psi	Major Effective Principal Stress	14.63psi
Axial Strain	4.90%	Final Moisture Content	26.3 %
Deviator Stress Correction	0.92psi		

**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT DOT	Lab Ref	
Project	HIGHGATE	Job	HIGHB5U1C
Borehole	GBH5	Sample	HIGHB5U1C



Mode of Failure

Tested By and Date:	caa 09/09/08
Checked By and Date:	
Approved By and Date:	

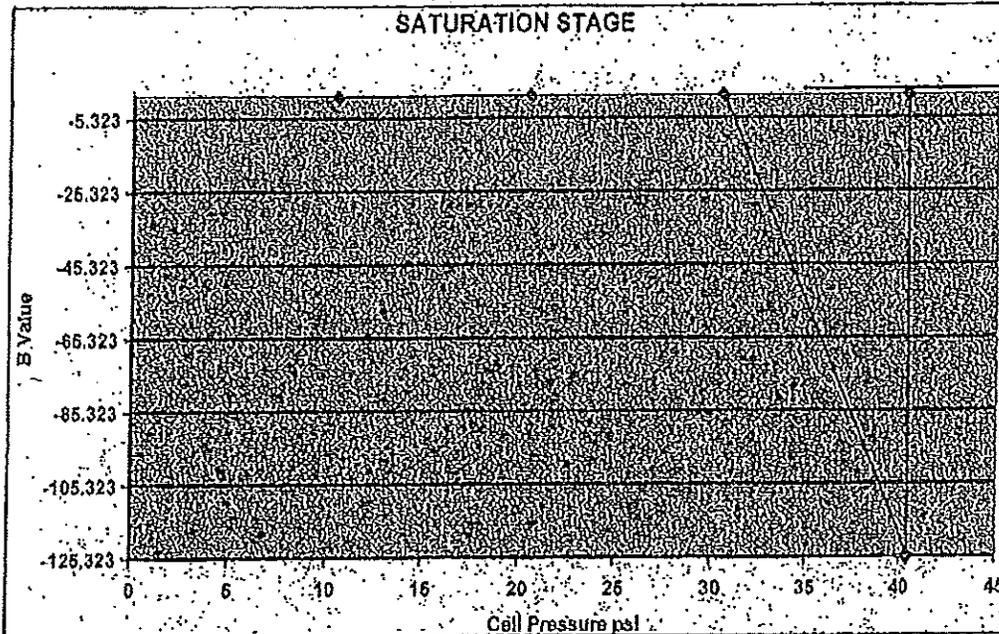
**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT AOT	Job Ref	
Project	HIGHGATE	Job	HIGHB5U1C
Borehole	GBH5	Sample	HIGHB5U1C

Test Details			
Standard	ASTM D4767 - 96 / AASHTO T297 - 94		
Sample Type	Undisturbed sample - open drive	Lab. Temperature	76.0 deg F
Sample Description	Cl gry-brn Moist	Particle Specific Gravity	2.65 (Assumed)
Mounting Method	Wet		
Variations from Procedure	None		

Specimen Details			
Specimen Reference	C	Description	clayey silt
Depth within Sample	14.0000 in	Orientation within Sample	
Initial Height	5.7000 in	Initial Diameter	2.8740 in
Preparation		Moisture Content	25.4 %
Bulk Density	124.38 lb/ft <sup>3</sup>	Initial Voids Ratio	0.668
Dry Unit Weight	99.22 lb/ft <sup>3</sup>	Initial Degree of Saturation	100.8%
Comments	1.7" to 2.0" horizontal crack specimen separated during initial measurement stage		



Saturation Method	Cell Pressure Increments	Cell Increments	10.50, 3.11, 15.59, 10.5 6, -2.40, psi
Final Cell Pressure	40.40 psi	Back Increments	No Back Pressure Data

**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**

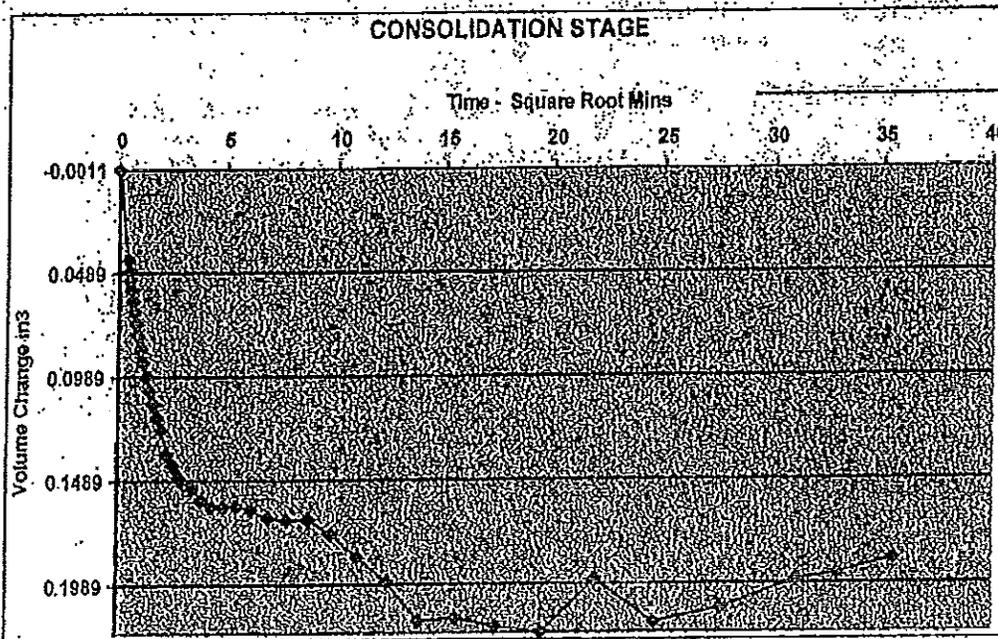


Final Pore Pressure	39.53psi	Final B Value	0.941
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**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT AOT	Lab Ref.	
Project	HIGHWAY 5	Job	HIGH5UTC
Booth	GBH5A	Sample	HIGH5UTC

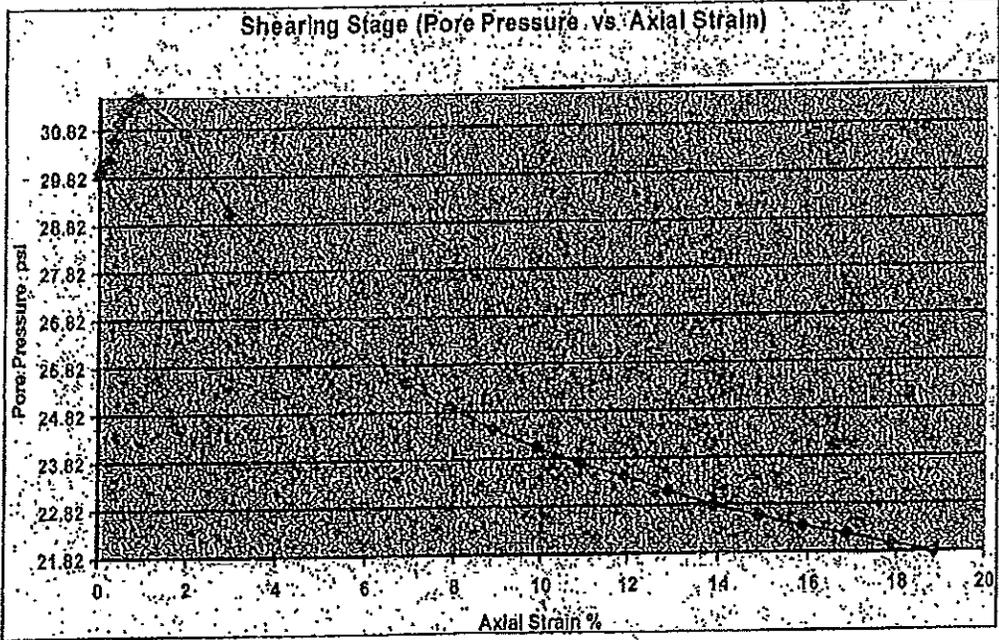
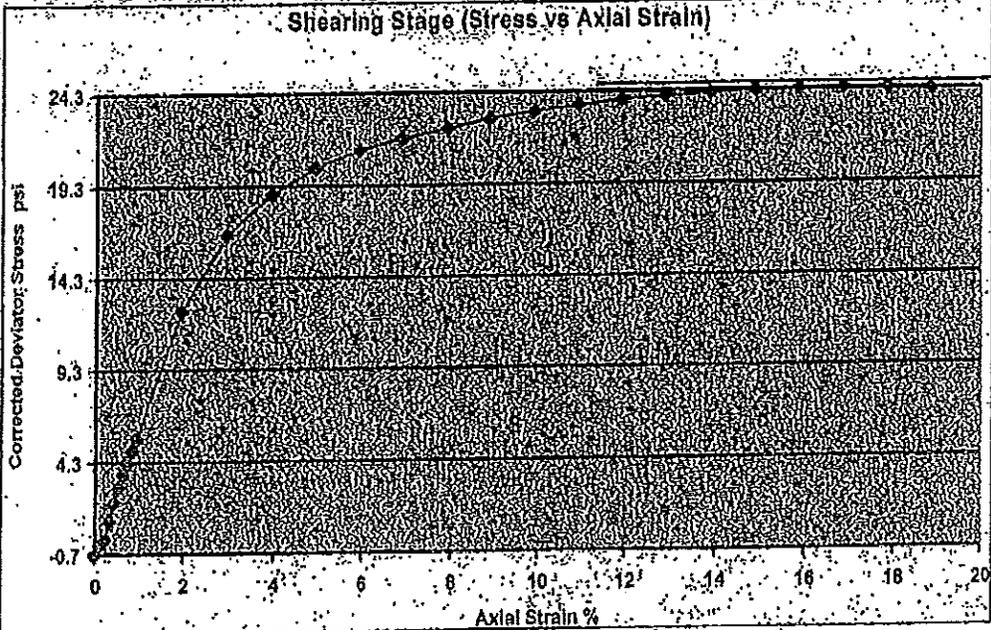


Cell Pressure	32.87psi	Back Pressure	29.94psi
Effective Pressure	2.93psi	Final Pore Pressure Dissipation	99.97%
Final Pore Pressure	29.94psi	Time to 50% Primary Consolidation	0.00 Min
Dry Unit Weight	99.73 lb/ft <sup>3</sup>	Cross sectional Area after consolidation (Method A)	6.46527 in <sup>2</sup>
Void Ratio	0.66	Saturation	108.3%
Moisture Content	27.0 %		

**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT AOT	Lab Ref	
Project	HIGHGATE	Job	HIGHB5U1C
Soils	OBH5	Sample	HIGHB5U1C

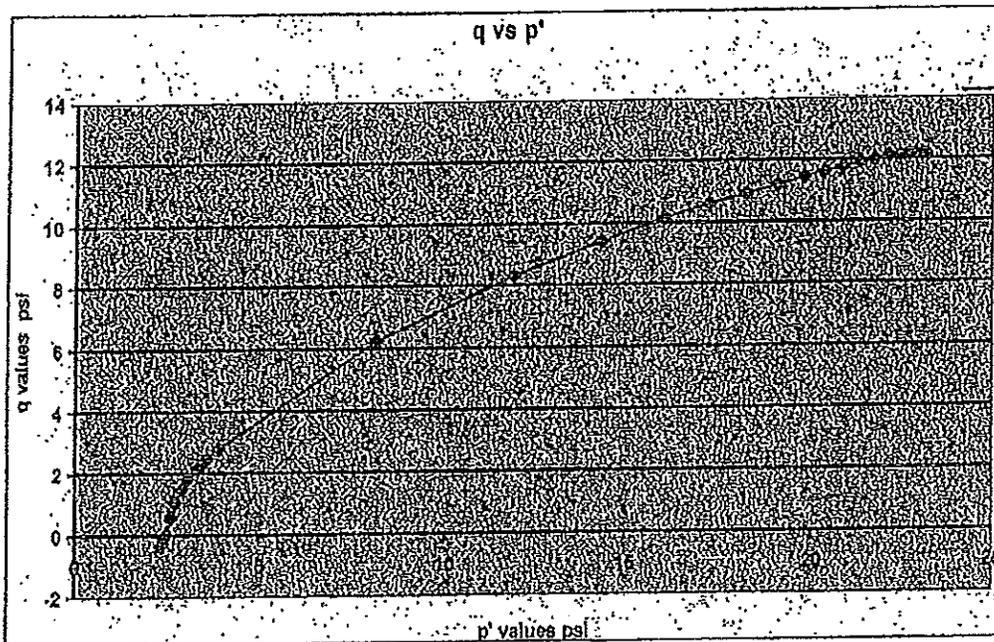


**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



Client	VERMONT AOT	Lab Ref	
Project	HIGHGATE	Job	HIGHB5U1C
Drainage	GBH5	Sample	HIGHB5U1C

Shear Conditions			
Rate of Strain	0.03 %/Min	Cell Pressure	32.64psi
Initial Pore Pressure	29.94psi	Effective Stress at Start of Stage	2.70psi

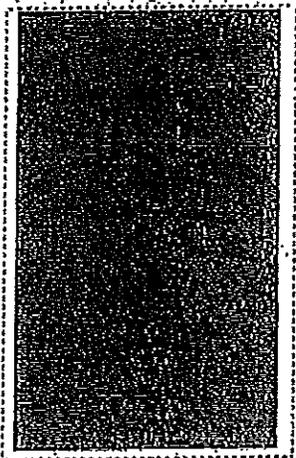


Conditions at Failure			
Failure Criterion	Maximum Deviator Stress		
Pore Pressure	22.36psi	Minor Effective Principal Stress	10.52psi
Deviator Stress	24.36psi	Major Effective Principal Stress	34.88psi
Axial Strain	15.87%	Final Moisture Content	27.0 %
Deviator Stress Correction	1.41psi		

**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soil**



Client	VERMONTAOT	Lab Ref	
Project	HIGHGATE	Y60	HIGHB5U1C
Boresole	GBH	Sample	HIGHB5U1C



Mode of Failure

Tested By and Date:	CEE/JET
Checked By and Date:	
Approved By and Date:	

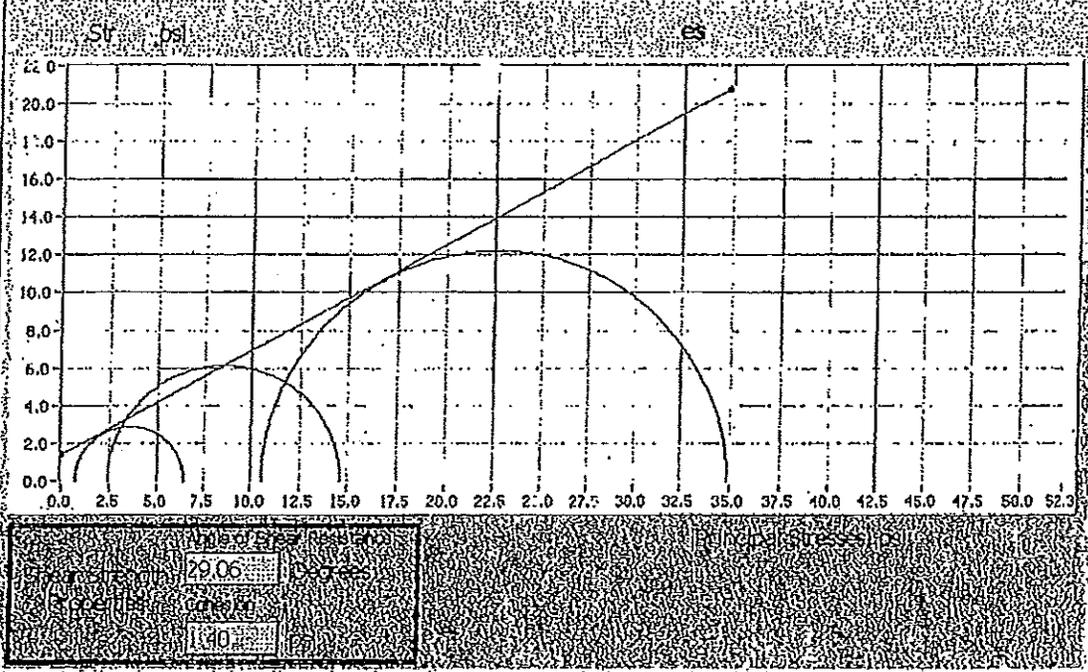
**Consolidated Undrained Triaxial Compression Test  
for Cohesive Soils**



**SUMMARY**

Test Details	
Standard	ASTM D4767 - 95 / AASHTO T297 - 94

Specimen Details		
Specimen Reference	Effective Minor Principal Stress ( $\sigma_3'$ )	Effective Major Principal Stress ( $\sigma_1'$ )
A	0.69psi	6.44psi
B	2.40psi	14.63psi
C	10.52psi	34.88psi



Vermont Agency of Transportation  
 Materials and Research Section  
 1 National Life Drive  
 Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: B080699      Corrected copy: N/A      Report Date: 9/25/2008 2:19:12 P  
 Project: HIGHGATE      Number: Missisquoi Br.      Site: VT-207 BR-6  
 Date sampled: 7/15/2008    Received: 8/13/2008    Tested: 8/13/2008    Tested by: J. TOUCHETTE  
 Station:      Offset:      Hole: GBH-3      Depth: 10 FT to: 12 FT  
 Field description:  
 Submitted by: WERNER/GOLDER      Address:  
 Sample type: TUBE      Quantity:  
 Sample source/Outside agency name:  
 Location used:      Examined for: CLASSIFICATION  
 Comment: TUBE S-6

Test Results

Sieve Analysis		Limits	
T-88	% Passing Total Sample		
75 mm (3.0"):		T-265 Moisture content:	29.2%
37.5 mm (1.5"):		T-89 Liquid Limit:	31
19 mm (3/4"):		T-90 Plastic Limit:	20
9.5 mm (3/8"):		T-90 Plasticity Index:	11
4.75 mm (#4):	100.0%	Moisture Density	
2.00 mm (#10):	100.0%	Test method: T-180	Method:
850 µm (#20):		Maximum density:	pcf
425 µm (#40):		Optimum moisture:	
250 µm (#60):		T-100 Specific Gravity:	2.776
150 µm (#100):	99.8%	Gr: 0.0%	D2487: CL
75 µm (#200):	99.6%	Sa: 0.4%	M145: A-6      Silty Clay
		Sl: 99.6%	
Hydrometer Analysis			
Particles smaller	% total sample		
0.05 mm:	98.0%		
0.02 mm:	86.1%		
0.005 mm:	53.9%		
0.002 mm:	36.1%		
0.001 mm:	29.3%		

Comments:

Reviewed by: T. Eliassen, P.G., Transportation Geologist

Vermont Agency of Transportation  
Materials and Research Section  
1 National Life Drive  
Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080699

Corrected copy: N/A

Report Date: 9/25/2008 2:19:55 P

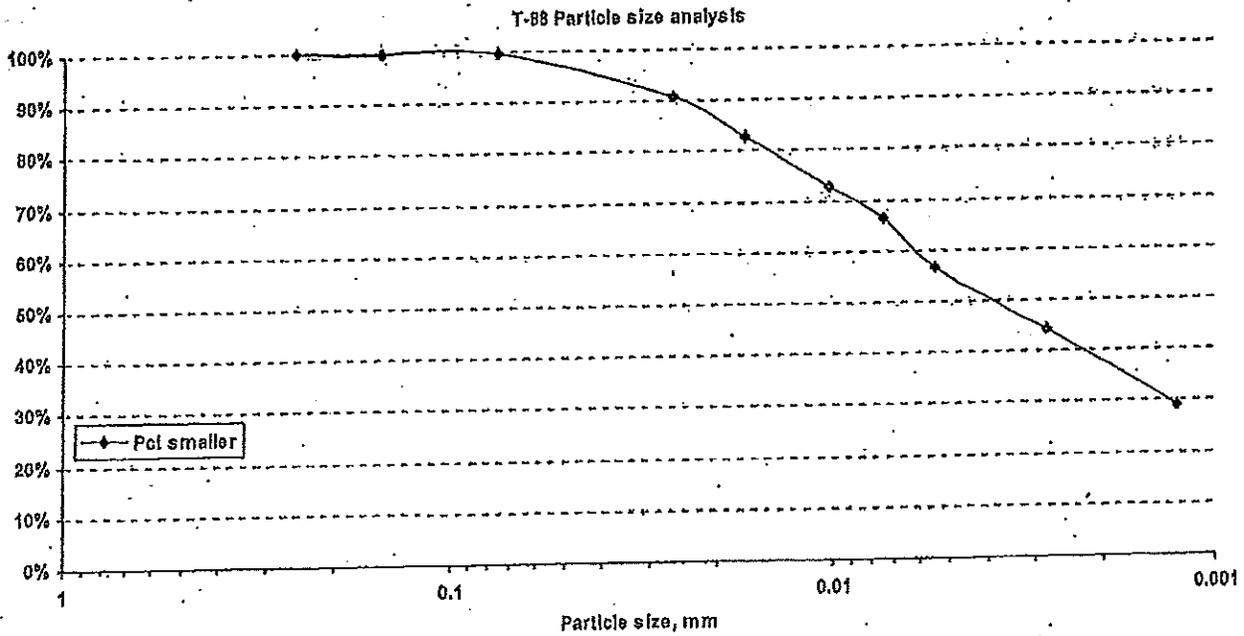
Project: HIGHGATE

Number: Missisquoi Br.

Site: VT-207 BR-6.

Hole: GBH-3

Depth: 10FT - 12FT



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 Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: B080700      Corrected copy: N/A      Report Date: 9/25/2008 2:20:51 P  
 Project: HIGHGATE      Number: Missisquoi Br.      Site: VT-207 BR-6  
 Date sampled: 7/14/2008    Received: 8/13/2008    Tested: 8/13/2008    Tested by: J. TOUCHETTE  
 Station:      Offset:      Hole: GBH-1      Depth: 17 FT to: 19 FT  
 Field description:  
 Submitted by: WERNER/GOLDER      Address:  
 Sample type: TUBE      Quantity:  
 Sample source/Outside agency name:  
 Location used:      Examined for: CLASSIFICATION  
 Comment: TUBE S-7

Test Results

Sieve Analysis	
T-88	% Passing
Total Sample	
75 mm (3.0"):	
37.5 mm (1.5"):	
19 mm (3/4"):	99.0%
9.5 mm (3/8"):	96.3%
4.75 mm (#4):	93.5%
2.00 mm (#10):	89.3%
850 µm (#20):	85.3%
425 µm (#40):	81.4%
250 µm (#60):	77.1%
150 µm (#100):	72.4%
75 µm (#200):	64.9%

Limits	
T-265 Moisture content:	19.6%
T-89 Liquid Limit:	21
T-90 Plastic Limit:	17
T-90 Plasticity Index:	4

Moisture Density		
Test method:	T-180	Method:
Maximum density:		pcf
Optimum moisture:		
T-100 Specific Gravity:		
Gr:	10.7%	D2487: CL-ML
Sr:	24.4%	M145: A-4    Sandy Silt
Si:	64.9%	

Hydrometer Analysis	
Particles smaller	% total sample
0.05 mm:	
0.02 mm:	
0.005 mm:	
0.002 mm:	
0.001 mm:	

Comments: WET DENSITY= 137.32 pcf  
 DRY DENSITY= 115.69 pcf

Reviewed by: T. Eliassen, P.G., Transportation Geologist

Vermont Agency of Transportation  
 Materials and Research Section  
 1 National Life Drive  
 Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080759      Corrected copy: N/A      Report Date: 9/25/2008 2:21:45 P  
 Project: HIGHGATE      Number: Missisquoi Br.      Site: VT-207 BR-6  
 Date sampled: 7/16/2008    Received: 9/4/2008    Tested: 9/4/2008    Tested by: J. TOUCHETTE  
 Station:                    Offset:                    Hole: GBH-5      Depth: 3.5 FT to: 5.5 FT  
 Field description: Cl, gry-brn, Moist  
 Submitted by: WERNER/GOLDER      Address:  
 Sample type: TUBE                    Quantity:  
 Sample source/Outside agency name:  
 Location used:                              Examined for: CLASSIFICATION  
 Comment: S-6 SAMPLE FROM TRIAXIAL TEST "A"

Test Results

Sieve Analysis		Limits	
T-88	% Passing Total Sample		
75 mm (3.0"):		T-265 Moisture content:	24.1%
37.5 mm (1.5"):		T-89 Liquid Limit:	31
19 mm (3/4"):		T-90 Plastic Limit:	22
9.5 mm (3/8"):		T-90 Plasticity Index:	9
4.75 mm (#4):	100.0%	Moisture Density	
2.00 mm (#10):	100.0%	Test method:	T-180      Method:
850 µm (#20):	99.7%	Maximum density:	pcf
425 µm (#40):	99.4%	Optimum moisture:	
250 µm (#60):	99.0%	T-100 Specific Gravity:	
150 µm (#100):	97.8%	Gr: 0.0%	D2487: CL
75 µm (#200):	96.1%	Sa: 3.9%	M145: A-4      Clayey Silt
		Si: 96.1%	
Hydrometer Analysis			
Particles smaller	% total sample		
0.05 mm:			
0.02 mm:			
0.005 mm:			
0.002 mm:			
0.001 mm:			

Comments: MISLABELED: WAS GBH-6 BRIDGE 1 (TUBE)

Reviewed by: T. Eliassen, P.G., Transportation Geologist

Vermont Agency of Transportation  
 Materials and Research Section  
 1 National Life Drive  
 Montpelier, VT 05633-5001

Distribution list

Report on Soil Sample

Lab number: E080772      Corrected copy: N/A      Report Date: 9/25/2008 2:22:22 P  
 Project: HIGHGATE      Number: Missisquoi Br.      Site: VT-207 BR-6  
 Date sampled: 7/16/2008      Received: 9/11/2008      Tested: 9/11/2008      Tested by: J. TOUCHETTE  
 Station:      Offset:      Hole: GBH-5      Depth: 3.5 FT to 5.5 FT  
 Field description: Cl, gry-brn, Moist  
 Submitted by: WERNER/GOLDER      Address:  
 Sample type: TUBE      Quantity:  
 Sample source/Outside agency name:  
 Location used:      Examined for: CLASSIFICATION  
 Comment: S6 SAMPLE FROM TRIAXIAL TEST "B"

Test Results

Sieve Analysis		Limits	
T-88	% Passing Total Sample		
75 mm (3.0"):		T-265 Moisture content:	25.6%
37.5 mm (1.5"):		T-89 Liquid Limit:	30
19 mm (3/4"):		T-90 Plastic Limit:	21
9.5 mm (3/8"):		T-90 Plasticity Index:	9
4.75 mm (#4):	100.0%	Moisture Density	
2.00 mm (#10):	100.0%	Test method: T-180	Method:
850 µm (#20):		Maximum density:	pcf
425 µm (#40):	99.9%	Optimum moisture:	
250 µm (#60):	99.6%	T-100 Specific Gravity:	
150 µm (#100):	98.0%	Gr: 0.0%	D2487: CL
75 µm (#200):	96.0%	Sa: 4.0%	M145: A-4      Clayey Silt
		Si: 96.0%	
Hydrometer Analysis			
Particles smaller	% total sample		
0.05 mm:			
0.02 mm:			
0.005 mm:			
0.002 mm:			
0.001 mm:			

Comments: MISLABELED: WAS GBH-6 BRIDGE 1 (TUBE)

Reviewed by: T. Eliassen, P.G., Transportation Geologist



**APPENDIX D**  
**GROUNDWATER MONITORING DATA**

















**Thilliyar, Mahendra**

---

**From:** Benda, Chris [Chris.Benda@state.vt.us]  
**Sent:** Tuesday, August 26, 2008 10:17 AM  
**To:** Thilliyar, Mahendra  
**Cc:** Ingraham, Peter  
**Subject:** FW: Highgate Water Levels  
**Attachments:** Highgate MW-4.pdf; Highgate MW-1.pdf; Highgate MW-2.pdf; Highgate MW-3.pdf; M-Wells (1-5).xls

Mahendra,

Here is the well data we have to date. Let me know if you have any questions.

Thanks,  
Chris

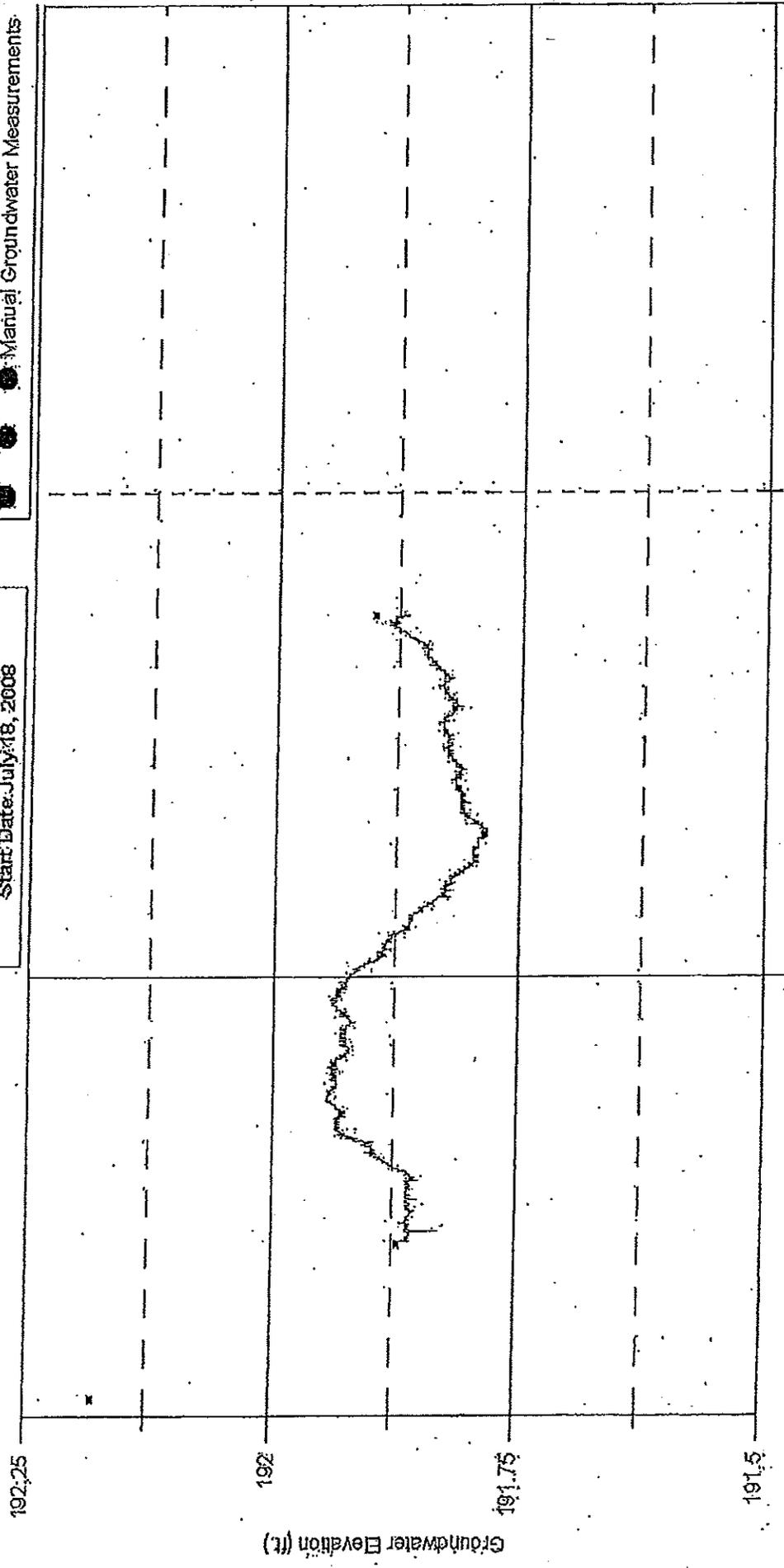
-----Original Message-----

**From:** Staab, John  
**Sent:** Monday, August 25, 2008 3:23 PM  
**To:** Benda, Chris  
**Subject:** FW: Highgate Water Levels

John J. Staab III  
Aggregate Technician  
Vermont Agency of Transportation  
Materials & Research Section  
(802) 828-6928  
(802) 828-2792 Fax

HIGHGATE ROUTE 207, BRIDGE 06  
GROUNDWATER ELEVATIONS MW-1  
Start Date: July 18, 2008

Levelogger Data  
Manual Groundwater Measurements



8/1/08

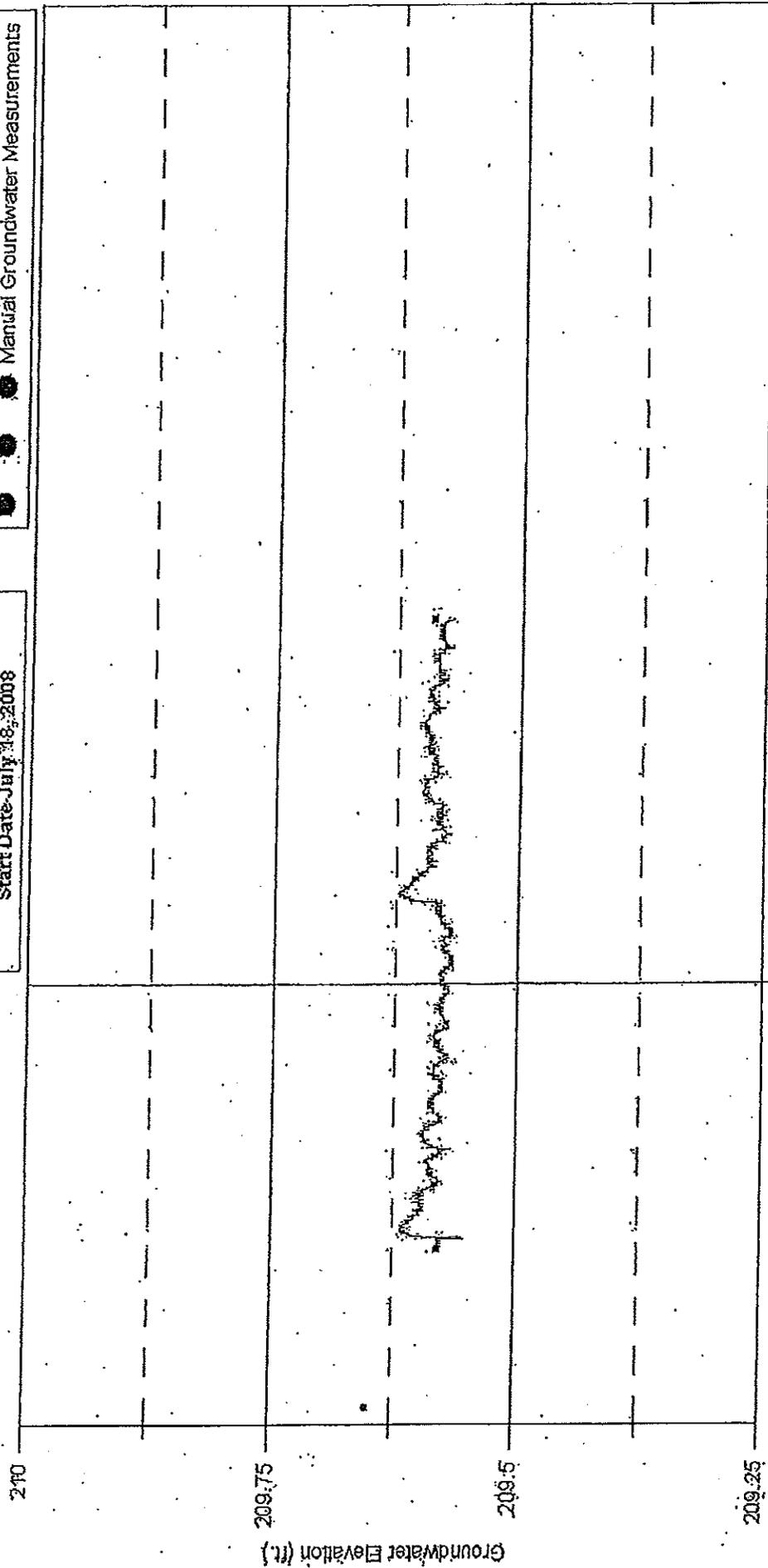
8/1/08

Groundwater Elevation (ft)



HIGHGATE ROUTE 207, BRIDGE-06  
GROUNDWATER ELEVATIONS MW-3  
Start Date: July 18, 2008

Levelogger Data  
Manual Groundwater Measurements



8/1/08

8/11/08

210

209.75

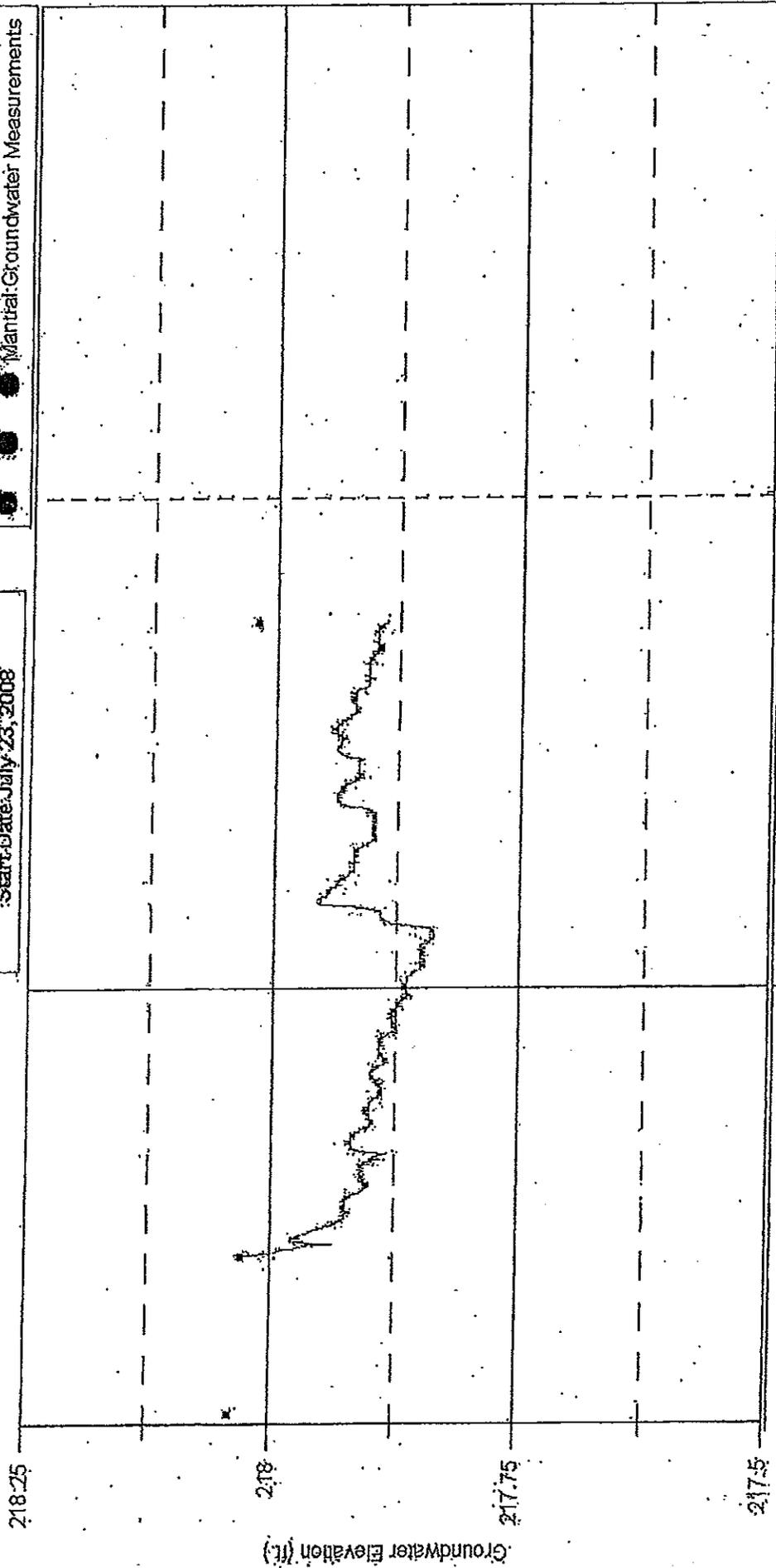
209.5

209.25

Groundwater Elevation (ft.)

HIGHGATE ROUTE 207, BRIDGE 06  
GROUNDWATER ELEVATIONS MW-4  
Start Date: July 23, 2008

Levelogger Data  
Mantel: Groundwater Measurements

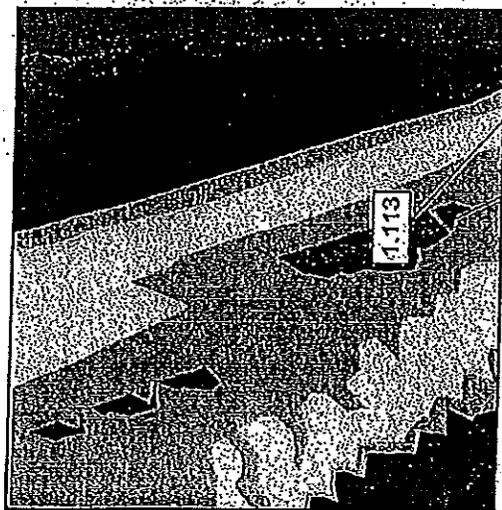
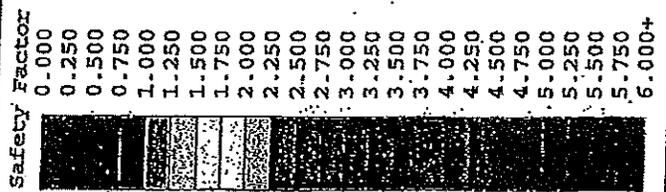


8/1/08

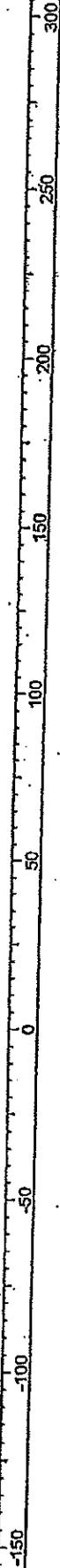
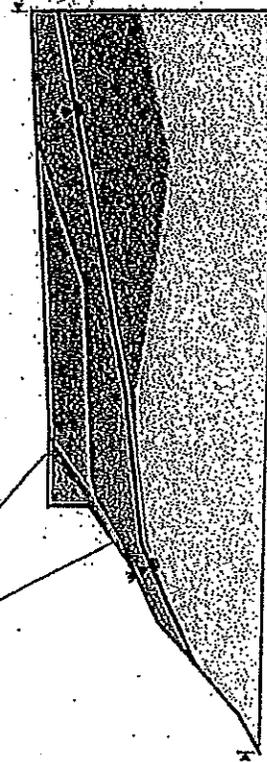
9/1/08

Groundwater Elevation (ft.)

**APPENDIX E**  
**SLOPE STABILITY ANALYSIS RESULTS**



Run 2B: Watertable approximately at measured elevation.  
Shown are the 10 most critical circles

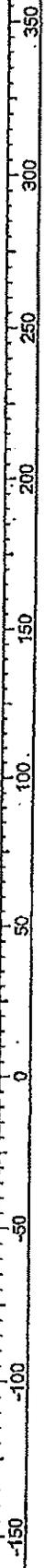
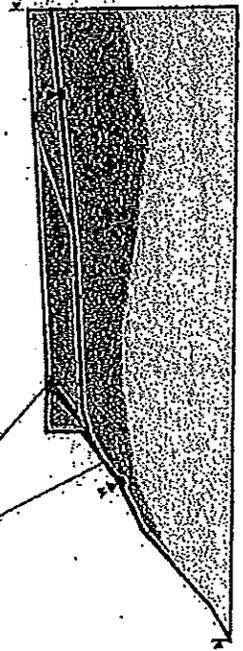


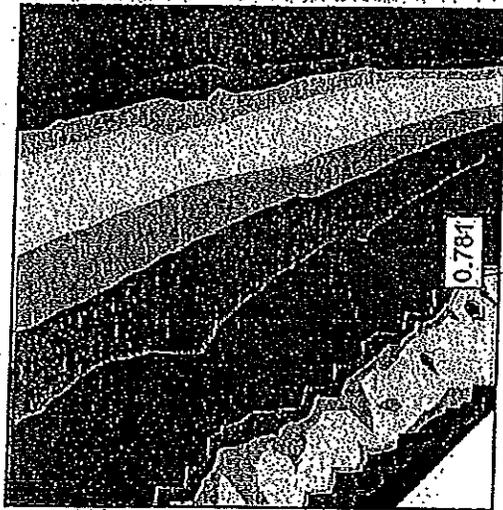
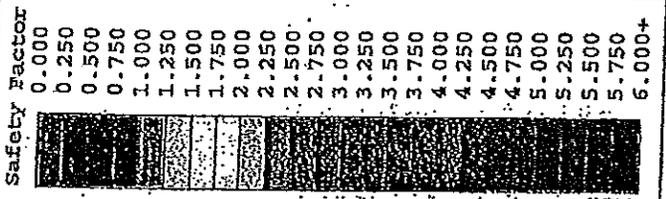
Safety Factor

- 0.000
- 0.250
- 0.500
- 0.750
- 1.000
- 1.250
- 1.500
- 1.750
- 2.000
- 2.250
- 2.500
- 2.750
- 3.000
- 3.250
- 3.500
- 3.750
- 4.000
- 4.250
- 4.500
- 4.750
- 5.000
- 5.250
- 5.500
- 5.750
- 6.000+

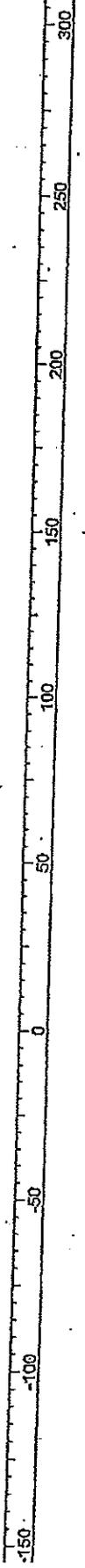
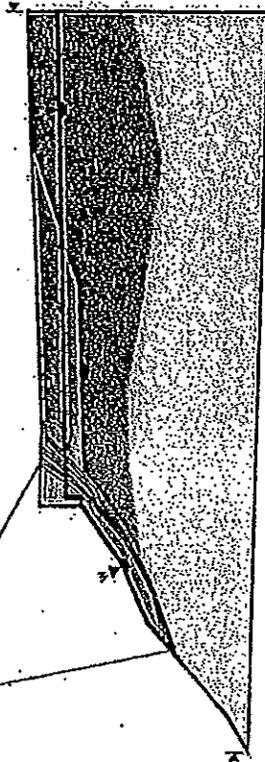


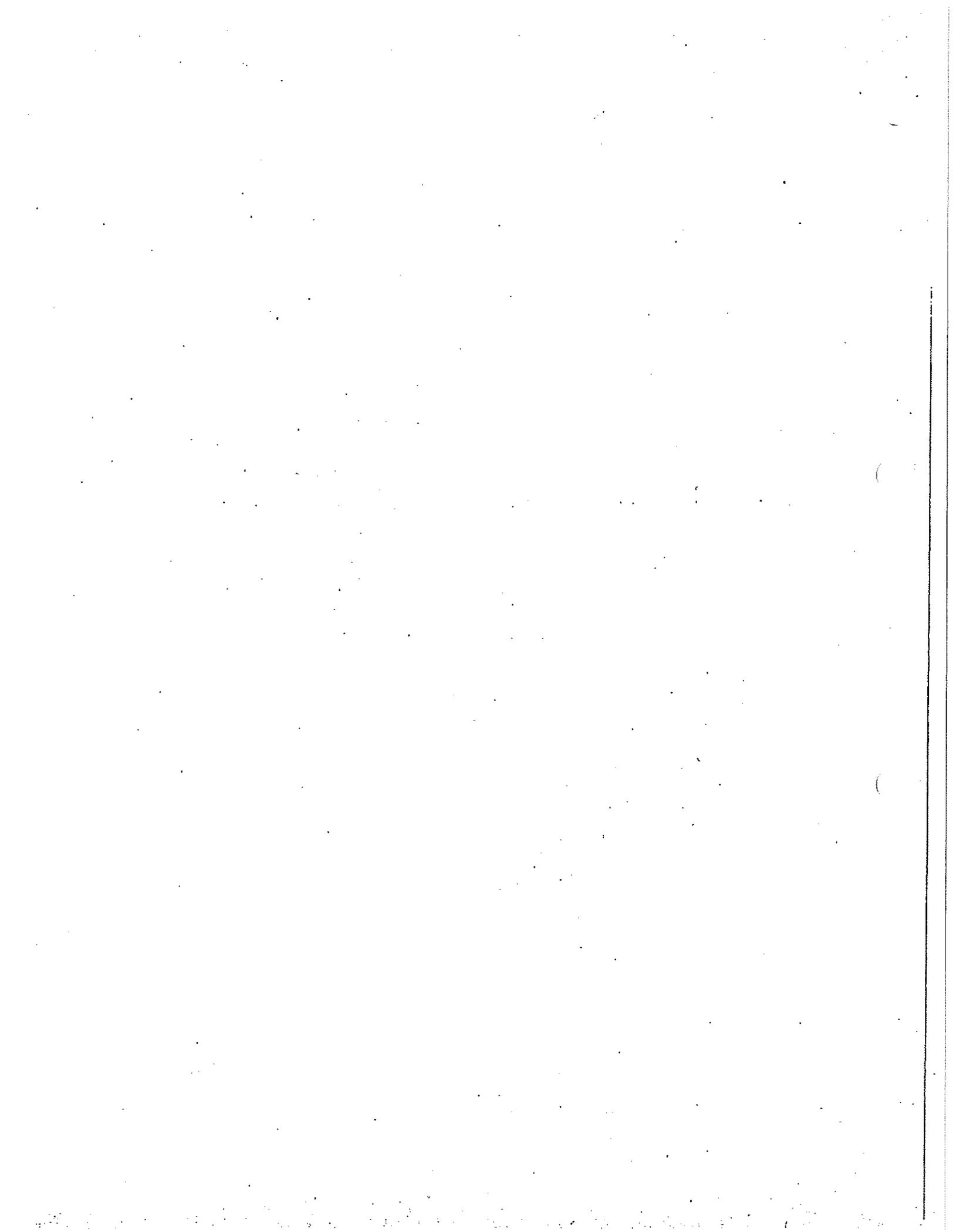
Run 1B: Water table approximately at the bottom of granular soil elevation  
Shown the 10 most critical circles.





Run 3B: Water table 7' bgs at underdrain level.  
 Shown are the 10 most critical circles





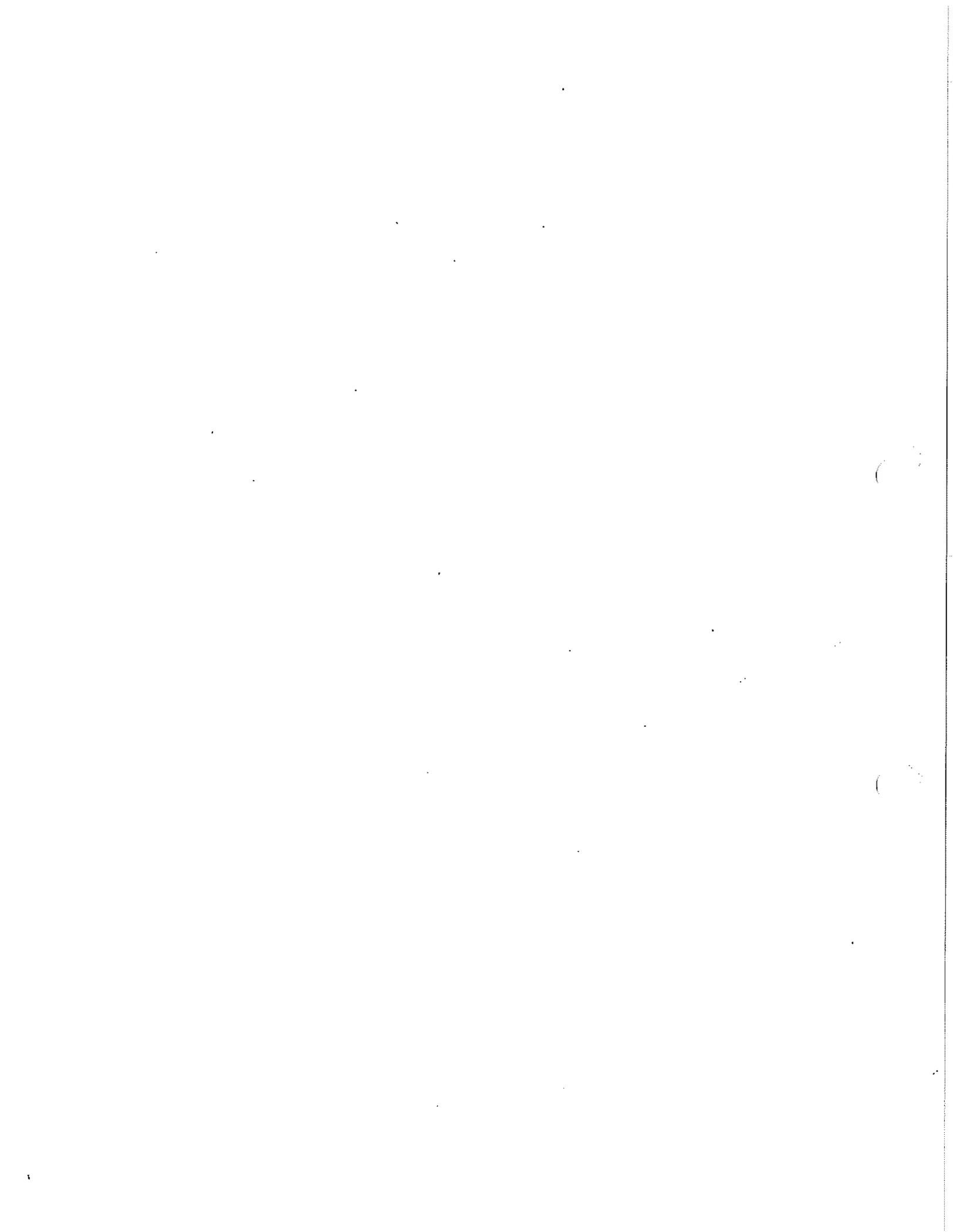
**CERTIFICATION FOR FEDERAL-AID CONTRACTS**

The prospective bidder, by signing and submitting this bid proposal, certifies, to the best of his or her knowledge and belief, that:

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person or influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered to. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such sub-recipients shall certify and disclose accordingly.



State of Vermont  
Agency of Transportation  
CONTRACTORS EEO CERTIFICATION FORM

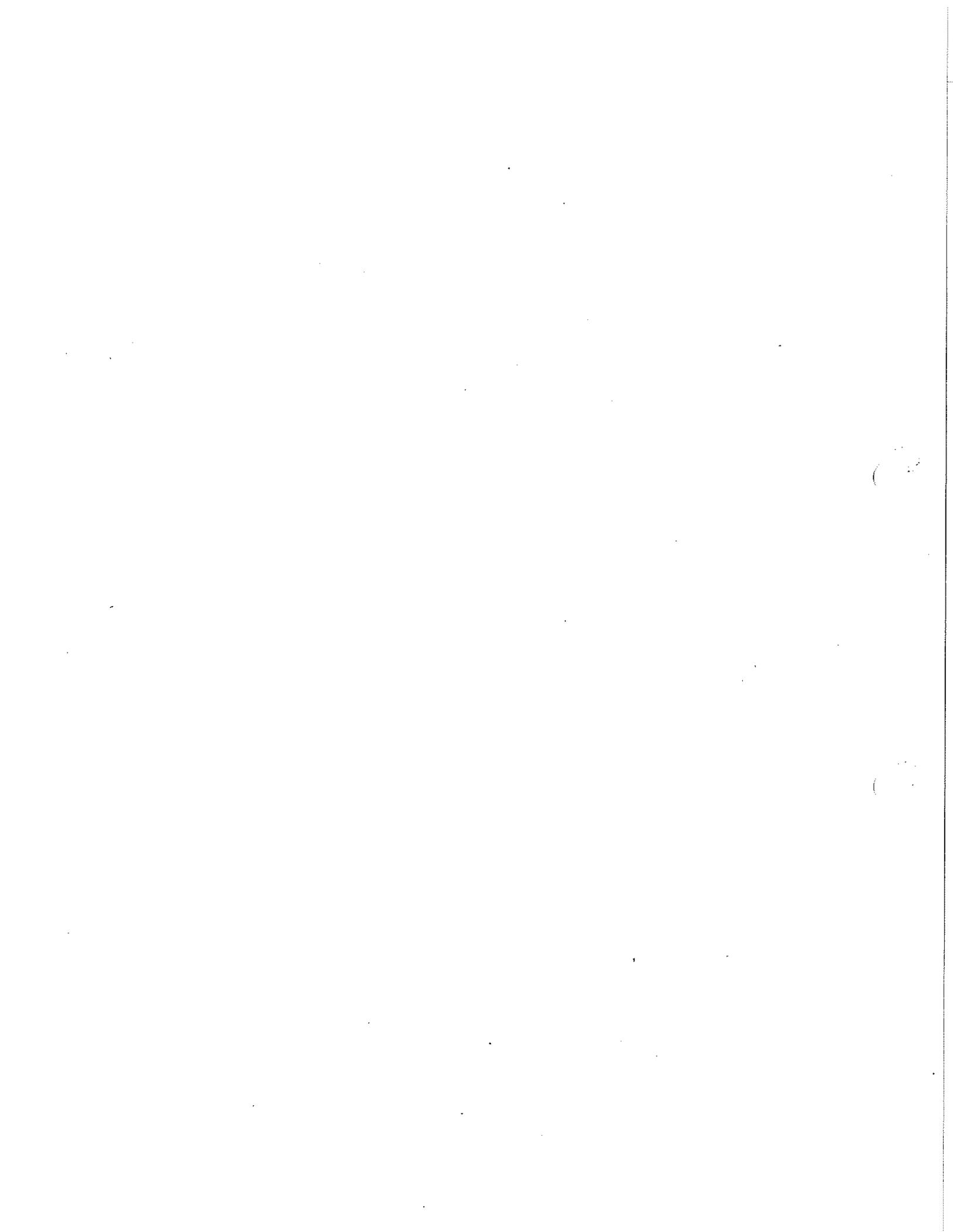
Certification with regard to the Performance of Previous Contracts of Subcontractors subject to the Equal Employment Opportunity Clause and the filing of Required Reports.

The bidder, hereby certifies that he/she has participated in a previous contract or subcontract subject to the equal opportunity clause as required by Executive Orders 10925, 11114, or 11246 as amended, and that he/she has, filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the Presidents committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

ENGINEERS CONSTRUCTION IN	SCOTT M. PIDGEON	VICE PRESIDENT
Company	By	Title

NOTE: The above certification is required by the Equal Employment Opportunity regulations of the Secretary of Labor(41 CFR 60-1.7(b)(1)), and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the equal opportunity clause. Contracts and subcontracts which are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5 (Generally only contracts or subcontracts of \$10,000 or under are exempt.) Currently, Standard Form 100(EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed the required reports should note that 41 CFR 60-1.7(b)(1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration, or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.



CONSTRUCTION CONTRACT

**1. Parties.** This is a construction contract made this 25<sup>th</sup> day of MARCH, 2013 between the State of Vermont, by its Agency of Transportation (hereafter called "State" or "Agency"), and Engineers Construction, Incorporated of PO Box 2187, South Burlington, VT 05407, a corporation, incorporated under the laws of the State of Vermont, its successors and assigns, (hereafter called Contractor).

**2. Subject Matter:** The Contractor, in consideration of the payment or payments specified in this Contract and agreed to by State, hereby agrees to furnish all the materials and to perform all the work and labor in the improvement of a certain project in the Town of Highgate, County of Franklin, State of Vermont, being approximately 100 Feet in length, at the unit prices bid by Contractor for the respective estimated quantities, aggregating approximately the sum of Four Hundred Twenty Four Thousand Eight Hundred Eighty Seven Dollars and No Cents (\$424,887.00), and such other items, as are mentioned in the original Proposal. The original Proposal and prices named, together with the Standard Specifications for Construction ("Specifications") as are listed in the Schedule of Prices, are made a part of this Contract Also, the drawings of the roadway prepared by the Agency, as verified by the Agency are made a part this Contract. The project is situated as follows:

Highgate STP 0297 (8) (Re-Advertised): TRAVELLING SOUTH ON VERMONT ROUTE 207 FROM THE INTERSECTION OF VERMONT ROUTE 78 TO MM 1.714 (STA 90+50) AND PROCEEDING NORTH TO MM 1.733 (STA 91+50).

The construction consists of: INSTALLATION OF SLOPE STABILIZATION AND UNDERDRAIN AT EXISTING BRIDGE ABUTMENT, WITH MINOR APPROACH WORK.

**3. Labor and Material; Specifications.** The Contractor shall perform all the work and labor in the best and most workmanlike manner. The materials and labor shall be in strict and entire conformity, in every respect, with the Specifications and drawings and shall be subject to the inspection and approval of the Agency. If any of the material or labor shall be rejected by the Agency as defective or unsuitable, then the Contractor shall remove and replace the defective or unsuitable materials with other approved materials and do the labor anew, to the satisfaction and approval of the Agency, at the cost and expense of the Contractor. The Standard Specifications for Construction, approved and adopted by the Agency in 2011 are incorporated herein, and made a part of this Contract.

**4. Time for Performance; Liquidated Damages.** The Contractor shall furnish the materials and perform the labor in every respect to the satisfaction and approval of the Agency, on or before October 11, 2013 after written notice has been given by the Engineer to begin work. In case of the failure on the part of the Contractor, for any reason, except as provided in this Contract, to complete the furnishing of the materials and performing the work on or before October 11, 2013 the State shall deduct from any moneys due or which may become due the Contractor, or if no moneys shall be due, the State shall have the right to recover the amount of liquidated damages as provided in the Specifications for each and every day elapsing between the time stipulated for the completion and the actual date of completion, in accordance with the terms of the Contract Any such deductions or sums to be recovered are not penalties but liquidated damages. However, the Agency at its discretion, shall make allowance over the period specified for the completion of the work, for causes over which the Contractor has no control and which must delay the completion of the work, in such case, the Contractor shall become liable for liquidated damages for delays beginning from the date on which the extended period shall expire.

**5. Extra Work or Materials; Claims.** The Contractor understands and agrees that the Agency will not allow any claim for extra work or materials, not specifically provided in this Contract. The Contractor shall not do any work or furnish any materials not covered by these Specifications and Contract, unless such work is ordered in writing by the Agency. In no event shall the Contractor incur any liability by reason of any verbal directions or instructions that he may be given by the Agency. The State will not be liable for any materials furnished or used or for any work or labor done, unless the materials, work or labor are required of the Contractor on written order furnished by the Agency. Any such work or material which may be done or furnished by the Contractor without such written order first being given by the Agency shall be at the Contractor's own risk, cost and expense. The Contractor agrees that without such written order the Contractor shall make no claim for compensation for work or materials so done or furnished.

**6. Assignment; Subcontracting.** The Contractor shall not assign this Contract or any part of this Contract, or any right to any moneys to be paid the Contractor under this Contract, without the prior written approval of the Agency. The Contractor shall not subcontract any part of the work to be done or materials furnished under the Contract without the written approval of the Agency.

**7. Acceptance of Final Payment; Release.** The Contractor's acceptance of the final payment shall be considered as a release in full of all claims against the State of Vermont arising out of, or by reason of the work done and materials furnished under this Contract.

**8. Bonds.** The Bonds given by the Contractor, a Compliance Bond in a sum equal to one-hundred (100) per centum, and a Labor and Materials Bond in the sum equal to one-hundred (100) per centum of the total contract price of the work to be done, to secure a proper compliance with the terms and provisions of this Contract, are attached to and made a part of this Contract.

**9. Dispute Resolution; Exclusivity of Administrative Remedies.** All questions or disputes arising between the parties hereto respecting any matter pertaining to this Contract or any part of this Contract, or any breach of this Contract shall be referred to the Secretary of Transportation, whose decision and award shall be final, binding and conclusive upon all parties, subject to the right of appeal to the Transportation Board under 19 V.S.A. § 5(d) (4). All other rights or rights of action at law or in equity under and by virtue of this Contract and all matters connected with and relating to this Contract are hereby expressly waived.

**10. Compensation for Contract Work.** The Contractor agrees to receive the prices set forth in the following Schedule of Prices as full compensation for furnishing all the materials and labor which may be required in the prosecution and completion of the whole of the work to be done under this Contract and in all respects to complete this Contract to the satisfaction of the Agency.

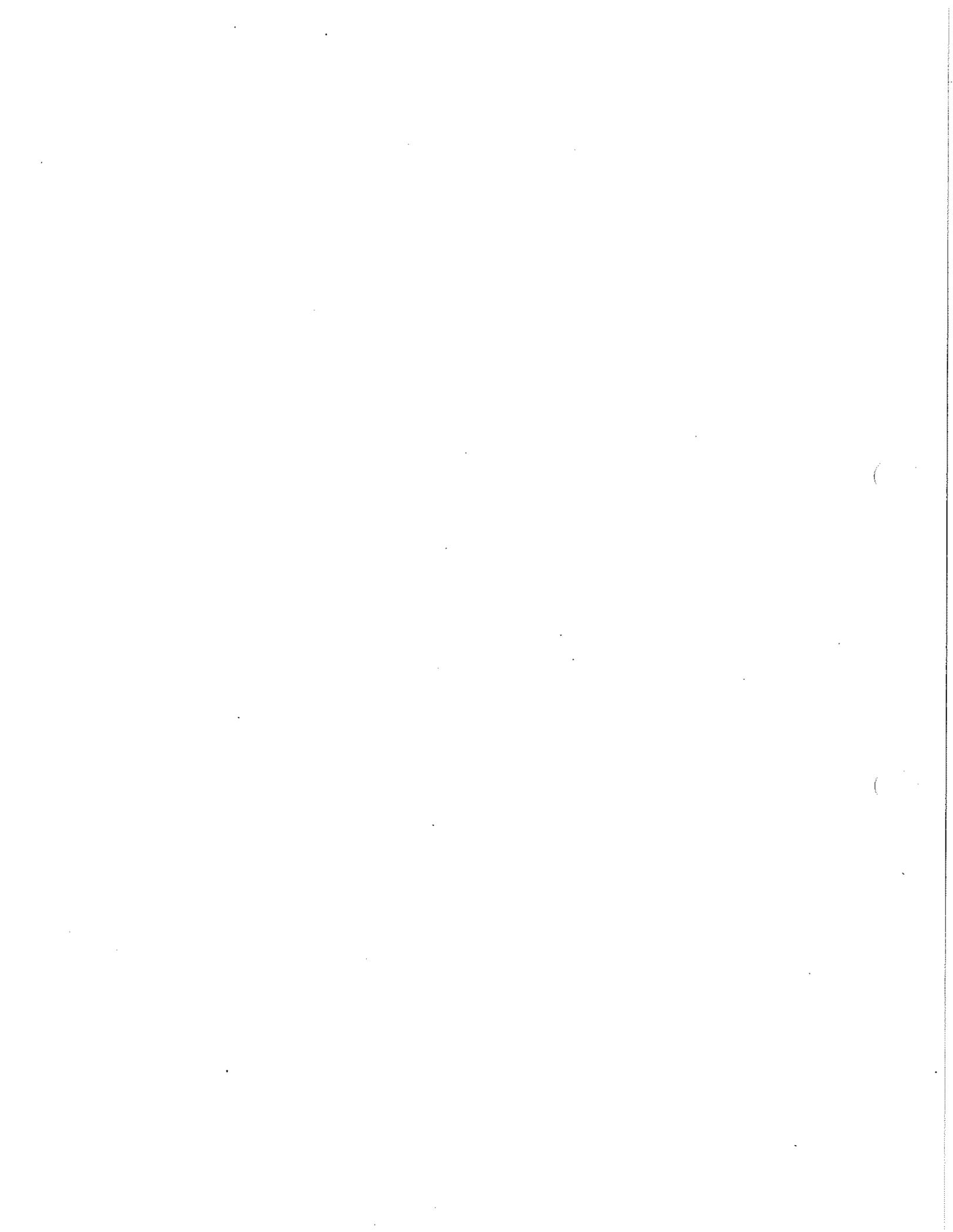
## CONTRACT SCHEDULE

REVISED:

CONTRACT ID: 10C218

PROJECT(S):HIGHGATE STP 0297(8)(RE-AD)

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0005	201.10 CLEARING AND GRUBBING, INCLUDING INDIVIDUAL TREES AND STUMPS	1.000 LS	3,500.00000		3,500.00	
0010	203.15 COMMON EXCAVATION	300.000 CY	25.00000		7,500.00	
0015	203.31 SAND BORROW	200.000 CY	40.00000		8,000.00	
0020	204.20 TRENCH EXCAVATION OF EARTH	40.000 CY	25.00000		1,000.00	
0025	204.22 TRENCH EXCAVATION OF EARTH, EXPLORATORY (N.A. B.I.)	1.000 CY	75.00000		75.00	
0030	204.30 GRANULAR BACKFILL FOR STRUCTURES	140.000 CY	46.00000		6,440.00	
0035	301.15 SUBBASE OF GRAVEL	90.000 CY	45.00000		4,050.00	
0040	404.65 EMULSIFIED ASPHALT	1.000 CWT	200.00000		200.00	
0045	406.50 PRICE ADJUSTMENT, ASPHALT CEMENT (N.A.B.I.)	1.000 LU	1.00000		1.00	
0050	501.34 CONCRETE, HIGH PERFORMANCE CLASS B	25.000 CY	535.00000		13,375.00	
0055	507.11 REINFORCING STEEL, LEVEL I	2,500.000 LB	1.50000		3,750.00	



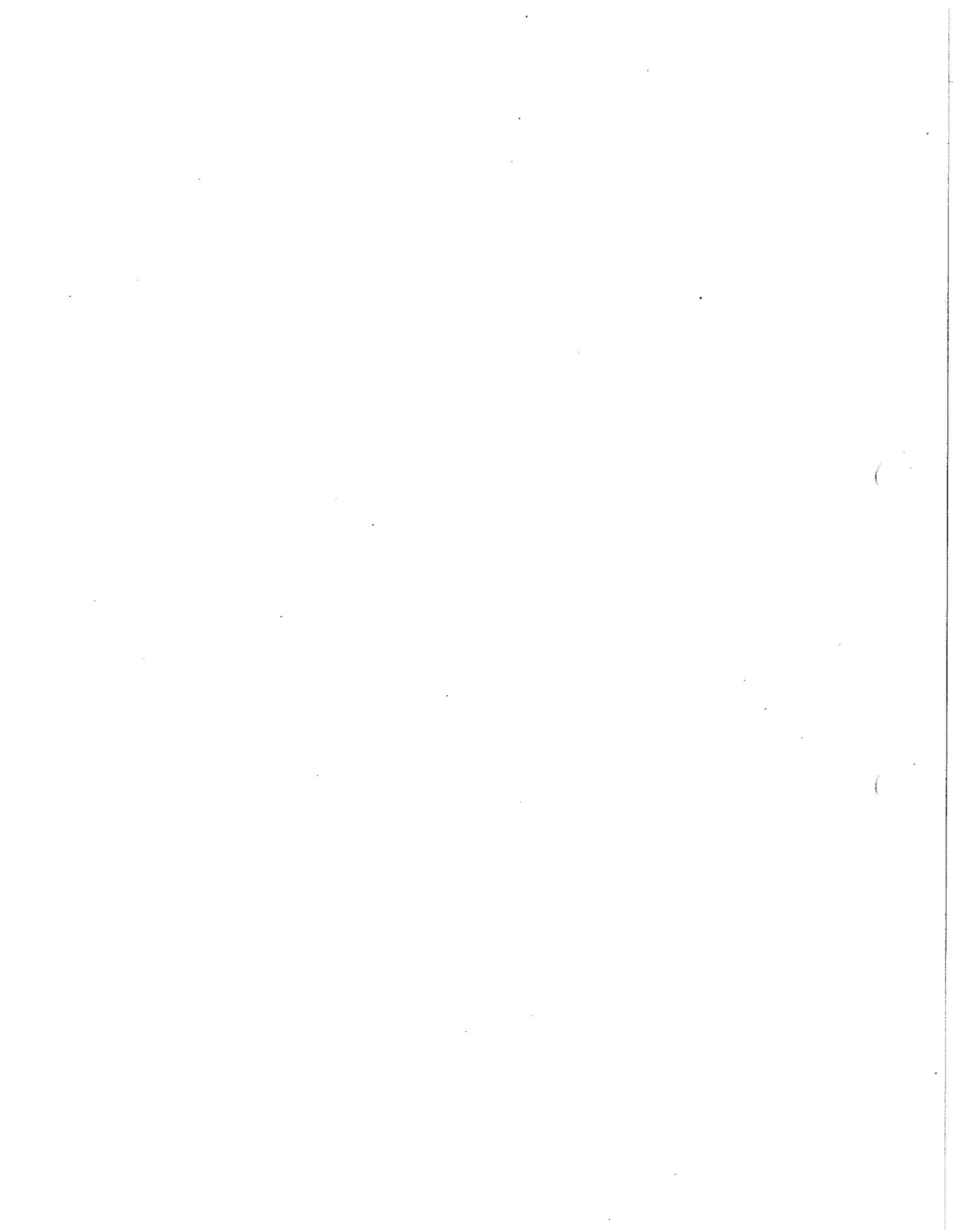
## CONTRACT SCHEDULE

REVISED:

CONTRACT ID: 10C218

PROJECT(S): HIGHGATE STP 0297(8)(RE-AD)

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0060	516.10 BRIDGE EXPANSION JOINT, ASPHALTIC PLUG	30.000 LF	138.00000		4,140.00	
0065	541.45 CONTROLLED DENSITY (FLOWABLE) FILL	10.000 CY	210.00000		2,100.00	
0070	605.13 12 INCH UNDERDRAIN PIPE	70.000 LF	47.00000		3,290.00	
0075	605.23 12 INCH UNDERDRAIN CARRIER PIPE	30.000 LF	42.00000		1,260.00	
0080	605.95 UNDERDRAIN FLUSHING BASIN	2.000 EACH	700.00000		1,400.00	
0085	608.25 ALL PURPOSE EXCAVATOR RENTAL, TYPE I	40.000 HR	80.00000		3,200.00	
0090	609.10 DUST CONTROL WITH WATER	1.000 MGAL	500.00000		500.00	
0095	613.10 STONE FILL, TYPE I	90.000 CY	70.00000		6,300.00	
0100	613.11 STONE FILL, TYPE II	5.000 CY	70.00000		350.00	
0105	613.25 GABION WALL	190.000 CY	174.00000		33,060.00	
0110	621.21 HD STEEL BEAM GUARDRAIL, GALVANIZED	63.000 LF	31.00000		1,953.00	



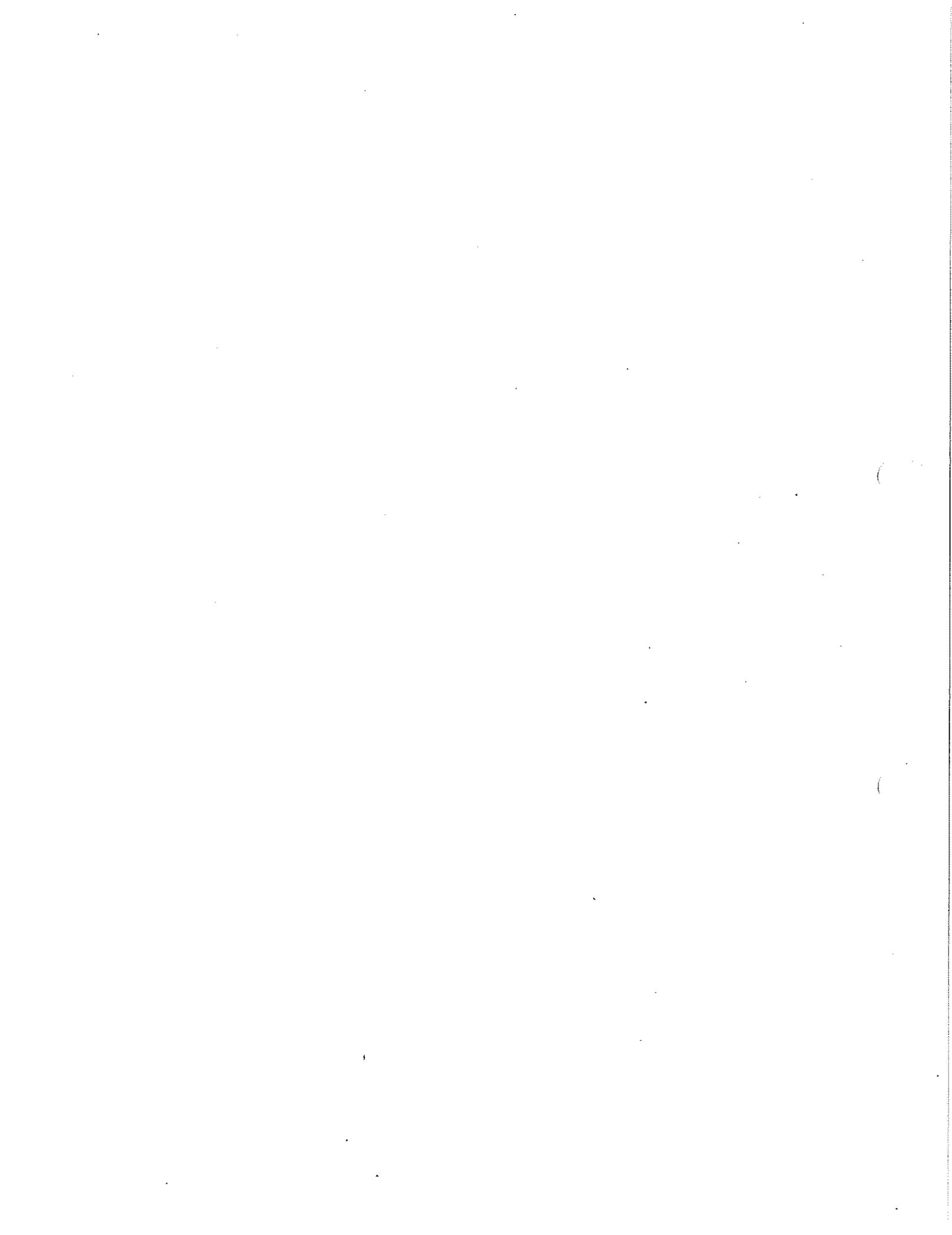
## CONTRACT SCHEDULE

REVISED:

CONTRACT ID: 10C218

PROJECT(S):HIGHGATE STP 0297(8)(RE-AD)

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0115	621.80 REMOVAL AND DISPOSAL OF GUARDRAIL	63.000 LF	5.00000		315.00	
0120	630.15 FLAGGERS	400.000 HR	28.00000		11,200.00	
0125	631.16 TESTING EQUIPMENT, CONCRETE	1.000 LS	200.00000		200.00	
0130	631.17 TESTING EQUIPMENT, BITUMINOUS	1.000 LS	200.00000		200.00	
0135	635.11 MOBILIZATION/DEMobilIZATION	1.000 LS	65,000.00000		65,000.00	
0140	646.20 4 INCH WHITE LINE	58.000 LF	1.00000		58.00	
0145	646.21 4 INCH YELLOW LINE	58.000 LF	1.00000		58.00	
0150	649.31 GEOTEXTILE UNDER STONE FILL	460.000 SY	2.00000		920.00	
0155	649.51 GEOTEXTILE FOR SILT FENCE	80.000 SY	7.00000		560.00	
0160	651.15 SEED	10.000 LB	10.00000		100.00	
0165	651.18 FERTILIZER	80.000 LB	5.00000		400.00	



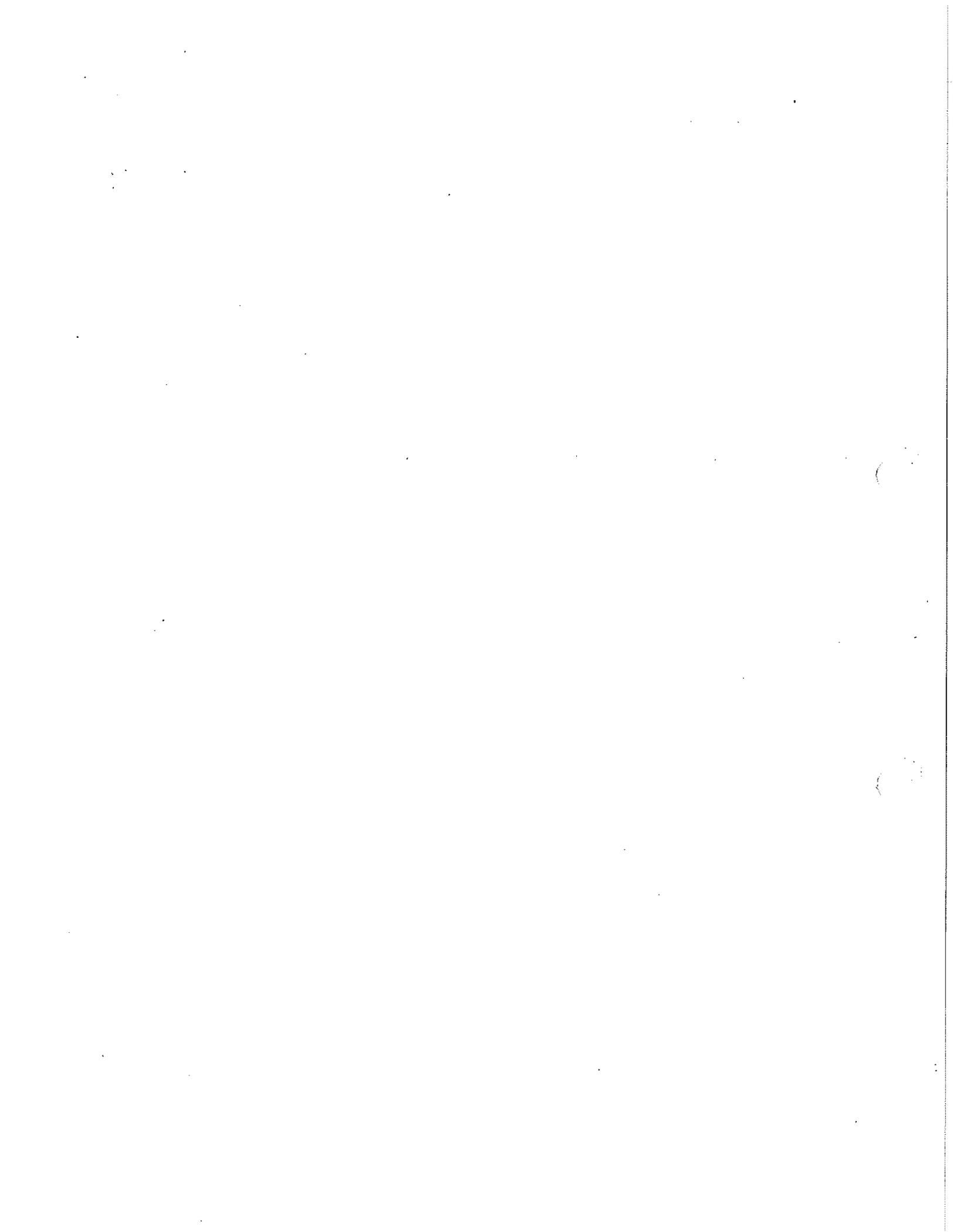
## CONTRACT SCHEDULE

REVISED:

CONTRACT ID: 10C218

PROJECT(S): HIGHGATE STP 0297(8) (RE-AD)

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0170	651.20 AGRICULTURAL LIMESTONE	1.000 TON	600.00000		600.00	
0175	651.25 HAY MULCH	1.000 TON	900.00000		900.00	
0180	651.35 TOPSOIL	100.000 CY	46.00000		4,600.00	
0185	652.10 EPSC PLAN	1.000 LS	700.00000		700.00	
0190	652.20 MONITORING EPSC PLAN	40.000 HR	40.00000		1,600.00	
0195	652.30 MAINTENANCE OF EPSC PLAN (N.A.B.I.)	1.000 LU	5,000.00000		5,000.00	
0200	653.20 TEMPORARY EROSION MATTING	600.000 SY	2.50000		1,500.00	
0205	653.35 VEHICLE TRACKING PAD	30.000 CY	40.00000		1,200.00	
0210	653.55 PROJECT DEMARCATION FENCE	350.000 LF	1.00000		350.00	
0215	900.608 SPECIAL PROVISION (COARSE AGGREGATE BACKFILL)	90.000 CY	52.00000		4,680.00	
0220	900.620 SPECIAL PROVISION (ROCK ANCHOR TESTING)	13.000 EACH	455.00000		5,915.00	



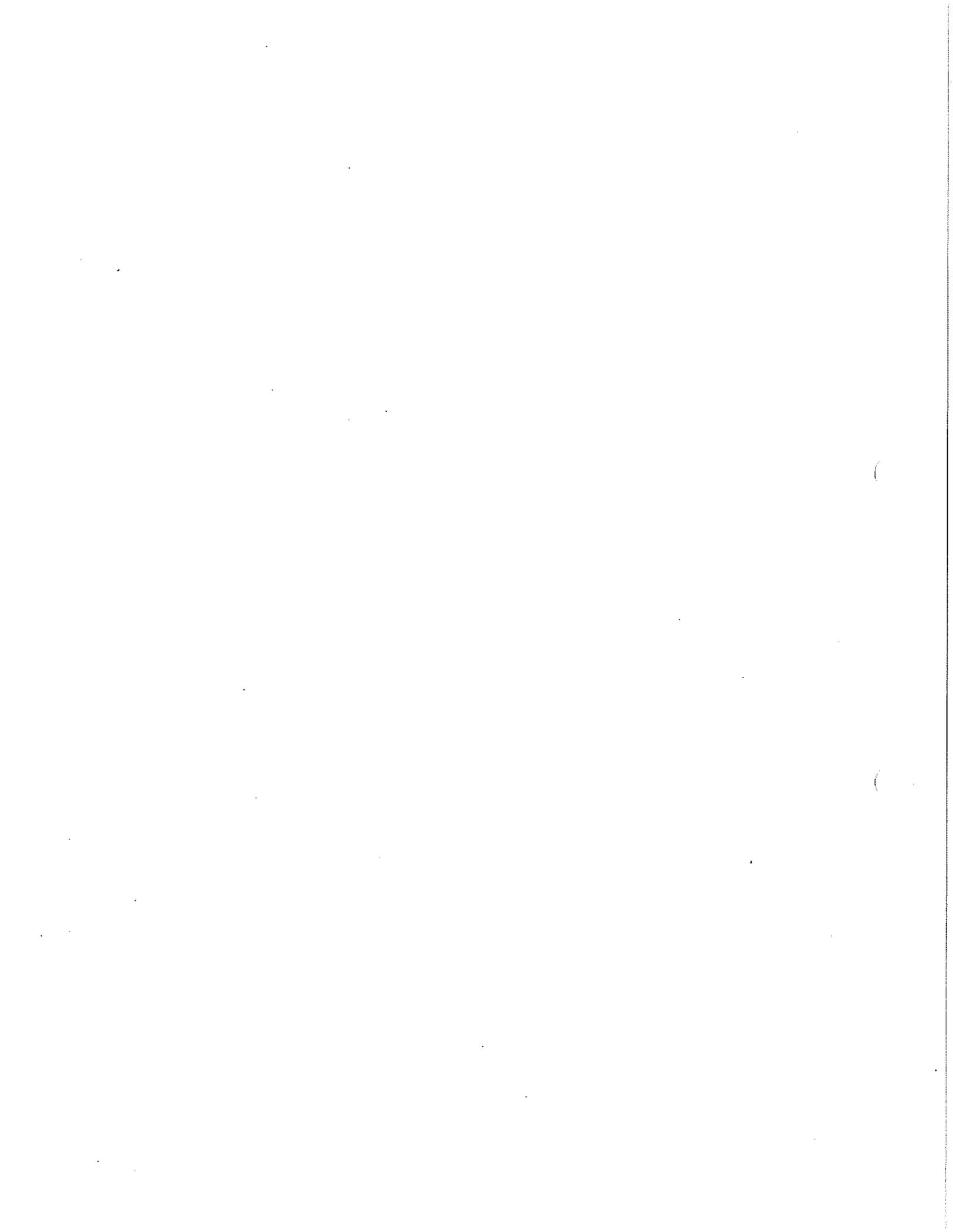
## CONTRACT SCHEDULE

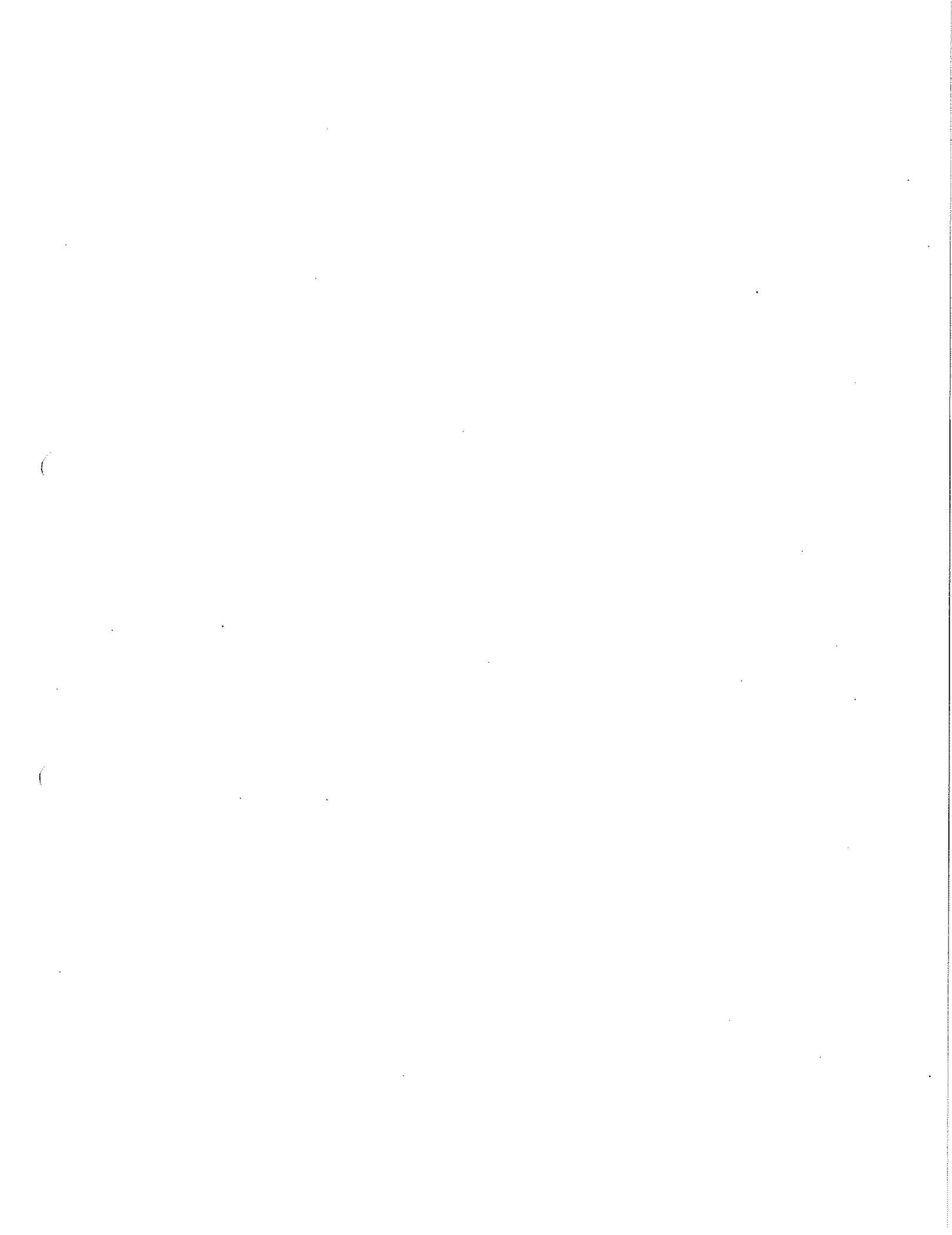
REVISED:

CONTRACT ID: 10C218

PROJECT(S): HIGHGATE STP 0297(8) (RE-AD)

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0225	900.640 SPECIAL PROVISION (ROCK ANCHOR)	350.000 LF	76.00000		26,600.00	
0230	900.640 SPECIAL PROVISION (ROCK DOWELING)	312.000 LF	77.00000		24,024.00	
0235	900.640 SPECIAL PROVISION (SOIL ANCHOR)	1,260.000 LF	81.00000		102,060.00	
0240	900.645 SPECIAL PROVISION (TRAFFIC CONTROL, ALL-INCLUSIVE)	1.000 LS	11,250.00000		11,250.00	
0245	900.650 SPECIAL PROVISION (INCENTIVE/DISINCENTIVE)(N. A.B.I.)	1.000 LU	1.00000		1.00	
0250	900.650 SPECIAL PROVISION (MAT DENSITY PAY ADJUSTMENT, SMALL QUANTITY)(N.A.B.I.)	1.000 LU	1.00000		1.00	
0255	900.650 SPECIAL PROVISION (MIXTURE PAY ADJUSTMENT)(N. A.B.I.)	1.000 LU	1.00000		1.00	
0260	900.670 SPECIAL PROVISION (WIRE MESH SLOPE STABILIZATION SYSTEM)	2,500.000 SF	13.50000		33,750.00	
0265	900.675 SPECIAL PROVISION (GEOMEMBRANE LINER)	60.000 SY	45.00000		2,700.00	
0270	900.680 SPECIAL PROVISION (BITUMINOUS CONCRETE PAVEMENT, SMALL QUANTITY)	40.000 TON	325.00000		13,000.00	
	TOTAL BID				424,887.00	





Project Name & Number: Highgate STP 0297 (8) (Re-Advertised)  
EMPLOYER IDENTIFICATION NUMBER

03-0218743

WE THE UNDERSIGNED PARTIES AGREE TO BE BOUND BY THIS CONTRACT

**By the State of Vermont:**

Date: March 25, 2013

Signature: 

Name: Brian R. Searles/Susan M. Minter

Agency: Transportation

**By the Contractor:**

Date: 03-22-13

Signature: 

Name: Kenneth A. Pidgeon

Title: President