

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

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BRIDGE STREET BRIDGE PROJECT

HARTFORD STP HTFD(1)

TOWN OF HARTFORD

COUNTY OF WINDSOR

NEW ENGLAND CENTRAL RAILROAD (NECR) BRIDGE # 8

OVER BRIDGE STREET (TH8)

Prepared for

TOWN OF HARTFORD

171 BRIDGE STREET

WHITE RIVER JUNCTION, VT 05001

November 2012

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INVITATION FOR BIDS  
HARTFORD STP HTFD(1)

Sealed bids from pre-qualified contractors shall be accepted until 3:00 PM, prevailing time on January 11, 2013 at Hartford Town Offices, 171 Bridge Street, White River Junction, VT 05001, for construction of the project hereinafter described. Bid opening will occur on January 11, 2013 at 3:00 PM at the Hartford Town offices. The time of receiving and opening bids may be postponed due to emergencies or unforeseen conditions.

Sealed BIDS shall be marked in the lower left hand corner:

Bid Documents: Hartford STP HTFD(1).

Each BID must be accompanied by a certified check payable to the MUNICIPALITY for five percent (5%) of the total amount of the BID. A BID bond may be used in lieu of a certified check.

All bidders shall be on the current list on the VTRANS Contract Administration pre-qualified list "Contractors List of Bridge Construction and/or Bridge Rehabilitation and/or Railroad Bridge Rehabilitation Category".

LOCATION: Beginning at a point in the Town of Hartford, on Bridge Street (TH 8), approximately 0.2 miles south of the intersection with Maple Street (US4).

TYPE OF CONSTRUCTION: Work to be performed under this project includes: Railroad Bridge rehabilitation and ancillary improvements to sidewalks, roadway, and adjacent railroad infrastructure.

CONTRACT COMPLETION DATE: The Contract shall be completed on or before Friday, May 23, 2014.

INTERIM COMPLETION DATE: The following Interim Completion Date is applicable to this Contract.

The Contractor shall complete all work involving the railroad and the need for railroad flaggers. The Contractor shall have Bridge Street completed sufficiently to allow vehicular use over the winter. The work described shall be done on or before Friday, November 1, 2013

COST OF PLANS: \$50 per electronic set. \$75 (plus \$15 for shipping, if applicable) per paper set (which includes an electronic version) after email request submitted to Ace Blueprint Service, One Glen Road, Box 2, West Lebanon, NH 03784. Contact [bill@aceblueprint.com](mailto:bill@aceblueprint.com) (email preferred) or FAX (603) 298-6598 or PH (603) 298-6678 Plans are not returnable or refundable. All bidders must register with Ace Blueprint Services in order to receive bid addenda information.

ENGINEERS ESTIMATE: For this Proposal the Engineers Estimate falls into VTrans Category D (1.0 – 2.5 million\$)

PLANS, SPECIFICATIONS AND PROPOSAL MAY BE SEEN AT THE OFFICE OF:

Hartford Public Works, 173 Airport Road, White River Junction, VT 05001.

PREBID CONFERENCE: A pre-bid conference will be held for the project on November 28, 2012 at 9:00AM at the Hartford Town offices at 171 Bridge Street.

STANDARD SPECIFICATIONS: This contract is governed by the VTrans 2006 STANDARD SPECIFICATIONS FOR CONSTRUCTION, as modified by Appendix I – General Special Provisions for All Projects 2006 Standard Specifications dated December 7, 2010.

QUESTIONS: During the advertisement phase of this project all questions shall be addressed solely to Keith Donington, Project Manager phone or email (donington@pbworld.com/ 603-647-2012 ext.109).

PREQUALIFICATION OF CONTRACTORS: All bidders shall be on the current list on the VTRANS Contract Administration pre-qualified list "Contractors List of Bridge Construction and/or Bridge Rehabilitation and/or Railroad Bridge Rehabilitation Category" or shall have submitted a complete annual prequalification application to the Agency of Transportation, Contract Administration no later than December 12, 2012. In addition, for this project, the contractor must submit a request for contract specific prequalification using form CA-82 by December 21, 2012. CA-82 may be found in Appendix V and at <http://www.aot.state.vt.us/conadmin/prequal.htm>. Completed prequalification forms shall be submitted to Jon Winter, Agency of Transportation, Office of Contract Administration, 1 National Life Drive, Montpelier, VT 05633-5001. Jon Winter may be contacted at (802) 828-2643 with questions.

Determination of contract specific prequalification will be decided on consideration of the current volume, degree of completion, and rate of progress of uncompleted work under contract in relation to the prospective bidder's Maximum Dollar Capacity Rating (MDCR) and Number of Contracts Capacity Rating (NCCR), and whether the prospective bidder is approved for the specific work classification(s) for the contract.

MDCR – The maximum dollar value of all uncompleted work that a contractor may have at any time for all clients.

NCCR – The maximum number of construction contracts for all clients that a contractor may have under contract and/or in progress at any one time.

NECR PREQUALIFICATION: All track work shall be performed by an NECR approved track contractor. All workers, where work is within 25 feet of and inside the NECR right-of-way, shall be Bridge Worker Safety Certified and Roadway Certified in accordance with Federal Railroad Administration Parts 214(b) and (c).

NON-COLLUSION AFFIDAVIT: All bidders are required to execute a sworn statement, certifying that the bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such contract. See Appendix B for Debarment and Non-Collusion Affidavit (CA-91). This affidavit must be submitted with the bid.

DEBARMENT AFFIDAVIT: All bidders are required to execute a sworn statement, certifying that the bidder has not within the last three (3) years, suspended, debarred, voluntarily excluded or determined ineligible by any Federal or State Agency; does not have a proposed suspension, debarment, voluntary exclusion or ineligibility determination pending; and has not been indicted, convicted or had civil judgment rendered against (it, him, her, them) by a court having

jurisdiction in any matter involving fraud or official misconduct within the past three (3) years. See Appendix B for Debarment and Non-Collusion Affidavit (CA-91). This affidavit must be submitted with the bid.

**EQUAL EMPLOYMENT OPPORTUNITY (EEO) CERTIFICATION:** 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. Generally only contracts and subcontracts of \$10,000 or under are exempt as set forth in 41 CFR 60-1.5.

**NON-DISCRIMINATION IN FEDERALLY ASSISTED CONTRACTS:** The Town of Hartford hereby notifies all bidders that it will insure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the basis of race, color, religion, sex or national origin for an award.

The right is reserved to reject any or all bids, to waive any formality and any and all technicalities in bids and to accept such bids as may be deemed in the best interest of the Town.

**DAVIS BACON WAGE REQUIREMENTS:** Bidders agree to abide by the Davis Bacon Wage Rate Schedule, which are appended to these Contract Documents.

**BUY AMERICA REQUIREMENTS:** Buy America requirements of 23 CFR 635.410 are applicable to all Federal-aid construction projects. All steel or iron products permanently incorporated into Federal-aid projects, shall be products that have been entirely manufactured within the United States. All manufacturing processes of the steel or iron material, in a product, must occur within the United States to be considered of domestic origin. This includes processes such as rolling, extruding, machining, bending, grinding and drilling. The action of applying a coating to a material is deemed a manufacturing process subject to Buy America. Coating includes epoxy coating, galvanizing, painting and any other coating that protects or enhances the value of the material.

This requirement does not prevent a minimal use of foreign materials, provided the cost of foreign materials used does not exceed 0.1 percent of the total Contract price or \$2,500, whichever is greater. The cost of foreign steel or iron is defined as its value delivered to the project.

INSTRUCTIONS TO BIDDERS  
HARTFORD STP HTFD(1)

1. Bid Preparation and Submission

- a. Bidders are expected to examine the specifications, drawings, all instructions and, the construction site. Failure to do so will be at the bidders' risk.
- b. All bids must be submitted on the forms provided by the Town. Bidders shall furnish all the information required by the solicitation. Bids must be signed and the bidders name typed or printed on the bid sheet and each continuation sheet which requires the entry of information by the bidder. Erasures or other changes must be initialed by the person signing the bid. Bids signed by an agent shall be accompanied by evidence of the agent's authority. (Bidders should retain a copy of their bid for their own records.)
- c. All bid documents shall be sealed in an envelope which shall be clearly marked with the words "Bid Documents," the Invitation for Bids (IFB) number, any project or other identifying number, the bidder's name, and the date and time for receipt of bids.
- d. This solicitation requires bidding on all items, failure to do so will disqualify the bid.
- e. Unless expressly authorized elsewhere in this solicitation, alternate bids will not be considered.
- f. Bids submitted by email or fax machines will not be considered.
- g. All blank spaces under the page(s) headed "Schedule of Items" must be filled in with ink or typewriter in both words and figures indicating the unit price for each respective bid item. The bid total shall also be entered in words and figures.
- h. In case of a discrepancy between a unit price written in words and one entered in figures, the price written in words shall govern.
- i. In case of a discrepancy between the bid total written in words and that entered as a figure, the adjusted figure shall govern.

2. Explanation and Interpretation to Prospective Bidders

- a. Any prospective bidder desiring an explanation or interpretation of the solicitation, specification, drawings, etc., must request it at least 10 days before the scheduled time for bid opening. Requests may be oral or written. Oral requests must be confirmed in writing. The only oral clarifications that will be provided will be those clearly related to solicitation procedures, i.e., not substantive technical information. No other oral explanation or interpretation will be provided. Any information given to a prospective bidder concerning this solicitation will be furnished promptly to all other prospective bidders as a written amendment to the solicitation, if that information is necessary in submitting bids, or if lack of it would be prejudicial to other prospective bidders.

- b. Any information obtained by, or provided to, a bidder other than by formal amendment to the solicitation shall not constitute a change to the solicitation.
3. Amendments to Invitation for Bids
    - a. If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.
    - b. Bidders shall acknowledge receipt of any addenda to this solicitation by identifying the addendum number and date on the bid form. Bids which fail to acknowledge the bidders receipt of any addenda will result in the rejection of the bid if the addenda contained information which substantively changed the Town's requirements.
    - c. Addenda will be on file in the offices of the Town and the Engineer at least 5 days before the bid opening.
  4. Responsibility of Prospective Contractor (Prequalification)
    - a. All prospective contractors shall be pre-qualified under the appropriate work category by the Vermont Agency of Transportation, Contract Administration. For this project a current annual prequalification and a contract specific prequalification is necessary. The contact for pre-qualification is Jon Winter, Tel: 802-828 2643.
    - b. The VERMONT AGENCY OF TRANSPORTATION "POLICIES AND PROCEDURES FOR PREQUALIFICATION, BIDDING, AND AWARD OF CONTRACTS", latest edition, Sections 1-6 and 9 are hereby incorporated in these specifications and the contract by reference. Sections 1 through 6 shall not be subject to the changes to the definitions in the Special Provisions.
    - c. The Method of Measurement and Basis of Payment for all contract items shall follow the Vermont Agency of Transportation's Standard Specification for Construction, 2006 Edition, unless modified in these Contract Documents.
    - d. If a bidder submits a unit bid price of zero for a contract bid item, the bid will be declared informal.
    - e. A bidder may submit a unit bid price that is obviously below the cost of the item. If the Town awards and enters into a contract with a Bidder that has submitted a unit bid price that is obviously below cost, the contractor shall be obligated to perform the work under such item as indicated in the contract documents and/or as directed by the Resident Engineer.
    - f. When Optional Bid Items are indicated in the proposal bidders shall bid on only one pay item in each group of options, leaving the other pay items in the group without a bid price. If a bidder enters more than one unit price bid in a group of options, only the lowest total price will be considered as the basis of calculation for determining the low bidder and used in the contract.

- g. When "Alternate Bid Items" are indicated in the Proposal bidders must bid on all pay items in each set of "Alternate Bid Items". Failure to bid on all of the "Alternate Bid Items" in the proposal may result in rejection of the bid.
- h. When the schedule of items for a contract contains one or more pay items which have a quantity of one (1) and a unit price and total price entered, the Town has set a unit price in the event that such item is used. If such item is determined to be needed by the Engineer, the work will be performed by the contractor according to the contract documents at the unit price listed.
- i. When it is indicated in the contract documents that payment or costs of work and/or materials are incidental to one or more other contract items (but not to specific other items), such costs shall be included by the bidder in the price bid for all other contract items.

#### 5. Errors and/or Inconsistencies in Contract Documents

- a. By submitting a request for a proposal a prospective bidder/contractor certifies that it shall report in writing to the Town any error or inconsistency discovered in the plans, proposal, specifications, or contract documents immediately upon discovery of such error or inconsistency.
- b. By submitting a request for a proposal a prospective bidder/contractor certifies that it shall assert no claim, cause of action, litigation, or defense against the Town unless notice was provided to the Town in writing of any error or inconsistency found in the plans, proposal, specifications, and/or contract documents immediately upon discovery of such error or inconsistency.

#### 6. Availability of Lands for Work

- a. The lands upon which the Work is to be performed, rights of way and easement for access thereto and other lands designated for use by the contractor in performing the Work are identified in the contract documents.

#### 7. Familiarity with Laws, Ordinances and Regulations

- a. By submitting a bid an entity certifies that it is familiar with all Federal, State and local laws, ordinances and regulations which affect in any way the materials, equipment, haul roads used in or upon the work, the conduct of the work, and the persons engaged or employed in the performance of the work to be performed pursuant to the contract.
- b. By submitting a bid an entity certifies that it shall forthwith report in writing to the Town any provision in the plans, proposal, specifications or proposed contract that the bidder/contractor believes is in conflict with or inconsistent with any Federal, State or local law, ordinance, or regulation.
- c. By submitting a request for a proposal a prospective Bidder certifies that if, during its investigation of the work in the process of preparing its bid, it discovers or



encounters subsurface or latent physical conditions at a project site differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the contract, it shall notify in writing the Town of the specific differing conditions immediately upon discovering or encountering the differing site conditions.

- d. An entity further certifies that if it fails to notify the Town of any differing site conditions as described above, it shall waive any and all rights that it might have to additional compensation from the Town for additional work as a result of the differing site conditions and that it shall not bring a claim for additional compensation because of differing site conditions.
- e. By submitting a request for a proposal a prospective bidder/contractor certifies that no claim or defense of ignorance or misunderstanding concerning Federal, State or local laws, ordinances and/or regulations will be employed by a bidder/contractor or considered by the Town in claims, litigation, alternative dispute resolution procedures, or other matters concerning the contract for which the bid is submitted.

#### 8. Late Submissions, Modifications, and Withdrawal of Bids

- a. Any bid received at the place designated in the solicitation after the exact time specified for receipt will not be considered.
- b. Any modification or withdrawal of a bid is subject to the same conditions as in paragraph a. of this provision.
- c. The only acceptable evidence to establish the time of receipt at the Town is the time/date stamp of the Town on the proposal wrapper, or other documentary evidence of receipt maintained by the Town.
- d. Bids may be withdrawn by written notice received at any time before the exact time set for opening of bids provided that written confirmation of the withdrawal is confirmed by the Town prior to the specified bid opening time. A bid may be withdrawn in person by a bidder or it's authorized agent if , before the exact time set for opening of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

#### 9. Bid Opening

- a. All bids received by the date and time specified in the solicitation will be publically opened and total bid amounts read aloud. The time and place of opening will be as specified in the solicitation. Bidders and other interested persons may be present.

#### 10. Pre-Contract Award

Definitions: As used in this provision.

"Interested party" means an actual or prospective bidder whose direct economic interest would be affected by the award of the contract.

“Protest” means written objection by an interested party to this solicitation or to a proposed or actual award of a contract pursuant to this solicitation.

Protests shall be served on the Town by obtaining written and dated acknowledgement from: Town Manager, Hunter Rieseberg at 802-295-9353 / hrieseberg@hartford-vt.org.

All protests shall be resolved first by the Town Manager and if that resolution is unacceptable to the bidder, then by the Board of Selectmen who’s decision is final.

#### 11. Rejection of Proposals

- a. A Proposal may be declared “Informal” and hence rejected if it shows any alteration of form, omissions or additions not called for in the proposal, lacks proper signatures, is a conditional bid, has alternate bids unless required in the proposal, has irregularities of any kind, has changes to the printed content, is submitted on a form not furnished by the Town, is incomplete, fails to acknowledge receipt of one or more addendums, or includes a clause in which the bidder reserves a right to accept or reject the contract award.
- b. A proposal may be rejected at the time of bid opening or following analysis to confirm the proposal.
- c. The Town may reject any or all proposals, waive any or all technicalities, and/or advertise for new proposals if in its sole judgment, or that of the awarding authority, the best interests of the Town, or the awarding authority, will be served.
- d. A proposal submitted without a completed Debarment and Non-Collusion Affidavit will be rejected.
- e. A proposal submitted without a signed Contractors Equal Employment Certification Form will be rejected.
- f. A proposal submitted without a Bid Guarantee will be rejected.
- g. Bids which fail to acknowledge the bidders receipt of any addendum will result in the rejection of the bid if the addendum (addenda) contained information which substantively changed the Town’s requirements.
- h. The Town will decide whether any bid prices are unbalanced above or below a reasonable cost analysis value as determined by Keith Donington, Parsons-Brinckerhoff Project Engineer. Proposals in which bid prices are unbalanced, mathematically and/or materially, may be rejected at the sole discretion of the Town. For purposes of this subsection “mathematically unbalanced bid” and “materially unbalanced bid” shall have the same meaning as in 23 CFR Part 635 – Construction and Maintenance.
- i. Prospective bidders may be disqualified for various reasons including (a) Submission of more than one proposal for the same work by an entity under the same or different names, (b) Evidence of collusion among bidders, or (c) Any other cause for

suspension or debarment as detailed in the Agency's policy and Procedures on Debarment, Code of Vermont Rules (CVR), Volume 8A, 14 010 004, pages 1-10.

- j. A proposal submitted by a contractor that has not received contract specific prequalification in accordance with Section 5 of the latest edition of the VTrans "POLICIES AND PROCEDURES ON PREQUALIFICATION, BIDDING AND AWARD OF CONTRACTS" will be rejected.

## 12. Contract Award

- a. The Town will evaluate bids in response to this solicitation without discussions and will award a contract to the lowest responsive and responsible bidder whose bid, conforming to the solicitation, will be most advantageous to the Town considering only price and any price related factors specified in the solicitation.
- b. Opened proposals will be considered and submitted bids confirmed on the basis of the summation of the products of the quantities shown in each proposal's Schedule of Items multiplied by the unit prices bid. In the event of a discrepancy between a unit price and the calculated extension, the product based on the unit price bid and the mathematically correct summation of the products shall govern.
- c. If the apparent low bid received in response to this solicitation exceeds the Town's available funding for the proposed work the Town may reject the bid.
- d. The Town may reject any and all bids, waive any or all technicalities, and/or advertise for new proposals if in its sole judgment the best interests of the Town will be served.
- e. The Town may reject any bid as nonresponsive if it is materially unbalanced as to the prices for the various items of work to be performed. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated for other work.
- f. A written award shall be furnished to the successful bidder within the period for acceptance specified in the bid and shall result in a binding contract without further action by either party.
- g. Prior to signing a construction contract, the successful bidder must verify that they are registered with the Vermont Secretary of State to do business in the State of Vermont.

## 13. Bid Guarantee

- a. All bids must be accompanied by a negotiable bid guarantee which shall not be less than five percent (5%) of the amount of the bid. The bid guarantee may be a certified check, bank draft, U.S. Government Bonds at par value, or a bid bond secured by a surety company acceptable to the U.S. Government and authorized to do business in the State of Vermont. Certified checks and bank drafts must be made payable to the order of the Town. The bid guarantee shall insure the execution of

the contract and the furnishing of a method of assurance of completion by the successful bidder as required by the solicitation. Failure to submit a bid guarantee with the bid shall result in rejection of the bid. Proposal guarantees of the two lowest bidders that have submitted proposals that comply with all the provisions required to render them formal will be retained until the contract and bonds have been signed by all parties. Bid guarantees submitted by the remaining unsuccessful bidders will be returned as soon as practicable after bid opening. Should no award be made within sixty-one calendar days following the opening of bids, sixty-two if the sixty-first day is a state holiday, all proposals may be rejected and all guarantees may be returned.

#### 14. Contract Bonds

- a. A successful bidder entering into a contract for any portion of the work included in a proposal shall provide the Town sufficient surety in the form of; 1) a labor and materials bond, and 2) a compliance bond, both as required by 19 V.S.A. Section 10(8) and (9).
- b. Each bond shall be in a sum equal to one hundred percent (100%) of the contract awarded.
- c. The labor and materials bond shall guarantee the payment in full of all bills and accounts for materials and labor used in the work as well as other obligations incurred in carrying out the terms of the contract.
- d. The compliance bond shall guarantee the faithful performance and completion of the work to be done under the contract as well as compliance with all provisions of the contract.
- e. The form of the bond shall be that provided by the Town, and the surety shall be acceptable to the State. The bonds shall be procured from an insurance company registered and licensed to do business in the State of Vermont.

#### 15. Signing the Contract

- a. The entity to which the Contract has been awarded shall sign the contract documents and return them the Town within 15 calendar days from the date of the award letter. No contract shall be considered effective until it has been fully executed by all parties.
- b. Failure to comply with any of the requirements of these provisions relative to signing the contract or failure to furnish the required surety within fifteen (15) calendar days after notice of award shall be just cause for the annulment of the award or of the contract and/or forfeiture of the proposal guarantee/bid bond. Further, if the award or the contract is annulled, or if the contract is not awarded due to in(action) of the lowest responsible bidder that has submitted a proposal that complies with all the provisions required to make it formal, the proposal guaranty accompanying the

proposal shall become the property of the Town, not as a penalty but as liquidated damages.

- c. If the award or the contract is annulled, the Town may award the contract to the next lowest responsible bidder that has submitted a proposal that complies with all the provisions required to make it formal or advertise a new request for bids for the contract(s).
- d. Failure by the contractor to sign the contract within the time provided by this Subsection shall not be reason for an extension of the contract completion date.

16. Taxes and Insurance Requirements

Taxes and insurance for this project shall be in conformance with Section 103 of the VAOT Standard Specifications for Construction 2006 Edition. For this project the following limits for Commercial Liability and Automobile coverage apply:

Commercial Liability:

- \$1,500,000 Each Occurrence
- \$2,000,000 General Aggregate applying, in total, to this project only
- \$2,000,000 Products/completed Operations Aggregate
- \$250,000 Fire Damage Legal Liability

Automobile Liability:

- Bodily Injury \$1,000,000 Each Person
- \$1,000,000 Each Occurrence
- Property Damage \$500,000 Each Occurrence

OR

- Combined Single Limit \$1,500,000 Each Occurrence

17. Preconstruction Conference

- a. After award of a contract under this solicitation and prior to the start of work, the successful bidder will be required to attend a preconstruction conference with representatives of the Town and its Engineer, and other interested parties convened by the Town. The conference will serve to acquaint the participants with the general plan of the construction operation and all other requirements of the contract. The Town will provide the successful bidder with the date, time and place of the conference.

18. Waste Borrow and Staging Areas

- a. The opening and use of off site waste, borrow and staging areas shall follow the provisions of Section 105.25 of the VAOT Standard Specifications for Construction, 2006 Edition.

- b. The Contractor and/or property owner shall obtain all necessary permits and clearances prior to using off site waste, borrow or staging areas. In addition all off site waste, borrow and staging areas must be reviewed and approved by the VTrans Environmental Section prior to use. Individual applications should be made at least 21 calendar days prior to planned utilization. No work will be performed at off site waste, borrow or staging areas without written approval of the Engineer.

#### 19. DBE Requirements

- a. There are to be no mandatory Contract goals for DBE compliance on this project. Bidders are advised, however, that a list of Subcontractors and approximate Contract Values will be required as part of the fully executed Contract for the successful Bidder as a means of evaluating DBE participation.

#### 20. Grievance Procedures (Post-Contract Award)

- a. The following grievance procedure shall govern all disputes arising under and claims for additional compensation or time, or both, with respect to this project.
- b. If any person, organization or agency believes they have a grievance with the OWNER/ENGINEER due to their action(s) or omission(s), they should first attempt to resolve the grievance informally with the Construction Inspection Engineer. If this is not possible, the person believing himself to be aggrieved should send a letter to the Engineer explaining his grievance in as much detail as possible and request a audience with Richard Menge, P.E., Hartford Public Works.
- c. Within five (5) working days of receipt of this letter, the section head or designee must schedule a meeting with the alleged aggrieved person, the Engineer, the Hartford Public Works Director, and all other parties directly involved, and notify the alleged aggrieved party and all other parties in writing of the date, time, and location of this meeting. This meeting must be set within thirty (30) calendar days of receipt of the letter of grievance. The Hartford Public Works Director may, at his discretion, conduct the meeting as an informal meeting or a formal hearing. If the grievance cannot be satisfied in one meeting, the Hartford Public Works Director may schedule as many as two additional meetings within thirty (30) calendar days of the first meeting or he may ask that the grievance be heard at the next regularly scheduled meeting of the BOARD OF SELECTMEN. If the grievance cannot be resolved in two meetings, with the BOARD OF SELECTMEN, This unresolved grievance will than follow Section 105.02 DIRECTOR OF PROGRAM DEVELOPMENT TO BE REFEREE to final resolution.

BID PROPOSAL FORM  
HARTFORD STP HTFD(1)

Proposal of \_\_\_\_\_  
Name

\_\_\_\_\_  
Address

to furnish the necessary labor, equipment and material to perform all work in accordance with the Plans, 2006 Standard Specifications for Construction, Contract Documents, and the description of construction as contained herein.

Bidder Acknowledges receipt of the following Addenda:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

In accordance with the Plans, 2006 Standard Specifications for Construction, Contract Documents and the description of the construction as shown above, I, or we, hereby certify that I am, or we are, the only person or persons interested in this Proposal as principal or principals; that it is made without collusion with any person, firm, or corporation; that an examination has been made of the Proposal, the Plans, the Specifications and the site of the work, and that I, or we, propose to furnish all necessary machinery, equipment, tools, labor and other means of construction, and all materials specified, in the manner and at the time prescribed, understanding that the quantities of work as shown herein are only estimated and approximate and are subject to increase or decrease and that all quantities of work, whether increased or decreased, are to be performed at the following unit prices:

These forms shall be filled in by the Bidder, with each Unit Price written IN WORDS AND IN FIGURES and the extensions properly made in figures.

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
201.11	CLEARING AND GRUBBING, INCLUDING INDIVIDUAL TREES AND STUMPS	A	0.09	
				dollars
				cents.
	( \$ _____ )			\$ _____
203.15	COMMON EXCAVATION	CY	52.24	
				dollars
				cents.
	( \$ _____ )			\$ _____
203.28	EXCAVATION OF SURFACES AND PAVEMENTS	CY	268.33	
				dollars
				cents.
	( \$ _____ )			\$ _____
203.32	GRANULAR BORROW	CY	25	
				dollars
				cents.
	( \$ _____ )			\$ _____
204.25	STRUCTURE EXCAVATION	CY	920	
				dollars
				cents.
	( \$ _____ )			\$ _____
204.30	GRANULAR BACKFILL FOR STRUCTURES	CY	280	
				dollars
				cents.
	( \$ _____ )			\$ _____



UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
208.40	COFFERDAM	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
210.10	COLD PLANING, BITUMINOUS PAVEMENT	SY	206.71	
				dollars
				cents.
	(\$ _____ )			\$ _____
301.26	SUBBASE OF CRUSHED GRAVEL, FINE GRADED	CY	52.24	
				dollars
				cents.
	(\$ _____ )			\$ _____
406.25	BITUMINOUS CONCRETE PAVEMENT	TON	410.73	
				dollars
				cents.
	(\$ _____ )			\$ _____
501.32	CONCRETE, HIGH PERFORMANCE CLASS AA	CY	184	
				dollars
				cents.
	(\$ _____ )			\$ _____
502.10	SHORING SUPERSTRUCTURE	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
505.35	PERMANENT STEEL SHEET PILING	SF	900	
				dollars
				cents.
	(\$ _____ )			\$ _____
506.50	STRUCTURAL STEEL, ROLLED BEAM	LB	10186	
				dollars
				cents.
	(\$ _____ )			\$ _____
507.15	REINFORCING STEEL	LB	34700	
				dollars
				cents.
	(\$ _____ )			\$ _____
507.16	DRILLING AND GROUTING DOWELS	LF	320	
				dollars
				cents.
	(\$ _____ )			\$ _____
507.17	EPOXY COATED REINFORCING STEEL	LB	13800	
				dollars
				cents.
	(\$ _____ )			\$ _____
507.19	MECHANICAL BAR CONNECTOR	EA	168	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
508.15	SHEAR CONNECTORS	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
510.24	GROUTING SHEAR KEYS	LF	92	
				dollars
				cents.
	(\$ _____ )			\$ _____
513.25	STRUCTURAL PAINTING, SHOP APPLIED	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
514.10	WATER REPELLENT, SILANE	GAL	31	
				dollars
				cents.
	(\$ _____ )			\$ _____
519.21	SHEET MEMBRANE WATERPROOFING, PREFORMED SHEET	SY	33	
				dollars
				cents.
	(\$ _____ )			\$ _____
524.21	JOINT SEALER, POLYURETHANE	LF	623	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
525.10	REMOVAL OF EXISTING RAILING	LF	171.53	
				dollars
				cents.
	(\$ _____ )			\$ _____
529.15	REMOVAL OF STRUCTURE	EA	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
529.25	REMOVAL OF CONCRETE OR MASONRY	CY	210	
				dollars
				cents.
	(\$ _____ )			\$ _____
531.11	BEARING DEVICE ASSEMBLY, ELASTOMERIC PAD	EA	24	
				dollars
				cents.
	(\$ _____ )			\$ _____
540.10	PRECAST CONCRETE STRUCTURE	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
541.25	CONCRETE, CLASS B	CY	233	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
541.58	MORTAR, TYPE IV	CY	10	
				dollars
				cents.
	(\$ _____ )			\$ _____
580.13	REPAIR OF CONCRETE SUBSTRUCTURE SURFACE, CLASS I	SY	50	
				dollars
				cents.
	(\$ _____ )			\$ _____
580.14	REPAIR OF CONCRETE SUBSTRUCTURE SURFACE, CLASS II	SY	50	
				dollars
				cents.
	(\$ _____ )			\$ _____
601.0905	12" CPEP	LF	10	
				dollars
				cents.
	(\$ _____ )			\$ _____
602.30	REPOINTING MASONRY	SY	135	
				dollars
				cents.
	(\$ _____ )			\$ _____
604.18	PRECAST REINFORCED CONCRETE DROP INLET WITH CAST IRON GRATE	EA	1	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
604.40	CHANGING ELEVATION OF DROP INLETS, CATCH BASINS, OR MANHOLES	EA	5	
				dollars
				cents.
	( \$ _____ )			\$ _____
604.42	CHANGING ELEVATION OF SEWER MANHOLES	EA	1	
				dollars
				cents.
	( \$ _____ )			\$ _____
604.47	CAST IRON GRATE WITH FRAME, TYPE D	EA	2	
				dollars
				cents.
	( \$ _____ )			\$ _____
616.20	GRANITE SLOPE EDGING	LF	12	
				dollars
				cents.
	( \$ _____ )			\$ _____
616.21	VERTICAL GRANITE CURB	LF	760	
				dollars
				cents.
	( \$ _____ )			\$ _____
616.41	REMOVAL OF EXISTING CURB	LF	520	
				dollars
				cents.
	( \$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
618.10	PORTLAND CEMENT CONCRETE SIDEWALK, 5 INCH	SY	77.74	
				dollars
				cents.
	(\$ _____ )			\$ _____
618.30	DETECTABLE WARNING SURFACE	SF	24	
				dollars
				cents.
	(\$ _____ )			\$ _____
621.80	REMOVAL AND DISPOSAL OF GUARDRAIL	LF	171.53	
				dollars
				cents.
	(\$ _____ )			\$ _____
631.10	FIELD OFFICE, ENGINEERS	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
635.11	MOBILIZATION/DEMOBILIZATION	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
641.10	TRAFFIC CONTROL	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
646.20	4 INCH WHITE LINE	LF	800	
				dollars
				cents.
	(\$ _____ )			\$ _____
646.26	24 INCH STOP BAR	LF	30	
				dollars
				cents.
	(\$ _____ )			\$ _____
646.31	CROSSWALK MARKING	LF	50	
				dollars
				cents.
	(\$ _____ )			\$ _____
646.410	DURABLE 4 INCH YELLOW LINE	LF	790	
				dollars
				cents.
	(\$ _____ )			\$ _____
651.15	SEED	LB	5.07	
				dollars
				cents.
	(\$ _____ )			\$ _____
651.18	FERTILIZER	LB	24.66	
				dollars
				cents.
	(\$ _____ )			\$ _____



UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
651.20	AGRICULTURAL LIMESTONE	TON	0.13	
				dollars
				cents.
	(\$ _____ )			\$ _____
651.25	HAY MULCH	TON	0.08	
				dollars
				cents.
	(\$ _____ )			\$ _____
651.35	TOPSOIL	CY	11.36	
				dollars
				cents.
	(\$ _____ )			\$ _____
653.15	HAY BALES	EA	134	
				dollars
				cents.
	(\$ _____ )			\$ _____
653.20	TEMPORARY EROSION MATTING	SY	400	
				dollars
				cents.
	(\$ _____ )			\$ _____
653.41	INLET PROTECTION DEVICE, TYPE II	EA	7	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
656.30	DECIDUOUS TREES	EA	2	
				dollars
				cents.
	(\$ _____ )			\$ _____
656.35	DECIDUOUS SHRUBS	EA	28	
				dollars
				cents.
	(\$ _____ )			\$ _____
656.40	GROUND COVERS AND VINES	EA	6	
				dollars
				cents.
	(\$ _____ )			\$ _____
656.41	PERENNIALS	EA	16	
				dollars
				cents.
	(\$ _____ )			\$ _____
656.80	LANDSCAPE BACKFILL, TRUCK MEASUREMENT	CY	127.10	
				dollars
				cents.
	(\$ _____ )			\$ _____
678.23	WIRED CONDUIT	LF	410	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
678.25	PULL BOX, STANDARD	EA	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
900.620	SPECIAL PROVISION (LOAD TEST FOR MICROPILES)	EA	28	
				dollars
				cents.
	(\$ _____ )			\$ _____
900.620	SPECIAL PROVISION (ORNAMENTAL STREET LIGHT)	EA	4	
				dollars
				cents.
	(\$ _____ )			\$ _____
900.620	SPECIAL PROVISION (UNDER BRIDGE LIGHT)	EA	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
900.625	SPECIAL PROVISION (CONCRETE STAINING AND SEALING)	GAL	6.85	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
900.640	SPECIAL PROVISION (MICROPILES)	LF	1700	
				dollars
				cents.
	(\$ _____ )			\$ _____
900.640	SPECIAL PROVISION (PEDESTRIAN HAND RAILING)	LF	342	
				dollars
				cents.
	(\$ _____ )			\$ _____
900.640	SPECIAL PROVISION (SAWED PAVEMENT)	LF	365	
				dollars
				cents.
	(\$ _____ )			\$ _____
900.645	SPECIAL PROVISION (BALLASTED TRACK CONSTRUCTION)	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____
900.645	SPECIAL PROVISION (DIRECT FIXATION TRACK CONSTRUCTION)	LS	1	
				dollars
				cents.
	(\$ _____ )			\$ _____

UNIT PRICE BID:

Item No.	Description Unit Price Bid in Both Words and Figures	Unit	Quantity	Total In Figures
900.645	SPECIAL PROVISION (CONTAINMENT AND DISPOSAL OF LEAD PAINT CLEANING RESIDUES)	LS	1	
				dollars
				cents.
			(\$ _____ )	\$ _____

Total Bid Price Written \_\_\_\_\_

The above unit prices shall include all labor, materials, removal, overhead, profit, insurance, etc. to cover the finished work of the several kinds called for on the drawings and specifications. We hereby certify that we did not enter into any agreement, participate in any collusion, or otherwise take any action in restraint of free competitive Bidding. The low bid will be determined by the base bid.

THE PROPOSAL IS HEREBY RESPECTFULLY SUBMITTED BY:

\_\_\_\_\_  
Contractor Date

\_\_\_\_\_  
By

\_\_\_\_\_  
Title

\_\_\_\_\_  
Business Address

\_\_\_\_\_  
City State Zipcode Email

SPECIAL PROVISIONS  
HARTFORD STP HTFD(1)

STANDARD SPECIFICATIONS. The provisions of the 2006 STANDARD SPECIFICATIONS FOR CONSTRUCTION, as modified herein, shall apply to this Contract.

SUBSTANTIAL COMPLETION DATE: The Contractor shall complete all work involving the railroad and the need for railroad flaggers. The Contractor shall have Bridge Street completed sufficiently to allow vehicular use over the winter. The work described shall be done on or before Friday, November 1, 2013

CONTRACT COMPLETION DATE: The Contract shall be completed on or before Friday, May 23, 2014.

UTILITIES. Existing aerial and underground facilities will not be adjusted for this project. The Contractor is cautioned to protect the facilities from damage.

Employees or agents of utility companies 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 companies.

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.

RAILROAD. The Contractor is advised that Appendix Q contains the agreement between the Town and the Railroad hereinafter referred to as the AGREEMENT. The Contractor should note the following.

Page 1, Last Paragraph of the AGREEMENT: The TOWN shall mean the CONTRACTOR

Paragraph 1-4 of the AGREEMENT: The CONTRACTOR shall be responsible for the preparation of the required as-built plans. Within thirty (30) days after the completion of the PROJECT and final payment, the CONTRACTOR shall provide as-built plans to the TOWN.

Paragraph 2-6 of the AGREEMENT: The TOWN shall mean the CONTRACTOR

Paragraph 3-3 of the AGREEMENT: All liquidated damages assessed to the TOWN shall be paid by the CONTRACTOR or deducted from payments due to the CONTRACTOR.

Paragraph 3-4 of the AGREEMENT: The TOWN shall mean the CONTRACTOR.

Paragraph 4-1 of the AGREEMENT: Replace *as shown in blue on Exhibit “C”* with *as shown with cross hatching and defined as AREA OF TEMPORARY CONSTRUCTION LICENSE on Exhibit “C”*.

Paragraph 4-3 of the AGREEMENT: The TOWN shall mean the CONTRACTOR.

Section 5 of the AGREEMENT: CONTRACTOR take note.

Paragraph 8-5 of the AGREEMENT: Replace *Upon completion of any work performed pursuant to this provision, the TOWN shall promptly remove from the COMPANY's property all tools, equipment and material placed thereon by the TOWN and the TOWN's agents or contractors. The TOWN shall restore the COMPANY's property to the same state and condition as when the TOWN entered thereon and shall leave said property in a clean and presentable condition.*

With the following *Upon completion of any work performed pursuant to this provision, the CONTRACTOR shall promptly remove from the COMPANY's property all tools, equipment and material placed thereon by the CONTRACTOR and the CONTRACTOR's agents or contractors. The CONTRACTOR shall restore the COMPANY's property to the same state and condition as when the CONTRACTOR entered thereon and shall leave said property in a clean and presentable condition.*

Paragraph 8-6 of the AGREEMENT: The TOWN shall mean the CONTRACTOR.

Section 11 of the AGREEMENT: CONTRACTOR take note.

Paragraph 13-1 of the AGREEMENT: The TOWN shall mean the CONTRACTOR.

Paragraph 13-6 of the AGREEMENT: CONTRACTOR take note.

Notwithstanding the items noted above the CONTRACTOR shall meet all the requirements of the AGREEMENT wherever there is reference to the TOWN's contractor whether specifically noted or implied.

STREET LIGHTING. The Contractor is advised that the Town of Hartford has a letter of approval from VTrans for a Public Interest Finding (PIF) to specify specific ornamental street lights, manufactured by Spring City Electrical Manufacturing Company, as shown on the contract plans.

The PIF is contingent on securing certification that Spring City Manufacturing Company's products comply with Buy America provisions.

Spring City Electrical Manufacturing Company has indicated via letter that their products comply with Buy America provisions and they will be able to provide appropriate certifications.

The Contractor will be responsible for acquiring the required certifications from Spring City Electrical Manufacturing Company.

TRAFFIC CONTROL REQUIREMENTS.

- A. A minimum of two weeks prior to implementation the Contractor shall submit a detailed traffic control plan to the Engineer for review and approval.
- 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 641.10.
- D. The Contractor shall have available on the project the current editions of the Manual on Uniform Traffic Control Devices (MUTCD) and the Traffic Control Devices Handbook. These reference books may be ordered from: Superintendent of Documents, U.S. Government Printing Office, Washington, DC, 20402. Information for obtaining these publications may be found at: <http://mutcd.fhwa.dot.gov/index.htm>.
- E. The sections of Bridge Street identified in the Plans may only be closed to vehicle and pedestrian traffic during active bridge construction periods. The Contractor will maintain vehicle / pedestrian traffic flows during road, rail, and incidental construction activities that do not necessitate a full road closure. Any temporary pedestrian access shall meet the requirements of ADA.

#### CONSTRUCTION SCHEDULING REQUIREMENTS.

- A. The Contractor shall submit to the Town a schedule for construction that will be reviewed and approved as the Project's construction schedule.
- B. The construction schedule should enumerate specific construction (e.g., bridge deck, sidewalks, abutments east and west) and non-construction (e.g., permit acquisition and mobilization) phases.

#### SECTION 101 – DEFINITIONS

101.02, DEFINITIONS, are hereby modified by deleting the existing following definitions and replacing as follows:

ACTUAL COMPLETION DATE – Date noted in the Completion and Acceptance memorandum on which designated responsible Municipal personnel have reviewed the project and determined that all Contract work is complete and all Contract requirements have been met, generally considered to be the last day the Contractor performed physical work on any contract item.

AGENCY – Wherever the word Agency appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the Town of Hartford, except when referenced to documents or publications.

BOARD – Wherever the term Board or Transportation Board appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the Transportation Board of the State of Vermont or its successor.

CHIEF OF CONTRACT ADMINISTRATION – Wherever the term Chief of Contract administration appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean, the Municipal Manager.

CONSTRUCTION ENGINEER – Wherever the term Construction Engineer appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the Resident Engineer (RE).



DIRECTOR OF PROJECT DEVELOPMENT – Wherever the terms Director of Project Development, director of Engineering and Construction, Director of Construction and Maintenance, Director, or Chief Engineer appears on the plans, in any specification, or in the Contract, they shall be read as and shall mean; the Director of the Program Development Division of the Agency of Transportation..

ENGINEER – Wherever the term Engineer appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the Resident Engineer (RE).

FINAL ACCEPTANCE DATE – Wherever the term Final Acceptance Date appears on the plans, in any specification, or in the Contract, it shall mean the date that the Town signs the Final Completion Certificate.

MATERIALS AND RESEARCH ENGINEER – Whenever the term Materials and Research Engineer appears on the plans, in any specification, or in the Contract, it shall be read as, and shall mean; the Design Consultant.

PROPOSAL FORM – Whenever the term Proposal Form appears on the plans, in any specification, or in the Contract it shall be read as, and shall mean; the BID FORM unless specifically referenced otherwise in these Special Provisions.

REGIONAL CONSTRUCTION ENGINEER – Whenever the term Regional Construction Engineer appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the Town of Hartford Project Engineer.

SECRETARY – Wherever the term Secretary appears on the plans, in any specification, or in the contract it shall be read as, and shall mean; the Municipal Manager.

STATE – Wherever the term State appears on the plans, in any specification, or in the contract, it shall be read as, and shall mean; the Municipal legislative body.

ADD the following definitions:

ADDENDUM (addenda) – Contract revisions developed after advertisement and before opening bids.

ADVERTISEMENT – A public announcement, inviting bids for work to be performed or materials to be furnished.

AGREEMENT – The written instrument which is evidence of the agreement between the Town and the Contractor.

AWARD – The formal acceptance by the Town of a proposal.

BID – The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

BID BOND – A proposal guarantee as outlined in the Instructions to Bidders for Contracts.

BIDDER – The individual, partnership, firm, corporation, or any combination thereof, or joint venture, submitting a Bid in accordance with the bidding requirements.

CALENDAR DAY – Any day shown on the calendar, beginning at 7am and ending at 5pm.

CHANGE ORDER – A document recommended by the Engineer, signed by the Contractor and the Town, and approved by the Agency of Transportation authorizing changes in the plans or quantities or both, within the scope of the Contract, establishing the basis of payment and time adjustments for the Work affected by the changes.

CHIEF OF CONTRACT ADMINISTRATION – The Municipal employee authorized to administer the bidding and contract award processes set out in the AOT POLICIES AND PROCEDURES ON PREQUALIFICATION, BIDDING, AND AWARD OF CONTRACTS.

COMPLETION – Completion of the project occurs when the Contractor has completed all work required by the Contract and has satisfactorily executed and delivered to the Engineer all documents, certificates and proofs of compliance required by the contract.

CONTRACT – The written agreement between the Town and a contractor setting out the obligations of the parties to the contract for the performance of the work described therein.

CONTRACT BOND(S) – The approved forms of security, signed and furnished by the contractor and the contractor's surety or sureties, guaranteeing signatures on the contract, performance of and compliance with the contract, and the payment of all legal debts pertaining to the construction of the contracted project.

CONTRACTOR(S) – An entity that has Annual Prequalification status and/or an entity that has a contract with the Town to perform construction work, including but not limited to an individual, partnership, firm, organization, association, corporation, or joint venture; a representative, trustee, or receiver of a contractor appointed by any court of competent jurisdiction.

CONTRACT TIME – The time allowed for completion of the contract including authorized time extensions.

DIRECTOR OF PROGRAM DEVELOPMENT – Wherever the term Director of Program Development appears on the plans, in any specification, or in the contract it shall read as , and shall mean; The Director of the Program Development Division of the Agency of Transportation.

GENERAL SPECIAL PROVISIONS – Approved additions and revisions to the Standard Specifications for Construction.

INCIDENTAL AND INCIDENTAL ITEM – These terms are used to indicate work for which no direct payment will be made. Such work is considered to be incidental to items having contract prices, and the bid prices submitted by the contractor shall be sufficient to absorb the cost of all work designated as incidental or as incidental items.

INSPECTION FIRM – An entity employed by the Town/Contractor to perform inspection and/or testing services on the project.

INVITATION FOR BIDS – An advertisement for receiving proposals for all work and/or materials on which bids are invited from prospective contractors.

MUNICIPAL PROJECT MANAGER – A person or firm employed or appointed by the Town to provide administrative services for the project.

NOTICE OF AWARD – The written notice of the acceptance of the Bid from the Owner to the successful Bidder.

OWNER - Town of Hartford / New England Central Railroad.

PREQUALIFICATION:

Annual Prequalification – This is an Agency of Transportation process by which an entity is generally approved to bid on contracts advertised by the Town. Depending on the project size annual prequalification may be the only prequalification necessary.

Contract Specific Prequalification – The process by which an entity is approved to bid on a specific contract determined by the Town to be of a size or scope to warrant more than an Annual Prequalification.

PREQUALIFICATION ADMINISTRATOR – An Agency of Transportation employee charged with administration of the prequalification process for the Prequalification Committee.

PROPOSAL – The offer of a bidder, on the prescribed form, to perform work and/or provide materials at the price quoted in the offer.

PROPOSAL FORM – The prescribed form on which the Town requires the Bid be submitted.

PROPOSAL GAURANTY – The security furnished with a bid to ensure that the bidder will enter into a contract if the bidder's proposal is accepted by the Town.

SPECIAL PROVISIONS – Additions and revisions to the Standard Specifications for Construction, Supplemental Specifications, General Special Provisions, Plans, or other documents that are part of a particular contract.

SPECIFICATIONS – The compilation of provisions and requirements for the performance of prescribed work including the Standard Specifications for Construction, Supplemental Specifications, General Special Provisions, Special Provisions, Plans, and other documents that are part of a particular contract.

STANDARD SPECIFICATIONS – The Vermont Agency of Transportation book entitled 2006 Edition Standard Specifications For Construction and the specifications included therein, as approved for general and repetitive use and application in Agency/Municipal projects.

SUBCONTRACTOR – An individual or legal entity to which the contractor sublets a part of the work included in the contract.

SURETY – An individual or legal entity acceptable to the Town executing the bond or bonds furnished by the bidder or contractor.

TESTING FIRM – An independent firm employed by the Contractor/Town/Inspection Firm to perform all sampling and testing of materials as specified in the Contract Documents.

WORK – The furnishing of all labor, materials, equipment, and incidentals necessary or convenient to the successful completion of a project and the carrying out of all duties and obligations imposed by a contract.

***APPENDIX A***

**CONTRACTOR'S EEO CERTIFICATION FORM**

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**APPENDIX A**

STATE OF VERMONT  
AGENCY OF TRANSPORTATION

November, 1985  
CA-109

**CONTRACTOR'S EEO CERTIFICATION FORM**

Certification with regard to the Performance of Previous Contracts of Subcontracts subject to the Equal Opportunity Clause and the filing of Required Reports.

The bidder \_\_\_\_\_, proposed subcontractor \_\_\_\_\_, hereby certifies that he/she has \_\_\_\_\_, has not \_\_\_\_\_, 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 \_\_\_\_\_, has not \_\_\_\_\_, filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

\_\_\_\_\_

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.

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***APPENDIX B***

STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
DEBARMENT AND NON-COLLUSION AFFIDAVIT



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**APPENDIX B**

CA-91

STATE OF VERMONT  
AGENCY OF TRANSPORTATION  
DEBARMENT AND NON-COLLUSION AFFIDAVIT

I, \_\_\_\_\_, representing  
(Official Authorized to Sign Contracts)  
\_\_\_\_\_ of \_\_\_\_\_,  
(Individual, Partnership or Corporation) (City or State)

being duly sworn, depose and certify under the penalties of perjury under the laws of the State of Vermont and the United States that on behalf of the person, firm, association, or corporation submitting the bid certifying that such person, firm, association, or corporation has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action, in restraint of free competitive bidding in connection with the submitted bid for the Vermont project:

\_\_\_\_\_  
(Project Name)  
\_\_\_\_\_ project located on \_\_\_\_\_,  
(Project Number) (Route or Highway)  
bids opened at \_\_\_\_\_,  
(Town or City)

Vermont on \_\_\_\_\_, 20\_\_.  
(Date)

I further depose and certify under the penalties of perjury under the laws of the State of Vermont and the United States that except as noted below said individual, partnership or corporation or any person associated therewith in any capacity is not currently, and has not been within the past three (3) years, suspended, debarred, voluntarily excluded or determined ineligible by any Federal or State Agency; does not have a proposed suspension, debarment, voluntary exclusion or ineligibility determination pending; and has not been indicted, convicted, or had a civil judgement rendered against (it, him, her, them) by a court having jurisdiction in any matter involving fraud or official misconduct within the past three (3) years.

Exceptions: \_\_\_\_ No \_\_\_\_ Yes. (If yes complete back of this form.)

Sworn to before me this

\_\_\_\_ day of \_\_\_\_\_, 20\_\_

\_\_\_\_\_  
(Name of Individual, Partnership or Corporation) L.S.

\_\_\_\_\_  
(Signature of Official Authorized to Sign Contracts) L.S.

\_\_\_\_\_  
(Notary Public)

\_\_\_\_\_  
(Name of Individual Signing Affidavit) L.S.

(My commission expires \_\_\_\_\_)

\_\_\_\_\_  
(Title of Individual Signing Affidavit) L.S.

**APPENDIX B**

Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception noted, indicate below to whom it applies, initiating agency, and dates of action. Providing false information may result in criminal prosecution or administration sanctions.

EXCEPTIONS:

***APPENDIX C***

REQUIRED CONTRACT PROVISIONS  
FEDERAL-AID CONSTRUCTION CONTRACTS

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

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**ATTACHMENTS**

- A. Employment Preference for Appalachian Contracts  
(included in Appalachian contracts only)

**I. GENERAL**

1. 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.

2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

- Section I, paragraph 2;
- Section IV, paragraphs 1, 2, 3, 4, and 7;
- Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 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 DOL, or the contractor's employees or their representatives.

6. **Selection of Labor:** During the performance of this contract, the contractor shall not:

a. discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or

b. employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

## II. NONDISCRIMINATION

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

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 and 41 CFR 60) 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 Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American 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 State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

b. The contractor will accept as his 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, preapprenticeship, and/or on-the-job training."

2. **EEO Officer:** The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active contractor program of EEO 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 minority group employees.

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 minority groups 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 minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority group 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, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)

c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group 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 his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

**6. Training and Promotion:**

a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.

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. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.

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 minority group and women employees 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 his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:

a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.

b. The contractor will use best 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 SHA 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 minority and women 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 minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) 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 SHA.

**8. 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.

a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.

b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.

c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

**9. 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 completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.

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

(1) The number 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;

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and

(4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.

b. The contractors will submit an annual report to the SHA 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. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.

### III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, timeclocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of \$10,000 or more and that it will retain such certifications in its files.

#### **IV. PAYMENT OF PREDETERMINED MINIMUM WAGE**

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

##### **1. General:**

a. All mechanics and laborers 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 (29 CFR 3) issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c)] the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) 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. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, 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 paragraphs 4 and 5 of this Section IV.

b. 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.

c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

**2. Classification:**

a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.

b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:

(1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;

(2) the additional classification is utilized in the area by the construction industry;

(3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) with respect to helpers, when such a classification prevails in the area in which the work is performed.

c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification 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 DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour 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.

d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional 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. Said 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.

e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

**3. Payment of Fringe Benefits:**

a. 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 or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.

b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a 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.

#### 4. Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:

##### a. Apprentices:

(1) 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 DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/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 Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeyman-level employees 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 employee 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 listed in 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 or subcontractor 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-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

(3) 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 journeyman-level 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 for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

##### b. Trainees:

(1) 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 DOL, Employment and Training Administration.

(2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. 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.

(3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level 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-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which case such trainees shall receive the same fringe benefits as apprentices.

(4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor 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. **Helpers:**

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV.2. Any worker listed on a payroll at a helper wage rate, who is not a helper under an approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

**5. 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.

**6. Withholding:**

The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor 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, as 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 SHA contracting officer 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.

**7. Overtime Requirements:**

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

**8. Violation:**

Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her 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, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

**9. Withholding for Unpaid Wages and Liquidated Damages:**

The SHA shall upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies 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 8 above.

**V. STATEMENTS AND PAYROLLS**

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

**1. Compliance with Copeland Regulations (29 CFR 3):**

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

**2. Payrolls and Payroll Records:**

a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof 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. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found 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 and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits.

Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.

c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices, trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period). The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;

(2) that such 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 the Regulations, 29 CFR 3;

(3) that each laborer or mechanic has been paid not less than the applicable wage rate and fringe benefits or cash equivalent for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

e. 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 2d of this Section V.

f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 231.

g. The contractor or subcontractor shall make the records required under paragraph 2b of this Section V available for inspection, copying, or transcription by authorized representatives of the SHA, the FHWA, or the DOL, 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 SHA, the FHWA, the DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions 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.

## **VI. RECORD OF MATERIALS, SUPPLIES, AND LABOR**

1. On all Federal-aid contracts on the National Highway System, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than \$1,000,000 (23 CFR 635) the contractor shall:



a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.

b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on Form FHWA-47.

c. Furnish, upon the completion of the contract, to the SHA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.

2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

## **VII. SUBLETTING OR ASSIGNING THE CONTRACT**

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 State. 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).

a. "Its own organization" shall be construed to include only workers employed and paid directly 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, assignee, or agent of the prime contractor.

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 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 VII 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 SHA 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 SHA 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 SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

## **VIII. SAFETY: ACCIDENT PREVENTION**

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 SHA 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. 333).

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. 333).

#### **IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS**

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, the following notice 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:

#### **NOTICE TO ALL PERSONNEL ENGAGED ON FEDERAL-AID HIGHWAY PROJECTS**

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 not more than \$10,000 or imprisoned not more than 5 years or both."

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

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$100,000 or

more.)

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

1. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.
2. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.
3. That the firm shall promptly notify the SHA of the receipt of any communication from the Director, Office of Federal Activities, EPA, indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.
4. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section X in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

#### **XI. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION**

##### **1. Instructions for Certification - Primary Covered Transactions:**

(Applicable to all Federal-aid contracts - 49 CFR 29)

a. By signing and submitting this proposal, the prospective primary 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 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 primary 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 department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.

d. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if any time the prospective primary 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," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and

"voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.

f. The prospective primary 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 primary 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 Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

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 may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the "Lists of Parties Excluded From Federal Procurement or Nonprocurement Programs" (Nonprocurement List) which is compiled by the General Services Administration.

i. 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.

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.

\* \* \* \* \*

#### **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-- Primary Covered Transactions**

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

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

b. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgement 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;

c. 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 1b

of this certification; and

d. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

2. Where the prospective primary 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 Covered Transactions:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions of \$25,000 or more - 49 CFR 29)

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," "primary covered transaction," "participant," "person," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.

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.

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 may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.

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.

\* \* \* \* \*

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--  
Lower Tier Covered Transactions:**

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

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

\* \* \* \* \*

**XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING**

(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 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 recipients shall certify and disclose accordingly.

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***APPENDIX D***

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



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**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)



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***APPENDIX E***

**CERTIFICATION FOR FEDERAL-AID CONTRACTS**

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**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.

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***APPENDIX F***

**MINIMUM LABOR AND TRUCK RATES**

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**APPENDIX F**

CA101

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

July 1990  
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</u> <u>Water Level Body Capacity</u>	<u>Minimum Rates</u> <u>Per YD per Hr.</u>
Trucks, Equipment Loaded	\$1.25



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***APPENDIX G***

VERMONT AGENCY OF TRANSPORTATION  
CONTRACTOR WORKFORCE REPORTING REQUIREMENTS

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**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".

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***APPENDIX H***

DISADVANTAGED BUSINESS ENTERPRISE (DBE) POLICY  
CONTRACT REQUIREMENTS

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**DISADVANTAGED BUSINESS ENTERPRISE (DBE) POLICY  
CONTRACT REQUIREMENTS**

1. Policy. Is it the policy of the United States Department of Transportation (USDOT) that Disadvantaged Business Enterprise (DBE) as defined in 49 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. In this regard, the State and its Contractors shall not discriminate on the basis of race, color, sex, national origin, physical disability or veteran status in the award and performance of USDOT assisted contracts.
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.
5. The Agency's 2010 Overall Annual Goal for DBE participation on FHWA-funded projects is 4.0%. The Agency's 2010 Overall Annual Goal for DBE participation on FTA-funded projects is 3.94%.



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***APPENDIX I***

VERMONT AGENCY OF TRANSPORTATION  
GENERAL SPECIAL PROVISIONS FOR ALL PROJECTS  
2006 STANDARD SPECIFICATIONS

DATED: DECEMBER 7, 2010

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GENERAL SPECIAL PROVISIONS FOR ALL PROJECTS  
2006 STANDARD SPECIFICATIONS

SECTION 101 - DEFINITIONS AND TERMS

1. 101.01 ABBREVIATIONS, is hereby corrected by deleting "American Railway Association" as the respective expression for ANSI and replacing it with "American National Standards Institute".
2. 101.01 ABBREVIATIONS, is hereby further corrected by deleting "American Wood-Preservers' Association" as the respective expression for ASTM and replacing it with "American International Standards Worldwide".
3. 101.01 ABBREVIATIONS, is hereby still further corrected by adding the abbreviation "AWPA" and its respective expression "American Wood-Preservers' Association" to the list of abbreviations immediately after "ASTM" and its respective expression.
4. 101.02 DEFINITIONS, is hereby modified by deleting the definition for ACTUAL COMPLETION DATE and replacing it with a new definition for ACTUAL COMPLETION DATE as follows:

ACTUAL COMPLETION DATE - Date noted in the Completion and Acceptance memorandum on which designated responsible Agency personnel have reviewed the project(s) and determined that all Contract work is complete and all Contract requirements have been met, generally considered to be the last day the Contractor performed physical work on any Contract item.

5. 101.02 DEFINITIONS, is hereby further modified by adding the following as the last sentence of the definition for CONTRACTOR:

The Contractor will act in an independent capacity and not as officers or employees of the State.

SECTION 105 - CONTROL OF THE WORK

6. 105.03 PLANS AND WORKING DRAWINGS, part (b) Working Drawings, subpart (3)b.4. Required Construction Drawings, is hereby modified by adding the following as the fifth row in the table:

501 HPC Structural Concrete (stay-in-place corrugated metal forms (SIPCMF))	Structures Engineer	For Approval
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7. 105.03 PLANS AND WORKING DRAWINGS, part (b) Working Drawings, subpart (3)b.4. Required Construction Drawings, is hereby further modified by adding the following as the twelfth row in the table:

522 Lumber and Timber (erection plan)	Construction Engineer	Documentation Only
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8. 105.20 CLAIMS FOR ADJUSTMENT, is hereby modified by being deleted in its entirety and replaced with the following:

9. 105.20 CLAIMS FOR ADJUSTMENT.

- (a) Notice Requirements. In order to bring a claim for additional compensation not clearly covered by the Contract for conditions substantially different than represented by the Contract and not ordered by the Engineer as Extra Work as defined herein, the Contractor must provide written notice ("the Notice of Intent to File a Claim" or the "Notice") to the Engineer before conducting any work or purchasing any materials subject to the claim (the "Claim"). The words "Notice of Intent to File a Claim" must appear in large print at the top of the document. The Notice must specify the basis for the Claim, including the nature of the Claim, the reason why the Contractor believes that the Agency is responsible for payment of the Claim, and a description of the additional compensation, including reference to each activity associated with the work and/or materials, including reference to any impacts to the Contractor's Progress Schedule, as defined in Subsection 108.03 (the "Critical Path"). If the Contractor fails to provide the Notice as specified herein, the Contractor waives its right to bring the Claim under the Contract.
- (b) Notice Documentation Requirements. Upon providing the Notice of Intent to File a Claim, the Project Superintendent must commence daily records for all labor hours, equipment hours (idle and operating), and materials involved with the work or materials at issue in the Notice. The Contractor must submit such records to the Engineer on a daily basis. Such records must include a written analysis of how the work and/or materials at issue in the Notice impact/s the Critical Path. If the Contractor fails to provide such records to the Engineer as required herein, the Contractor waives its right to bring the Claim.
- (c) Claims Procedure. The Engineer's written acknowledgement of the Notice and receipt of the Contractor's daily reporting under this Subsection shall not be construed as an approval by the Agency of the merits of the Claim. Claims are evaluated by the Construction Engineer. If the Construction Engineer rules in favor of the Contractor, the Claim will be allowed, in whole or in part, and paid as provided in the Contract. If the Construction Engineer denies the Claim, in whole or in part, the Contractor may appeal to the Director of Program Development. Notwithstanding any other provision of law, case law, regulation, or the Contract, an appeal from the decision of the Construction Engineer shall be made within 30 calendar days of denial, and not thereafter.
- (d) Claims Documentation Requirements. The Contractor must provide the Construction Engineer with the following documentation in support of the Claim:
  - (1) A detailed statement of the Claim, including all necessary dates, location, and work and material items at issue in the Claim;

- (2) The date on which the Contractor first became aware of the actions or conditions giving rise to the Claim;
- (3) A copy of the Notice of Intent to File a Claim;
- (4) A list of the names of all Agency employees and agents, including consultants, the Contractor believes have knowledge or information concerning the facts giving rise to the Claim;
- (5) A list of the names of all Contractor employees and agents, including subcontractors, whom the Contractor believes have knowledge or information concerning the facts giving rise to the Claim;
- (6) A list of the specific provisions of the Contract that the Contractor believes support the Claim, and a description of why the Contractor believes those provisions support the Claim;
- (7) A list of all documents and all oral statements that the Contractor believes support the Claim;
- (8) A statement as to whether additional compensation and/or a time extension are being requested in the Claim;
- (9) If a time extension is being requested in the Claim, a statement as to the specific number of days being requested, supported with reference to how the facts underlying the Claim affected the Contractor's performance schedule, including how such facts affected the Critical Path;
- (10) A description of the amount of additional compensation being sought, itemized by category of work, including delays associated with performing the work, work items, materials costs, and any and all other costs at issue in the Claim. Such documentation includes, but is not limited to, invoices for rented equipment, a Blue Book analysis for owned equipment; and subcontractor agreements.
- (11) If additional compensation for delays associated with performing the work is included in the Claim, the Contractor must provide a description of the operations that were delayed, the reasons for the delay, the impact of the delay on the operations, and how the delay impacted the Contractor's progress schedule, including the Critical Path.

- (12) For every claim seeking additional compensation in excess of \$50,000, the Contractor must provide a separate document certifying that the documentation provided in support of the Claim and that the amount of additional compensation sought in the Claim is accurate and that the Contractor has a good faith basis for believing that the Agency is responsible for payment of the Claim (the "Claims Certification"). The Claims Certification shall be notarized and executed by a senior officer of the Contractor with legal authority to bind the Contractor, or if the Contractor is a sole proprietor, by the proprietor. The Claims Certification may be used in any proceeding under the False Claims Act, 18 U.S.C.A. §1020 23 C.F.R. §635.119.
- (e) Appeal to the Director of Program Development. Appeals will be judged by the Director of Program Development. Should an appeal be judged in favor of the Contractor, it will be allowed and paid as provided in the Contract. Should a claim be denied by the Director of Program Development, the Contractor may appeal under Subsection 105.02.
- (f) Time for Claims; Appeals. Notwithstanding any other provision of law, case law, regulation, or the Contract, all claims by the Contractor shall be submitted in writing within 90 calendar days after the Acceptance Date of the project or within 90 calendar days of the Notice of Intent to File a Claim, whichever occurs first, and not thereafter (the "Claim Filing Period"). Such claims must meet the requirements set forth above, including but not limited to complete documentation supporting the Claim. If the Contractor fails to meet these requirements, the Construction Engineer may grant the Contractor additional time to meet the requirements. Any additional time granted for such purpose shall not be the subject of any demand for interest payments or for attorneys' fees and/or other costs. If the Contractor fails to file the Claim within the Claim Filing Period, the Contractor waives its right to bring the Claim. If the disputed work continues to be performed beyond the Claim Filing Period, the Contractor must submit a written request to extend the Claim Filing Period prior to the expiration of the Claim Filing Period. The Contractor shall submit such requests for extension of the Claims Filing Period every 90 calendar days until the disputed work is completed.
10. 105.30 VALUE ENGINEERING, is hereby modified by being deleted in its entirety and replaced with the following:
11. 105.30 VALUE ENGINEERING.
- (a) General. The intent of value engineering (VE) is to provide an incentive to the Contractor to initiate, develop, and present to the Engineer for consideration cost reduction proposals involving changes in the drawings, designs, specifications, or other requirements of the Contract. These provisions do not apply unless the proposal submitted is specifically identified by the Contractor as being presented for consideration as a VE proposal.

The change in cost proposals contemplated are those that would require a Change Order/Supplemental Agreement (COSA) modifying the Contract and would produce an overall savings to the public by providing items or methods other than those specified in the Contract and/or reduce future maintenance costs without impairing essential functions and characteristics such as service life, safety, durability, reliability, economy of operation, ease of maintenance, and necessary standardized features. A VE proposal shall contain proven features that have been used under similar conditions, and is presented as such, and does not contain equivalent options already provided in the Contract.

(b) Procedure.

- (1) General. Unless mutually agreed otherwise, the VE proposal approval process will occur in three steps:
  - a. A conceptual VE proposal submission and review.
  - b. A detailed VE proposal submission and evaluation, and if approved.
  - c. A COSA modifying the Contract, including the amount of payment due to the Contractor and credit due to the Agency.
  
- (2) Conceptual Value Engineering Proposal (CVEP). To begin the VE proposal approval process, the Contractor shall submit a written Conceptual Value Engineering Proposal (CVEP) to the Engineer for consideration. The CVEP is not a formal and complete submittal based upon detailed technical analysis, but instead relays a conceptual idea based upon the Contractor's knowledge and expertise. The CVEP should include the following information based upon the Contractor's best knowledge and understanding:
  - a. General Description. A narrative that describes the proposed change in concept and includes the basic differences between the existing Contract and the proposed change.
  - b. Advantages and Disadvantages. A listing and brief description of the comparative advantages and disadvantages of the CVEP including effects on the service life, safety, durability, reliability, economy of operation, ease of maintenance, and any other factors significantly altered by the CVEP.
  - c. Impacts to Permits and/or Third-Party Agreements. A description of steps necessary to address existing permits, new permits, or third party agreements that may be impacted or required in order to initiate the proposed change(s). In addition, the Contractor shall describe its expectation of securing or modifying these documents, who is responsible for securing them, and required timeframe(s).



- d. Identification of Prior Similar CVEPs. If the CVEP was submitted previously on another Agency project, the date, the project name and number, and the action taken by the Agency shall be indicated.
- e. Known Use or Testing. A description of any previous use or testing of the concept(s) included in the CVEP that is known to the Contractor, including the tester, the conditions, and the results.
- f. Estimate of Net Savings. An estimate of the Net Savings as defined in part (c) below. This amount shall not include the cost to prepare and submit the CVEP)
- g. Estimate of Development Costs. A scope of work and related cost estimate to develop and submit a Detailed Value Engineering Proposal (DVEP). This estimate should include a detailed estimate of both the engineering costs the Contractor will incur in preparing the DVEP (the "Internal DVEP Costs") and the cost the Contractor will incur to obtain specialty engineering services that the Contractor cannot perform and which are necessary to prepare the DVEP (the "External DVEP Costs") (collectively, the "DVEP Costs"). If the Contractor establishes, to the satisfaction of the Construction Engineer, that it does not have the financial resources to incur the DVEP Costs, the Agency may, in its sole discretion, decide to advance the Contractor up to 50% of the DVEP Costs. In no event will the Agency pay more than 50% of the DVEP Costs, nor will the DVEP Costs exceed 50% of the Net Savings amount, as defined in part (c) below.
- h. Savings and Schedule Impacts. An estimate of the time necessary for the Contractor to submit a DVEP and the time-sensitivity of the savings identified. Such estimate shall specify the date by which the Agency must approve the DVEP to obtain the maximum cost reduction, and the latest date by which the Agency must approve the DVEP for the Contractor to avoid significant impacts on the estimated Net Savings or the Contractor's schedule of work. If the Agency determines that the time for response is insufficient for review, the Contractor will be promptly notified.
- i. Agency Review. The Engineer will use best efforts to review a conforming CVEP and respond to the Contractor within 14 calendar days of receipt. The Agency may, at its sole discretion:
  - 1. Invite the Contractor to submit a DVEP;
  - 2. Reject the CVEP for reasons that will be described briefly; or
  - 3. Request additional information.

- (3) DVEP. If invited by the Agency as provided in subpart (b)(2)i.1., the Contractor may submit a DVEP. DVEPs will be processed in the same manner as prescribed for any other alterations of the Contract that require a COSA and shall contain, as a minimum, the following information:
- a. Description. A description of what is being changed, altered, or deleted, and why, and what is being proposed to improve upon the originally designed feature.
  - b. Itemization. An itemization of the requirements of the Contract (plans, specifications, pay items, and unit prices) that must be changed and a recommendation of how to make each change, including a description of the advantages and disadvantages and where these items have been successfully used on other projects before or tested elsewhere.
  - c. Computation of Net Savings. A detailed computation of the estimated net savings to be generated as defined in part (c), actual DVEP development costs, and estimated savings and schedule impacts, including approval date(s) required. If the Agency determines that the time for response is insufficient for review, the Contractor will be promptly notified.
  - d. Prediction of Other Costs. A prediction of any effects the proposed changes would have on other costs to the Agency, including environmental effects, traffic impacts, and preventive action or treatment costs.
  - e. Plans and Specifications. A complete set of Plans and Specifications, prepared as Construction Drawings in accordance with Subsection 105.03, showing the proposed revisions relative to the original Contract features and requirements. All DVEPs that require engineering design, computations, or analysis shall be prepared under the responsible charge of and sealed by a Professional Engineer licensed in the State of Vermont.
  - f. Contract Completion. A statement as to the effect the proposal would have on the time for the completion of the Contract. Extension to the original Contract Completion Date will generally not be approved.
- (4) Evaluation of DVEP. The Agency will evaluate the DVEP and consider the following:
- a. The Agency may request any additional information that it determines is necessary to properly evaluate the DVEP. Where design changes are proposed, such additional information may include results of field investigations and surveys, design computations, specifications, and any field changes already incorporated into the project. The Contractor shall promptly provide any such requested information.

- b. The Agency may require the Contractor to provide additional information to verify the Contractor's cost analysis.
  - c. When the Agency is acting as the contracting authority for a locally owned facility, the local governing body must also provide approval. The Contractor shall present their proposal to the local governing body and allow sufficient time to present the proposal and receive comments.
- (5) Evaluation Response. The Agency will use its best effort to evaluate a conforming DVEP and provide the Contractor with a written response within 30 calendar days of receipt of all of the information it has determined was necessary to properly evaluate the DVEP. Such response will include a brief description of the Agency's reason(s) for its decision. The Agency, at its sole discretion, will either accept the DVEP, accept it with conditions, or reject it.
- (6) No Liability for Delay. The Agency shall not be liable for any delay in acting upon any VE proposal submitted. The Contractor may withdraw in whole or in part any VE proposal not accepted within the period specified in the proposal. The decision of the Engineer as to the acceptance or rejection of VE proposals will be final and will not be subject to the provisions of Subsections 105.02 or 105.20.
- (7) Contingencies. The Agency may approve a DVEP with contingencies, which if not met by the Contractor, will prompt the Agency to reject the DVEP before the execution of a COSA. Contingencies may include but not be limited to the necessary approvals of permits, amendments, execution or amendments to third-party agreements, specific deadlines for completion of submittals, or execution of permits, agreements, and/or amendments thereof.
- (8) Rejection/Termination. If the Agency rejects the DVEP, the DVEP process will terminate. The Agency, in its sole discretion, will determine whether to reimburse the Contractor for DVEP Costs, and if so, what percentage of those costs. In no event will the Agency pay more than 50% of the DVEP Costs. These costs will not include the cost to prepare the CVEP.

(c) Accepted Proposals; COSA. If a DVEP is accepted, or if it is accepted with conditions and the Contractor wants to proceed, the necessary Contract modifications will be effected by execution of a COSA which will provide for equitable price adjustments giving the Contractor and the Agency equal shares in the net savings. Unless and until a proposal is effected by such Contract modification, the Contractor shall remain obligated to perform in accordance with the terms of the existing Contract. In addition to the requirements of Subsections 109.04 and 109.05, the DVEP will set forth the credit due the Agency calculated as the difference between the cost of performing the work, as originally specified, and the amount payable to the Contractor for the revised work. The payment for this Contract modification will only include the following amounts:

- (1) The cost of performing the work as revised by the DVEP at agreed upon unit or lump sum prices;
- (2) The DVEP development costs that the Agency agreed to reimburse the Contractor as provided in subpart (b)(2)g., if any; and
- (3) Fifty percent (50%) of the Net Savings (NS) generated by the DVEP as determined by the Agency, calculated as follows:

$$NS = EGS + CSP - CUDC - AVEC$$

Where:

NS = Net Savings generated by the DVEP.

EGS = Estimated Gross Savings is an agreed upon difference between the cost of performing the Work as originally specified in the Contract and the cost of performing the Work as revised by the DVEP.

CSP = Cost Savings to the Public are those funds not expended by the public, including but not limited to reduced maintenance costs and reduced road user costs. CSP shall not include any cost savings attributable to a time period exceeding ten (10) years from the Contract Completion Date.

CUDC = Contractor's Unreimbursed Development Costs related to the preparation of the DVEP, including costs of the Contractor's design subconsultants and subcontractors, but excluding all such costs already paid by the Agency under subpart (b)(2)g. above.

AVEC = Agency's VE Costs related to review, approval, and implementation of the DVEP including design costs, field inspection, and the value of any Agency-provided property.

The COSA effecting the necessary Contract modifications shall establish the net savings agreed upon and shall provide for such adjustment in the Contract price as will divide the net savings equally between the Contractor and the Agency. All reasonably incurred costs of developing the cost reduction proposal and implementing the changes, including any increased costs to the Agency resulting from its application, will be deducted from the total estimated decrease in the Contractor's costs of performance to arrive at the net savings.

- (d) Subsequent Payment Adjustments. Upon completion of the portion of the work revised by the DVEP, the Agency, on its own initiative or upon request by the Contractor, may review the actual net savings realized by the DVEP. The Contractor will be afforded an opportunity to review and comment on such a review. If the actual net savings were greater than set forth in the COSA, the increased savings will be shared equally between the Agency and the Contractor. If the net savings were less than set forth in the COSA, the reduction in savings will be borne equally by the Agency and the Contractor by a reduction of amounts otherwise due the Contractor.
- (e) General Conditions.
- (1) DVEPs will remain the property of the Contractor, provided that the Agency will have the unrestricted right to use any approved DVEP, or any DVEP in which the Agency has reimbursed the Contractor for any portion of the development costs, on other Agency projects without notice, cost, or liability to the Contractor.
  - (2) Only the Contractor may submit DVEPs. The Contractor shall review, be responsible for, and submit all proposals initiated by the Contractor's subcontractors.
  - (3) The Contractor shall not anticipate Agency approval of a VE proposal when bidding or otherwise before approval of a DVEP. The Contractor is responsible for all delays caused by the VE proposal that were not negotiated in the COSA.
  - (4) If a VE proposal is rejected by the Agency, the Contractor shall perform the work in accordance with the Contract.
  - (5) Except as otherwise provided in this Subsection, the Contractor shall have no claim against the Agency for additional compensation or time resulting from the delayed review or rejection of a DVEP, including but not limited to development costs, loss of anticipated profits, and increased material or labor costs.
  - (6) Cost sharing applies only to the Contract for which the DVEP was submitted.
  - (7) Upon acceptance of a cost reduction proposal, any restrictions imposed by the Contractor on its use or on disclosure of the information submitted shall be void, and the Agency shall thereafter have the right to use, duplicate, and disclose in whole or in part any data necessary to the utilization of the proposal on this project or other projects.

- (8) Any time savings realized by implementation of VE proposals may result in a corresponding adjustment in the Contract completion time. No incentive pay will be provided for early completion days resulting from time savings of any approved VE proposals.
- (9) Because the Agency has no obligation to change the terms of the original Contract, all VE proposal decisions by the Agency are final and are not subject to the dispute resolution provisions provided in this Contract or otherwise available in law.
- (10) The Contractor may withdraw any DVEP prior to the time the Contractor signs the COSA. If the Contractor elects to withdraw the DVEP in accordance with this provision, the Contractor waives its right under subpart (b)(2)(g) for reimbursement of DVEP costs, including any costs advanced to the Contractor. If such costs have been advanced, the Contractor shall reimburse the Agency for those costs within 30 calendar days of withdrawing its DVEP.
- (11) Acceptance by the Agency of a DVEP does not indicate any assumption of liability by the Agency for any design errors and/or omissions associated with the implementation of the DVEP.

SECTION 106 - CONTROL OF MATERIAL

12. 106.03 SAMPLES AND TESTS, subpart (a)(1), is hereby modified by adding the phrase "Materials and Research" before the word "Engineer" in the second sentence of the second paragraph.
13. 106.03 SAMPLES AND TESTS, subpart (a)(8), is hereby modified by replacing the phrase "lot/day" with the word "lot" in both the first and second sentences.
14. 106.03 SAMPLES AND TESTS, subpart (b)(1), is hereby modified by replacing both occurrences of the word "day's" with the word "lot's" in the second sentence of the first paragraph.
15. 106.03 SAMPLES AND TESTS, subpart (b)(1), is hereby further modified by replacing the words "day" and "day's" with the words "lot" and "lot's", respectively, in the second paragraph.

SECTION 107 - LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

16. 107.16 RESPONSIBILITY FOR DAMAGE CLAIMS, part (a) General, is hereby modified by deleting the second and third sentences in their entirety and replacing them with the following:

The State shall notify the Contractor in the event of any such claim or suit, and the Contractor shall immediately retain counsel and otherwise provide a complete defense against the entire claim or suit.

17. 107.16 RESPONSIBILITY FOR DAMAGE CLAIMS, part (a) General, is hereby further modified by adding the following paragraphs:

After a final judgment or settlement the Contractor may request recoupment of specific defense costs and may file suit in Washington Superior Court requesting recoupment. The Contractor 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 Contractor.

The Contractor 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 Contractor.

18. 107.16 RESPONSIBILITY FOR DAMAGE CLAIMS, part (b) Submission for Damage Claims, is hereby modified by being re-designated from part "(b)" to part "(c)".

19. 107.16 RESPONSIBILITY FOR DAMAGE CLAIMS, is hereby modified by adding the following new part (b):

(b) Right to Retention of Funds. So much of the money due the Contractor under and by virtue of the Contract as shall be considered necessary by the Agency for such purpose may be retained for the use of the State. If no money is due, the Contractor's surety shall be held until such suit or suits, action or actions, or claim or claims for injuries or damages shall have been resolved and suitable evidence to that effect furnished by the Agency.

SECTION 108 - PROSECUTION AND PROGRESS

20. 108.11 DETERMINATION OF EXTENSION OF CONTRACT TIME FOR COMPLETION, part (a) General; Request for Extension of Contract Completion Date, text is hereby modified by being deleted in its entirety and replaced with the following:

When a definite date or a fixed number of days for completion is specified in the proposal and Contract, and when the Contractor fails to substantially complete the work within the Contract time specified due to unforeseen conditions beyond the control and without fault or negligence of the Contractor, the Contractor will be credited additional contract completion time on a full day basis as provided in Subsection 108.11(b). The Finals Engineer will submit to the Contractor a "Request for Extension of Time Form" containing a preliminary review of extension of time in accordance with Subsection 108.11(b). If the Contractor concurs with the preliminary review, the Contractor shall sign and return the form to the Finals Engineer within 60 calendar days of the date of presentation (the "60 day period"). If the Contractor disputes the preliminary review, the Contractor shall notify the Finals Engineer within the 60 day period and provide supportive documentation regarding the dispute. Upon receipt of a dispute, the Finals Engineer will research, consult with the Resident Engineer and the Construction Engineer, and provide a response to the Contractor. The Contractor may appeal this decision as provided in Subsection 105.20. Notwithstanding Subsections 105.02 and 105.20, failure to notify the Finals Engineer of a dispute within the 60 day period shall constitute concurrence with the preliminary review and be deemed a waiver of the Contractor's right to appeal, in which case the extension of time will be processed without the Contractor's signature.

No extension of time will be required when a Substantial Completion Date is established prior to the Contract Completion Date, as modified by applicable change orders.

21. 108.11 DETERMINATION OF EXTENSION OF CONTRACT TIME FOR COMPLETION, part (b) Determination of Contract Completion Date Extension, subpart (6), is hereby modified by deleting the fourth sentence in its entirety.
22. 108.12 FAILURE TO COMPLETE WORK ON TIME, part (c) Liquidated Damages; General; Days Charged, is hereby modified by deleting the DAILY CHARGE FOR LIQUIDATED DAMAGES FOR EACH WORKING DAY OF DELAY table in its entirety and replacing it with a new table as follows:

DAILY CHARGE FOR LIQUIDATED DAMAGES  
 FOR EACH WORKING DAY OF DELAY

Original Contract Amount		
From More Than	To And Including	Daily Charge Per Day of Delay
\$ 0	\$ 300,000	\$ 700.00
300,000	500,000	900.00
500,000	1,000,000	1,300.00
1,000,000	1,500,000	1,500.00
1,500,000	3,000,000	1,900.00
3,000,000	5,000,000	2,200.00
5,000,000	10,000,000	2,700.00
10,000,000	20,000,000	4,200.00
20,000,000+	-----	6,600.00



23. 108.14 TERMINATION OF CONTRACT FOR CONVENIENCE, is hereby modified by being deleted in its entirety and replaced with the following:

24. 108.14 TERMINATION OF CONTRACT FOR CONVENIENCE.

- (a) General. The Agency may, by written order to the Contractor, terminate the Contract or any portion thereof when such termination would be in the best interest of the Agency.

Any such termination shall be effected by delivery to the Contractor an Order of Termination specifying the termination is for the convenience of the Agency, the extent to which performance of work under the Contract is terminated, and the effective date of the termination.

In the event such termination occurs, without fault and for reasons beyond the control of the Contractor, all completed items of work as of the date of termination will be paid for at the Contract bid price. Payment for partially completed work will be made either at agreed prices or by force account methods provided elsewhere in the Contract.

Pursuant to Subsection 109.07, no compensation will be allowed for items eliminated from the Contract.

Upon request the Contractor shall make all Contract-related records available to the Agency.

- (b) Contractor Obligations. After receipt of the Order of Termination and except as otherwise directed by the Engineer, the Contractor shall immediately proceed to:

- (1) To the extent specified in the Order of Termination, stop work under the Contract on the date specified.
- (2) Place no further orders or subcontracts for materials, services, and/or facilities except as may be necessary for completion of such portion(s) of the work under the Contract as is (are) not terminated.
- (3) Terminate and cancel all orders or subcontracts for materials, services, and/or facilities except as may be necessary for completion of such portion(s) of the work under the Contract as is (are) not terminated.
- (4) Submit to the Engineer a material inventory list, certified as to quantity and quality of materials in its possession or in transit to the project.
- (5) Transfer to the Agency all completed or partially completed plans, drawings, information, and other property which, if the Contract had been completed, would be required to be furnished to the Agency.
- (6) Take other action as may be necessary or as directed by the Engineer for the protection and preservation of the property related to the Contract which is in the possession of the Contractor and in which the Agency has or may acquire any interest.

- (c) Claim by Contractor. After receipt of the Order of Termination from the Agency, the Contractor shall submit any claim for additional damages or costs not covered herein or elsewhere in the Contract within 60 days of the effective termination date, and not thereafter.

Should the Contractor fail to submit a claim within the 60 day period, the Agency may, at its sole discretion, based on information available to it, determine what, if any, compensation is due the Contractor and pay the Contractor the determined amount.

- (d) Materials. At the option of the Agency, acceptable materials included in the material inventory in subpart (b)(4) above that have been obtained by the Contractor for the work but which have not been incorporated into the work may be purchased from the Contractor at actual cost delivered to a location prescribed by the Engineer or otherwise disposed of as mutually agreed.

Payment for materials included in the material inventory chosen to be purchased by the Agency will be made at actual cost delivered to the project or storage site designated by the Engineer, including transportation charges, to which 10 percent overhead and profit will be added.

- (e) Idle Equipment. Idle equipment time claimed by the Contractor will be paid as follows:

(1) Contractor Owned Equipment. For the portion of any claim relating to idle equipment time for equipment owned by the Contractor, the Contractor will be entitled to recover equipment rates based on the Contractor's internal ownership costs. Recovery for idle equipment time shall not be based on published rental rates.

(2) Rented Or Leased Equipment. For the portion of any claim relating to idle equipment time for equipment rented or leased by the Contractor, the Contractor will be entitled to recover the lesser of the actual rental costs or fair market rental costs, and the amount shall not exceed 30 days rental.

(3) Limitations On Recovery For Idle Equipment. Claims for idle equipment time, whether for Contractor owned equipment or leased/rented equipment, following termination of the Contract pursuant to this Subsection are limited to a maximum of 30 days and may not include any operating expenses.

- (f) Negotiation; No Anticipated Profit. Negotiation to settle a timely claim shall be for the sole purpose of reaching a settlement equitable to both the Contractor and the Agency. Settlement shall be based on actual costs incurred by the Contractor plus overhead and profit as specified in Subsection 109.06. Consequential damages, loss of overhead, loss of overhead contribution of any kind, and/or loss of anticipated profits on work not performed shall not be included in the Contractor's claim and will not be considered, allowed, or included as part of any settlement.

- (g) Records. The Contractor shall make available to the Agency all cost records relevant to a determination of an equitable settlement.
- (h) Contractual Responsibilities Continue. Termination of the Contract, or portion thereof, shall not relieve the Contractor of its contractual responsibilities for work completed and shall not relieve the Contractor's Surety of its obligation for and concerning any just claim arising out of the work performed.

SECTION 109 - MEASUREMENT AND PAYMENT

25. 109.08 PARTIAL AND FINAL PAYMENTS, part (d) Final Payments, text is hereby modified by being deleted in its entirety and replaced with the following:

Payment of the Final Estimate will be made when an agreement is reached between the Agency and the Contractor regarding the final quantities of all Contract pay items, the Acceptance Date as defined in Subsection 101.02 is established, all materials and certifications are accepted, and all other project requirements have been met. The Finals Engineer will present the Agency's determination of final quantities to the Contractor. If the Contractor wishes to dispute the final quantities, the Contractor shall notify the Finals Engineer within 60 calendar days of the date of presentation (the "60 day period") of final quantities. The Contractor shall indicate which specific quantities are being disputed and provide supportive documentation regarding the disputed quantities. The Contractor may request a 30 day extension to review the quantities by notifying the Finals Engineer within the 60 day period. Upon receipt of a dispute, the Finals Engineer will research, consult with the Resident Engineer and the Construction Engineer, and provide a response to the Contractor. The Contractor may appeal this decision as provided in Subsection 105.20. Notwithstanding Subsections 105.02 and 105.20, failure by the Contractor to notify the Finals Engineer of dispute of final quantities within the 60 day period (or 90 calendar days from the date of presentation if a 30 day extension is granted) will be deemed as agreement to the final quantities as presented, and deemed a waiver of the Contractor's right to appeal.

Following the resolution of final quantities, the Finals Engineer will present the Contractor with close-out documents consisting of the Final Estimate for signature and a "Status of Claims" form. Failure by the Contractor to sign the Final Estimate and "Status of Claims" form within 20 days will result in closure of the Contract, provided that there are no claims on file with the Agency.

At the discretion of the Finals Engineer, the Contractor may be presented with close-out documents concurrent with the final quantities. In such case, notwithstanding Subsections 105.02 and 105.20, failure by the Contractor to notify the Finals Engineer of dispute of final quantities within applicable time durations specified in this Subsection will be deemed as agreement to the final quantities as presented, and closure of the Contract without the Contractor's signature will result.

In cases when presentation of final quantities to the Contractor indicates that the Agency has overpaid the Contract, the Contractor shall remit payment to the Agency by the end of the 60 day period, unless the Contractor is appealing final quantities. Failure to make payment may result in notification to the Agency's Prequalification Committee by the Construction Engineer, and/or may result in set off pursuant to the Bulletin 3.5 Compliance requirements in the Contract.

26. 109.09 STATEMENT OF MATERIALS AND LABOR FORM FHWA-47, is hereby modified by being deleted in its entirety.
27. 109.10 FINAL PAY QUANTITY, is hereby made a new Subsection of this Section as follows:
28. 109.10 FINAL PAY QUANTITY. When a Contract item is designated in the Contract Documents as (FPQ), then this item shall be considered a Final Pay Quantity item. The Contract quantity shall be considered the final pay quantity for the item, unless the Plan dimensions of any portion for measurement of the item or the Contract quantity of that item are revised by the Engineer, or the Contract quantity of the item or any portion of the Contract quantity of the item is eliminated.

If the dimensions of any portion for measurement of the item or the Contract quantity of the item is revised, and the revision results in an increase or decrease in the Contract quantity of the item, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions or by the imposed revision. If the item is eliminated, the Contract quantity for the item will be eliminated. If a portion of the item is eliminated, the Contract quantity will be revised in the amount represented by the eliminated portion of the item.

No adjustment will be made to the Contract quantity for an FPQ pay item, except as allowed under this Subsection.

#### SECTION 208 - COFFERDAMS

29. 208.01 DESCRIPTION, is hereby modified by deleting the word "specifications" and replacing it with the phrase "Contract Documents" in the first paragraph.
30. 208.11 METHOD OF MEASUREMENT, part (c) Cofferdam Excavation, Rock, is hereby modified by deleting the word "footing" and replacing it with the phrase "foundation or component of a structure" in the first sentence of the third paragraph.
31. 208.11 METHOD OF MEASUREMENT, part (d), is hereby modified by being deleted in its entirety and replaced with a new part (d) Bottom of Excavation as follows:
  - (d) Bottom of Excavation. The bottom of excavation shall be as indicated on the Plans.

When a foundation seal is specified in the Contract, the bottom of excavation shall be considered to be the bottom of the excavation required for the foundation seal. For a seal proposed by the Contractor, no excavation shall be measured for payment below the bottom of excavation as indicated on the Plans.

32. 208.12 BASIS OF PAYMENT, is hereby modified by deleting the phrase "the Engineer (by written order) requires" and replacing it with the phrase "the Contract Documents or the Engineer (by written order) require" in the second sentence of the fifth paragraph.

SECTION 213 - MILLED RUMBLE STRIPS

33. 213.04 METHOD OF MEASUREMENT, is hereby modified by deleting the first sentence of the Subsection text in its entirety and replacing it with the following:

The quantity of Milled Rumble Strips to be measured for payment will be the longitudinal length in meters (linear feet) of treated surface measured on the pavement marking line adjacent to or within the installed rumble strip.

SECTION 301 - SUBBASE

34. 301.02 MATERIALS, is hereby modified by adding the following as the first entry in the Subsection listing in the first paragraph:

Coarse Aggregate for Concrete.....704.02

35. 301.02 MATERIALS, is hereby further modified by adding the following paragraphs:

When specified for use on the project or as directed by the Engineer, Subbase, RAP shall include cold planed grindings which have been screened or crushed by the Contractor in order that 100% passes the 37.5 mm (1 ½ inch) sieve prior to blending.

The grindings shall be blended in equal proportions (50% by mass (weight)) with material meeting the requirements of Subbase of Crushed Gravel, Fine Graded as specified in Table 704.05A.

36. 301.03 GENERAL CONSTRUCTION REQUIREMENTS, is hereby modified by adding the following as the last sentence in the sixth paragraph:

If needed, the Contractor may use material meeting the requirements of Subsection 704.02, Table 704.02B as filler to achieve the design grade when the variation of the surface is less than 25 mm (1 inch).

37. 301.03 GENERAL CONSTRUCTION REQUIREMENTS, is hereby further modified by deleting the word "above" in the eighth paragraph.

38. 301.06 COMPACTION, is hereby modified by deleting the last sentence of the second paragraph in its entirety and replacing it with the following:

The maximum dry density shall be determined after any change in source, regardless of quantity, and confirmed by repetition of the selected test method at a frequency of 10,000 m<sup>3</sup> (12,500 yd<sup>3</sup>) when the prescribed standard error can be attained by five or less replicate tests. If more than five replicate tests are required to meet the prescribed standard error, the maximum dry density shall be confirmed at a frequency of every 5000 m<sup>3</sup> (6250 yd<sup>3</sup>). The Engineer may reduce this frequency with the approval of the Materials and Research Engineer after the initial two maximum dry density determinations.

39. 301.07 METHOD OF MEASUREMENT, is hereby modified by adding the phrase ", including any filler material used to achieve the design grade" to the end of the first paragraph.

40. 301.07 METHOD OF MEASUREMENT, is hereby further modified by adding the following as the fourth paragraph of the Subsection text:

The quantity of Subbase, RAP to be measured for payment will be the number of metric tons (tons) of material in place in the complete and accepted work, as determined from the load tickets.

41. 301.08 BASIS OF PAYMENT, is hereby modified by adding the phrase "blending," before the phrase "transporting," in the second sentence of the first paragraph.

42. 301.08 BASIS OF PAYMENT, is hereby further modified by adding the following as the third paragraph of the Subsection text:

No additional payment will be made for filler material used as a replacement for the specified subbase material.

43. 301.08 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>
301.40 Subbase, RAP	Metric Ton (Ton)

SECTION 303 - ASPHALT TREATED PERMEABLE BASE

44. 303.02 MATERIALS, is hereby modified by deleting the second sentence of the second paragraph (paragraph below the Subsection listing) in its entirety.

45. 303.02 MATERIALS, is hereby further modified by deleting the eighth row (beginning with the phrase "Asphalt Binder") in its entirety from the table in the third paragraph.

46. 303.02 MATERIALS, is hereby still further modified by adding the word "written" before the word "approval" in the third (last) sentence of the fourth (last) paragraph.

SECTION 310 - RECLAIMED STABILIZED BASE

47. 310.07 SHAPING AND COMPACTING, is hereby modified by adding the following as the second paragraph of the Subsection text:

When additional aggregate material is added to the previously reclaimed roadway to correct geometric deficiencies, said material shall be subject to a second pass of the reclamation equipment to achieve a homogenous subbase and shall be shaped, graded, and compacted.

48. 310.10 BASIS OF PAYMENT, is hereby modified by adding the following as the second paragraph of the Subsection text:

No additional compensation will be provided for multiple passes of the reclamation equipment and additional shaping, grading, and compacting.

SECTION 406 - MARSHALL BITUMINOUS CONCRETE PAVEMENT

49. 406.03 COMPOSITION OF MIXTURE, part (b) Design Criteria, TABLE 406.03B - DESIGN CRITERIA is hereby modified by adding the phrase "%" after the phrase "Air Voids" in the first column, second row entry.
50. 406.03 COMPOSITION OF MIXTURE, part (b) Design Criteria, TABLE 406.03B - DESIGN CRITERIA is hereby further modified by deleting the seventh and eighth rows in their entirety and replacing them with the following:

Stability, Newtons (Pounds)	5340 (1200) min.	8010 (1800) min.
Flow, millimeters (0.01 inches)	2.0 - 4.5 (8.0 - 18.0)	2.0 - 4.0 (8.0 - 16.0)

51. 406.03 COMPOSITION OF MIXTURE, part (b) Design Criteria, is hereby modified by adding the following new TABLE 406.03B1 - PG BINDER GRADE SELECTION directly below TABLE 406.03B - DESIGN CRITERIA:

TABLE 406.03B1 - PG BINDER GRADE SELECTION

RAP CONTENT	BINDER GRADE
< 15.0%	PG 58-28
15.0% ≤ to < 25.0%	PG 52-34
25.0% ≤ to ≤ 50.0% <sup>1</sup>	footnote 1

1 - The Contractor shall determine the grade of PG binder necessary so that when combined with the RAP asphalt cement, the composite asphalt material grades at a PG 58-28 as a minimum. The maximum acceptable low end temperature is -28°C (-18°F) and the minimum acceptable high end temperature is 58°C (136°F). The Engineer will sample haul units from the plant and have the material extracted for grading at the Agency's Materials and Research Laboratory in Berlin, VT to verify the binder grade of the mix being supplied. The Contractor's Quality Control Plan shall specify a grading frequency and include an action plan for when test results verify that the grade of PG binder is less than a PG 58-28.

52. 406.03 COMPOSITION OF MIXTURE, part (c) Mix Design, is hereby modified by adding the following as the last sentence of the third paragraph:

For mix designs containing RAP, the dry and wet mixing times shall be adjusted to assure moisture from the RAP is completely dissipated prior to adding the liquid PG binder.

53. 406.03 COMPOSITION OF MIXTURE, part (d) Control of Mixtures, is hereby modified by adding the following to the listing in the eighth paragraph:

h. For mix designs containing ≥ 25.0 percent RAP, indicate the following: RAP percentage, PG Grade of virgin binder determined, testing frequency of mix to verify composite PG Grade, and actions to be taken when test results are outside of PG Grade limits.

54. 406.03 COMPOSITION OF MIXTURE, part (d) Control of Mixtures, TABLE 406.03D - MINIMUM QUALITY CONTROL GUIDELINES is hereby modified by adding the following as the bottom row and by adding footnote 7 as follows:

Determine composite PG binder grade <sup>(7)</sup>	1 per 5000 metric ton (ton)	AASHTO R 29
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7 - For mix containing ≥ 25.0 percent RAP.

55. 406.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, TABLE 406.03E - ACCEPTANCE GUIDELINES, is hereby modified by deleting the third and fourth columns in their entirety and replacing them with the following:

TARGET LOT SIZE	TARGET SUBLLOT SIZE
3000 Metric Ton (Ton)	500 Metric Ton (Ton)

56. 406.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (2) Lot Size, is hereby modified by being deleted in its entirety and replaced with the following:

- (2) Lot Size. For the purpose of evaluating acceptance test properties, the number of lots to be applied to the project (or Contract as specified) for each applicable individual mix type (mix design) is defined by the following equation:

$$\text{Lots}_{\text{Type}} = \frac{\text{QTotal}_{\text{Type}}}{3000}$$

where,

$\text{Lots}_{\text{Type}}$  = the number of lots to be applied to the project (or Contract as specified) for each applicable individual mix type (mix design) rounded to the nearest whole number per the rounding procedure specified by Contract.

$\text{QTotal}_{\text{Type}}$  = total project (or Contract as specified) bituminous mix tonnage for each applicable individual mix type (mix design).

The representative tonnage of bituminous material within each lot ( $\text{QLot}_{\text{Type}}$ ) is defined as:

$$\text{QLot}_{\text{Type}} = \frac{\text{QTotal}_{\text{Type}}}{\text{Lots}_{\text{Type}}}$$

If project yields are different than anticipated, the chance of a partial lot exists. If the final lot consists of less than four acceptance samples, it will be combined with the previous lot.



57. 406.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (3) Sublot Size, is hereby modified by being deleted in its entirety and replaced with the following:
- (3) Sublot Size. The number of sublots will be determined by dividing the lot tonnage ( $Q_{Lot_{Type}}$ ) by 500 and rounding to the nearest whole number, per the rounding procedure specified by Contract. The resultant sublot size will be determined by dividing the lot size determined in subpart (2) above by the number of sublots determined herein.
58. 406.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (4) Pay Factor (PF) Determination, is hereby modified by adding the phrase "equals or" before the word "exceeds".
59. 406.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (5), Rejected Material, is hereby modified by being re-designated as Rejectable Material.
60. 406.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (5) Rejectable Material, item a. Rejection by Contractor, is hereby modified by replacing the phrase ", prior to sampling," with the phrase "at any time" in the first sentence.
61. 406.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (5) Rejectable Material, item b., is hereby modified by being deleted in its entirety and replaced with the following:
- b. For those lots with a PWL less than 50% and greater than or equal to 25%, the PF for each lot of bituminous concrete mixture, based on "air voids" test results, will be determined using the following equation:
- $$PF(av) = ((2.16PWL - 29)/100) - 1.0$$
- For those lots with a PWL less than 25%, the Engineer will require complete removal of the representative lot and replacement with mix meeting Contract requirements at no additional cost to the Agency.
62. 406.05 BITUMINOUS MIXING PLANT AND TESTING, part (a) Requirements for All Plants, subpart (12) Testing Facilities, is hereby modified by adding the following at the end of the second paragraph:
- An internet connection, which provides Agency personnel a minimum speed of 700 Kbps (Kilobits Per Second) download, without utilizing compression algorithms, shall be provided in the laboratory. The connection bandwidth speed shall be verifiable using an online speed test.
63. 406.08 MIXING, is hereby modified by adding the word "wet" before the word "mixing" in the second (last) sentence of the fourth paragraph.
64. 406.14 COMPACTION, is hereby corrected by deleting the text "1.000" and replacing it with the text "0.000" in the fourteenth paragraph.

65. 406.16 SURFACE TOLERANCE, is hereby modified by deleting the third sentence of the third paragraph in its entirety and replacing it as follows:

The corresponding Surface Tolerance Pay Factor (PF(r)) will be determined as follows and applied to the corresponding lot as defined below:

66. 406.16 SURFACE TOLERANCE, is hereby further modified by adding the following as the fourth (final) paragraph:

For the purpose of evaluating surface tolerance acceptance, a lot shall consist of the total project quantity of wearing surface of bituminous concrete pavement constructed and measured in place. Said measurement shall include all shoulders, side roads, drives, and any other miscellaneous mix as measured by the Engineer.

67. 406.18 METHOD OF MEASUREMENT, is hereby modified by adding the phrase "wearing surface of" after the phrase "the measured quantity of" and by deleting the phrase "that day" in the sixth paragraph.

SECTION 415 - COLD MIXED RECYCLED BITUMINOUS PAVEMENT

68. 415.02 MATERIALS, table in second paragraph, is hereby corrected by deleting the second row in its entirety and replacing it with the following:

37.5 mm (1 ½ inches)	100
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SECTION 417 - BITUMINOUS CRACK SEALING

69. 417.05 PREPARATION, is hereby modified by designating the first paragraph under a part (a) General heading.

70. 417.05 PREPARATION, is hereby further modified by designating the second through fifth paragraphs under a part (b) Bituminous Crack Sealing heading.

71. 417.05 PREPARATION, is hereby still further modified by adding the following new part (c):

(c) Bituminous Crack Sealing, "Blow and Go" Method. Bituminous Crack Sealing, "Blow and Go" Method shall be performed in accordance with part (b) of this Subsection, with the exception that no routing or saw cutting will be required prior to cleaning and sealing the crack.

72. 417.07 METHOD OF MEASUREMENT, is hereby modified by adding the phrase "and Bituminous Crack Sealing, "Blow and Go" Method" after the phrase "Bituminous Crack Sealing".

73. 417.08 BASIS OF PAYMENT, is hereby modified by adding the phrase "and Bituminous Crack Sealing, "Blow and Go" Method" after the phrase "Bituminous Crack Sealing" in the first sentence.

74. 417.08 BASIS OF PAYMENT, is hereby further modified by adding the following pay item:

Payment will be made under:

Pay Item

Pay Unit

417.20 Bituminous Crack Sealing, "Blow and Go" Method Kilogram (Pound)

SECTION 490 - SUPERPAVE BITUMINOUS CONCRETE PAVEMENT

75. 490.03 COMPOSITION OF MIXTURE, part (b) Design Criteria, is hereby modified by replacing the phrase "(for example 50, 75, or 100)" with the phrase "(50, 65, or 80)" in the first sentence of the first paragraph.

76. 490.03 COMPOSITION OF MIXTURE, part (b) Design Criteria, TABLE 490.03B - DESIGN CRITERIA is hereby modified by deleting row 7 in its entirety and replacing it with a new row 7 as follows:

Voids in Mineral Aggregate (VMA) %	11.5 min.	12.5 min.	13.5 min	14.5 min.	15.5 min.	16.5 min.
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77. 490.03 COMPOSITION OF MIXTURE, part (b) Design Criteria, TABLE 490.03B - DESIGN CRITERIA is hereby further modified by deleting row 10 in its entirety and replacing it with new rows 10 and 11 as follows:

Compaction Parameters	$N_{initial} = 6$ $N_{design} = 50$ $N_{max} = 75$	$N_{initial} = 7$ $N_{design} = 65^1$ $N_{max} = 115$	$N_{initial} = 8$ $N_{design} = 80^2$ $N_{max} = 160$
Voids Filled With Asphalt (VFA) %	70.0 - 80.0 <sup>4,5</sup>	65.0 - 78.0 <sup>5</sup>	65.0 - 75.0 <sup>3,5</sup>

78. 490.03 COMPOSITION OF MIXTURE, part (b) Design Criteria, TABLE 490.03B - DESIGN CRITERIA is hereby still further modified by adding the following as the bottom rows:

PG BINDER GRADE SELECTION	
RAP CONTENT	BINDER GRADE
< 15.0%	PG 58-28
15.0% ≤ to < 25.0%	PG 52-34
25.0% ≤ to ≤ 50.0% <sup>6</sup>	footnote 6

79. 490.03 COMPOSITION OF MIXTURE, part (b) Design Criteria, TABLE 490.03B - DESIGN CRITERIA is hereby still further modified by deleting footnotes 1, 2, and 3 in their entirety and replacing them with new footnotes 1, 2, 3, 4, 5, and 6 as follows:

- (1) When estimated design traffic levels are between 300,000 and 1 million ESALs, the Agency may at its discretion specify  $N_{initial}$  at 6,  $N_{design}$  at 50, and  $N_{max}$  at 75.
- (2) When estimated design traffic levels are between 3 and < 10 million ESALs, the Agency may at its discretion specify  $N_{initial}$  at 7,  $N_{design}$  at 65, and  $N_{max}$  at 115.
- (3) For design traffic levels > 3,000,000 ESALs, the specified VFA range for 9.5 mm (3/8 inch) nominal maximum size mixtures shall be 73.0 to 76.0% and for 4.75 mm (3/16 inch) nominal maximum size mixtures shall be 75.0 to 78.0%.
- (4) For a Type IS pavement with ESALs < 300,000, Table 490.03B will apply with the exception of the VFA percentage, which shall have a range from 67.0 to 80.0%. For a Type IVS, 9.5 mm (3/8 inch) pavement with ESALs < 1,000,000, Table 490.03B will apply with the exception of the VFA percentage, which shall have a range from 70.0 to 82.0%.
- (5) For a Type MS pavement, all traffic levels (ESALs), Table 490.03B will apply with the exception of the VFA percentage, which shall have a lower limit of 64.0%.
- (6) The Contractor shall determine the grade of PG binder necessary so that when combined with the RAP asphalt cement, the composite asphalt material grades at a PG 58-28 as a minimum. The maximum acceptable low end temperature is  $-28^{\circ}\text{C}$  ( $-18^{\circ}\text{F}$ ) and the minimum acceptable high end temperature is  $58^{\circ}\text{C}$  ( $136^{\circ}\text{F}$ ). The Engineer will sample haul units from the plant and have the material extracted for grading at the Agency's Materials and Research Laboratory in Berlin, VT to verify the binder grade of the mix being supplied. The Contractor's Quality Control Plan shall specify a grading frequency and include an action plan for when test results verify that the grade of PG binder is less than a PG 58-28.

80. 490.03 COMPOSITION OF MIXTURE, part (b) Design Criteria, is hereby further modified by deleting the table below footnote 6 of TABLE 490.03B - DESIGN CRITERIA in its entirety and replacing it with the following:

Aggregate Consensus Properties	Traffic Level (ESALs)	
	< 30,000,000	$\geq$ 30,000,000
Fractured Faces Coarse Aggregate, % min	95/90	100/100
Uncompacted Void Content of Fine Aggregate, % min	45	45
Sand Equivalent, % min	45	50
Flat and Elongated, % max	10	10

81. 490.03 COMPOSITION OF MIXTURE, part (c) Mix Design, is hereby modified by adding the following as the last sentence of the fourth paragraph:

For mix designs containing RAP, the dry and wet mixing times shall be adjusted to assure moisture from the RAP is completely dissipated prior to adding the liquid PG binder.

82. 490.03 COMPOSITION OF MIXTURE, part (d) Control of Mixtures, is hereby modified by deleting footnote 2 below TABLE 490.03C - PRODUCTION TESTING TOLERANCES in its entirety and replacing it with the following:

2 - The VFA value shall not exceed 80.0% at any time for Type I, II, III, and IV mixes. Type V mixes may be adjusted upward to 82.0% upon written approval of the Engineer, and only on a case by case basis.

83. 490.03 COMPOSITION OF MIXTURE, part (d) Control of Mixtures, is hereby further modified by adding the following as the second sentence of the seventh paragraph:

A single QC Plan shall be submitted for all applicable work under the Contract.

84. 490.03 COMPOSITION OF MIXTURE, part (d) Control of Mixtures, is hereby still further modified by adding the following to the listing in the eighth paragraph:

h. For mix designs containing  $\geq 25.0$  percent RAP, indicate the following: RAP percentage, PG Grade of virgin binder determined, testing frequency of mix to verify composite PG Grade, and actions to be taken when test results are outside of PG Grade limits.

85. 490.03 COMPOSITION OF MIXTURE, part (d) Control of Mixtures, TABLE 490.03D - MINIMUM QUALITY CONTROL GUIDELINES is hereby modified by adding the following as the bottom row and by adding footnote 7 as follows:

Determine composite PG binder grade <sup>(7)</sup>	1 per 5000 metric ton (ton)	AASHTO R 29
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7 - For mix containing  $\geq 25$  percent RAP.

86. 490.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, TABLE 490.03E - ACCEPTANCE GUIDELINES, is hereby modified by deleting the third and fourth columns in their entirety and replacing them with the following:

TARGET LOT SIZE	TARGET SUBLOT SIZE
3000 Metric Ton (Ton)	500 Metric Ton (Ton)

87. 490.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (2) Lot Size, is hereby modified by being deleted in its entirety and replaced with the following:

- (2) Lot Size. For the purpose of evaluating acceptance test properties, the number of lots to be applied to the project (or Contract as specified) for each applicable individual mix type (mix design) is defined by the following equation:

$$\text{Lots}_{\text{Type}} = \frac{\text{QTotal}_{\text{Type}}}{3000}$$

where,

- $\text{Lots}_{\text{Type}}$  = the number of lots to be applied to the project (or Contract as specified) for each applicable individual mix type (mix design) rounded to the nearest whole number per the rounding procedure specified by Contract.
- $\text{QTotal}_{\text{Type}}$  = total project (or Contract as specified) bituminous mix tonnage for each applicable individual mix type (mix design).

The representative tonnage of bituminous material within each lot ( $\text{QLot}_{\text{Type}}$ ) is defined as:

$$\text{QLot}_{\text{Type}} = \frac{\text{QTotal}_{\text{Type}}}{\text{Lots}_{\text{Type}}}$$

If project yields are different than anticipated, the chance of a partial lot exists. If the final lot consists of less than four acceptance samples, it will be combined with the previous lot.

88. 490.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (3) Sublot Size, is hereby modified by being deleted in its entirety and replaced with the following:

- (3) Sublot Size. The number of sublots will be determined by dividing the lot tonnage ( $\text{QLot}_{\text{Type}}$ ) by 500 and rounding to the nearest whole number, per the rounding procedure specified by Contract. The resultant sublot size will be determined by dividing the lot size determined in subpart (2) above by the number of sublots determined herein.

89. 490.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (4) Pay Factor (PF) Determination, is hereby modified by adding the phrase "equals or" before the word "exceeds".

90. 490.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (5), Rejected Material, is hereby modified by being re-designated as Rejectable Material.

91. 490.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (5) Rejectable Material, item a. Rejection by Contractor, is hereby modified by replacing the phrase ", prior to sampling," with the phrase "at any time" in the first sentence.
92. 490.03 COMPOSITION OF MIXTURE, part (e) Quality Acceptance, subpart (5) Rejectable Material, item b., is hereby modified by being deleted in its entirety and replaced with the following:

- b. For those lots with a PWL less than 50% and greater than or equal to 25%, the PF for each lot of bituminous concrete mixture, based on "air voids" test results, will be determined using the following equation:

$$PF(av) = ((2.16PWL - 29)/100) - 1.0$$

For those lots with a PWL less than 25%, the Engineer will require complete removal of the representative lot and replacement with mix meeting Contract requirements at no additional cost to the Agency.

93. 490.05 BITUMINOUS MIXING PLANT AND TESTING, part (a) Requirements for All Plants, subpart (12) Testing Facilities, is hereby modified by adding the following at the end of the second paragraph:

An internet connection, which provides Agency personnel a minimum speed of 700 Kbps (Kilobits Per Second) download, without utilizing compression algorithms, shall be provided in the laboratory. The connection bandwidth speed shall be verifiable using an online speed test.

94. 490.08 MIXING, is hereby modified by adding the word "wet" before the word "mixing" in the second (last) sentence of the fourth paragraph.

95. 490.14 COMPACTION, is hereby corrected by deleting the text "1.000" and replacing it with the text "0.000" in the fifteenth paragraph.

96. 490.14 COMPACTION, part (e) REJECTED MATERIAL, is hereby corrected by replacing the phrases "406.18" and "406.19" with the phrases "490.18" and "490.19", respectively, in the first sentence of the third (last) paragraph.

97. 490.16 SURFACE TOLERANCE, is hereby modified by deleting the third sentence of the third paragraph in its entirety and replacing it as follows:

The corresponding Surface Tolerance Pay Factor (PF(r)) will be determined as follows and applied to the corresponding lot as defined below:

98. 490.16 SURFACE TOLERANCE, is hereby further modified by adding the following as the fourth (final) paragraph:

For the purpose of evaluating surface tolerance acceptance, a lot shall consist of the total project quantity of wearing surface of bituminous concrete pavement constructed and measured in place. Said measurement shall include all shoulders, side roads, drives, and any other miscellaneous mix as measured by the Engineer.

99. 490.18 METHOD OF MEASUREMENT, is hereby modified by adding the phrase "wearing surface of" after the phrase "the measured quantity of" and by deleting the phrase "that day" in the sixth paragraph.

SECTION 501 - HPC STRUCTURAL CONCRETE

100. 501.02 MATERIALS, is hereby modified by adding the following as the tenth entry in the Subsection listing:

Stay-in-Place Corrugated Metal Forms (SIPCMF).....715.05

101. 501.02 MATERIALS, is hereby further modified by adding the following paragraph:

Precast concrete stay-in-place forms (prestressed deck panels) shall conform to the requirements of Section 510.

102. 501.03 CLASSIFICATION AND PROPORTIONING, Required Cementitious Materials (Metric Units), is hereby corrected by deleting the entry for HP Class AA of "355" in the tenth row and replacing it with "335".

103. 501.09 FORMS, is hereby modified by deleting the word "call" and replacing it with the word "allow" in the fourth sentence of the first paragraph.

104. 501.09 FORMS, is hereby further modified by adding the following new part (k):

(k) Stay-in-Place Corrugated Metal Forms (SIPCMF) for Superstructure Deck Slabs.

- (1) Use. Use of SIPCMF for superstructure deck slab construction shall be subject to the following requirements:

- a. Fascia overhangs shall be formed with removable forms. The forms used shall leave the resulting concrete flat-surfaced.
- b. Any bay, constructed in stages such that a longitudinal joint is required, shall be formed with removable forms.

- (2) Design Requirements. The following requirements shall govern the design of SIPCMF:

- a. Design span shall be the clear span of form plus 50 mm (2 inches) measured parallel to the form flute (also referred to as the form valley).
- b. Design load shall be the sum of the weight of forms, bar reinforcement, plastic concrete, and 2.7 kPa (55 psf) for construction loads.
- c. Unit working stress shall not exceed 0.725 of the specified minimum yield strength of the material.
- d. Dead load deflection shall not exceed 1/180 times the form span length or 13 mm (1/2 inch), whichever is less.



- e. Physical design properties shall be computed with the requirements of the American Iron and Steel Institute Specifications for the Design of Cold Formed Steel Structural Members, latest edition.

(3) Construction Requirements. The following construction requirements shall apply to the use of SIPCMF:

- a. The Contractor shall submit Construction Drawings for SIPCMF in accordance with Subsection 105.03. These Drawings shall contain the following information as a minimum:

1. A layout showing the compression and tension region of each beam/girder.
2. The method of SIPCMF attachment for the compression and tension regions.
3. Geometric properties of each type of panel being used.
4. Identification of the supplier of the SIPCMF.
5. The number, location, and type of panels being used within each girder bay.
6. Panel laps, taking into account the direction of concrete pours.
7. The specifications for the material used to fill the flutes.
8. Any other material data, erection information, or miscellaneous notes that may be required.

- b. Handling and Installation. Care and protection shall be given the metal form sheets, supports, and accessory items during handling, shipping, and storage. During loading, hoisting, and unloading operations, extra precaution and care shall be taken to prevent damage to ends, corners, and edges of form sheets, supports, and accessory items. If the form units and accessories are to be stored prior to installation, they shall not be placed in contact with the ground and shall be adequately covered or protected to keep them dry.

Form supports shall be placed in direct contact with the flange of beam/girder/stringer or floorbeam. All attachments shall be made by permissible welds, bolts, clips, or other approved means. The welding of form supports to steel not considered weldable or to portions of flanges subject to tensile stresses shall not be permitted. Welds and welding shall be in accordance with Subsection 506.10, with the exception that a 3 mm (1/8 inch) fillet weld will be permitted.

Form sheets shall not be permitted to rest directly on the flanges. They shall be securely fastened to form supports by self-tapping screws and shall have a minimum bearing length of 25 mm (1 inch) at each end. Transverse construction joints shall be located at the bottom of a valley. A 6 mm (1/4 inch) diameter weep hole shall be drilled at the lower end of each flute or valley.

Screed and pouring runway supports shall not be located directly on the form sheets, form supports, or reinforcing steel. No loose sheets or miscellaneous hardware shall be left on the structural slab at the end of the working day.

The corrugated metal sheets shall be fabricated for the placement sequence used, with the joints between sections of sheets overlapped or securely fastened to eliminate differential deflections. Any exposed form metal where galvanizing has been damaged shall be cleaned and repaired to the satisfaction of the Engineer.

- (4) Inspection Procedures. The following three step inspection procedure will be used to check the soundness of the concrete deck against the SIPCMF:
- a. Not less than two days after completion of a concrete structural slab pour, but prior to the next slab pour, one panel of the SIPCMF shall be removed from the most recently completed pour of each span, at a location selected by the Engineer, in order to provide visual evidence that the concrete mix or the construction procedures are obtaining the desired results. If the concrete mix or the construction procedures are varied significantly within a pour, such as a change in the extent of vibration or change in the workability of the mix, another section of forming shall be removed to verify that the new procedures are yielding desirable results.
  - b. After the concrete has attained 85% of the specified design strength, the Engineer will spot-check the underside areas of the steel forms by sounding with a suitable weight hammer. If honeycomb or voided areas are detected, the SIPCMF at that location shall be removed for a visual inspection.
  - c. A minimum of two percent of the total SIPCMF area shall be removed for visual inspection of the concrete surface. The amount of sounding and form removal may be moderated, at the Engineer's discretion, after a substantial amount of the slab has been constructed and inspected, if the Contractor's methods of construction and results of the inspections as outlined above indicate that sound concrete is being obtained throughout the slab.

If, after removing a section of form, the concrete is found to be defective, additional panels shall be removed as directed by the Engineer. All defective concrete shall be repaired to match the adjacent concrete in section and color to the satisfaction of the Engineer.

The Contractor shall provide all facilities required for the safe, suitable, and convenient means of access to the forms for the Engineer's inspection procedures.

The form sections shall be removed by a metal saw or air-carbon-arc gouging with minimum damage to the concrete. Cuts shall only be sufficiently deep to sever the form. Any other method of removal shall be submitted to the Structures Engineer for approval. Cuts parallel to the corrugations in the forms shall be located on the sloping surface midway between a crest and valley. Cuts parallel to the supporting beams/girders shall be made through the supporting angles taking care not to damage the structural steel beams/girders.

The Contractor will not be required to replace the forms which have been removed.

105. 501.19 METHOD OF MEASUREMENT, is hereby modified by inserting the word "superstructure" before the phrase "precast concrete stay-in-place forms" in the first sentence.

SECTION 502 - SHORING SUPERSTRUCTURES

106. 502.03 CONSTRUCTION REQUIREMENTS, is hereby modified by adding the following paragraphs:

When components and/or materials that are not otherwise specified for removal are removed from the structure during shoring operations and the components and/or materials are to be re-installed in the construction, the components and/or materials shall be carefully removed and salvaged by the Contractor.

Components and/or materials to be retained and re-installed shall be stored at the location specified in the Contract or as directed by the Engineer.

The Contractor shall take every precaution necessary to prevent damage to remaining components and/or materials and those to be retained for re-installation. Damage to remaining structure components and/or materials and to those to be re-installed shall be repaired or replaced by the Contractor both to the satisfaction of the Engineer and at no additional cost to the Agency.

107. 502.04 METHOD OF MEASUREMENT, is hereby modified by adding the following as the second paragraph of the Subsection text:

Unless otherwise specified in the Contract, all work for removing, salvaging, stockpiling, and re-installing existing structure components and/or materials during the Contractor's shoring operations will not be measured for payment, but will be considered incidental to Shoring Superstructure.

SECTION 503 - PREPARING SUBSURFACE FOR DRIVING PILING

108. 503.01A MATERIALS, is hereby made a new Subsection of this Section as follows:

109. 503.01A MATERIALS. Materials shall meet the requirements of the following Subsections:

Aggregate for Bituminous Surface Treatment.....	704.11
Corrugated Polyethylene Pipe.....	710.03
Polyvinyl Chloride (PVC) Plastic Pipe.....	710.06
Steel Tubing.....	714.11

110. 503.02A CONSTRUCTION REQUIREMENTS FOR PRE-EXCAVATION OF INTEGRAL ABUTMENT PILES, is hereby made a new Subsection of this Section as follows:

111. 503.02A CONSTRUCTION REQUIREMENTS FOR PRE-EXCAVATION OF INTEGRAL ABUTMENT PILES. The pre-excavation of integral abutment piles shall consist of augering, pre-boring, or some other means of excavation to produce an excavation to the depth and diameter specified in the Contract Documents. The excavation shall be maintained during the pile driving operations by temporary casings. Unless otherwise specified in the Contract, the depth of pre-excavation shall be 2.4 meters (8 feet) from the top of the pile cut-off elevation.

Temporary casings may be either rigid or flexible. Rigid casings shall be smooth-walled unperforated pipes made of steel tubing or PVC plastic pipe. Rigid casings shall include all necessary lifting mechanisms for removal prior to placement. Flexible casings shall be corrugated polyethylene pipe. The inner diameter of the pipe shall be 100 mm (4 inches) larger than the diagonal width of the pile.

Following installation of the piles, the pre-excavation shall be backfilled with peastone meeting the requirements of Subsection 704.11. Rigid casings shall not be left in place without the written approval of the Structures Engineer. Flexible casings may be left in place.

112. 503.03 METHOD OF MEASUREMENT, is hereby modified by adding the following paragraph:

The quantity of Pre-Excavation of Integral Abutment Piles to be measured for payment will be the total number of meters (linear feet) of excavation to the depth specified in the Contract Documents or as ordered by the Engineer, measured to the nearest meter (linear foot) from the top of the ground at the time of excavation to the bottom of the excavation.

113. 503.04 BASIS OF PAYMENT, is hereby modified by adding the following paragraph and pay item:

The accepted quantity of Pre-Excavation of Integral Abutment Piles will be paid for at the Contract unit price per meter (linear foot). Payment shall be full compensation for all excavation as well as furnishing, transporting, storing, and installing the materials specified, including the temporary casing and peastone, and for removing the temporary casing. No additional compensation will be made for temporary casing left in place at the Contractor's request.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
503.20 Pre-Excavation of Integral Abutment Piles	Meter (Linear Foot)

SECTION 505 - PILING

114. 505.03 FURNISHING OF PILING, is hereby modified by adding the following new part (e):

- (e) Steel Piling for Integral Abutments. Steel piling up to and including 10 meters (35 feet) in length shall be furnished in one unwelded piece.

Steel piling over 10 meters (35 feet) in length shall be furnished with not more than the number of splices allowed by Table 505.05B.

Steel piling shall be of the size, type, and material specification indicated in the Plans. No substitutions for the number, size, and material specification of the pile will be allowed without the written authorization of the Project Manager.

115. 505.04 DRIVING OF PILING, part (b) Pile Loading Tests, is hereby modified by adding the phrase "When not driven as a permanent production pile," at the beginning of the second sentence of the first paragraph.

116. 505.04 DRIVING OF PILING, part (b) Pile Loading Tests, is hereby further modified by adding the following as the first sentence of the third paragraph:

A static load test pile shall not be used as a permanent production pile.

117. 505.04 DRIVING OF PILING, part (b) Pile Loading Tests, is hereby still further modified by deleting the word "The" and replacing it with the phrase "A dynamic load" at the beginning of the second sentence of the third paragraph.

118. 505.04 DRIVING OF PILING, part (b) Pile Loading Tests, is hereby still further modified by deleting the text of subpart (3) of the third paragraph in its entirety and by re-designating subpart (4) as subpart (3).

119. 505.04 DRIVING OF PILING, part (e) Steel Piling, is hereby modified by adding the phrase ", including test piling," after the phrase "the driving point of all piling" in the first sentence of the first paragraph.
120. 505.04 DRIVING OF PILING, part (e) Steel Piling, subpart (3) of the first paragraph, is hereby modified by adding the phrase ", in addition to pile points supplied for all permanent production and test piling," after the phrase "One extra pile point of each type and size supplied".
121. 505.04 DRIVING OF PILING, is hereby modified by adding the following new part (f):

- (f) Steel Piling for Integral Abutments. In addition to meeting all of the requirements for steel piling in Subsections 505.04(a) and 505.04(e), Steel Piling for Integral Abutments shall be installed to the following tolerances:

Piling shall be installed such that no portion of the top 3 meters (10 feet) of the pile is out of plumb more than 20 mm in 1000 mm (1 inch in 4 feet). For piles that cannot be inspected internally after installation, the Contractor shall check the pile for plumb prior to installing the last 1.5 meters (5 feet) of pile, or after installation is completed provided that the exposed portion of the pile is a minimum of 1.5 meters (5 feet) in length. The Engineer may require that driving be stopped in order to check the pile for plumb. Pulling laterally on piles to correct out-of-plumb errors, or splicing a section that meets the tolerances for plumb in this section on an out-of-plumb section will not be permitted.

No pile shall be nearer than 150 mm (6 inches) to the face of the concrete stem.

If the location and/or out-of-plumb tolerances specified herein are exceeded, the extent of corrective measures will be evaluated by the Engineer. If in the judgment of the Engineer corrective measures are necessary, suitable measures shall be designed and constructed by the Contractor. The Contractor shall bear all costs, including delays, associated with the corrective action.

122. 505.05 SPLICES, is hereby modified by adding the following new part (c):

- (c) Splices for Steel Piling for Integral Abutments. Splices shall be made in accordance with the details shown in the Plans at locations approved by the Engineer.

Splices will be allowed as shown in the following table:

TABLE 505.05B  
ALLOWABLE SPLICES

Length of Steel Piling		Maximum Number of Splices Allowed
Meters	Feet	
Over 10 to and including 18	Over 35 to and including 60	1
Over 18 to and including 37	Over 60 to and including 120	3
Over 37 to and including 55	Over 120 to and including 180	5

The splicing sequence shall be arranged to exclude splices from the upper 6 meter (20 foot) section of the piles. The total number of splices in the upper 6 meter (20 foot) section of the piles shall be limited to one per abutment.

123. 505.08 METHOD OF MEASUREMENT, part (a) Piling, subpart (1) is hereby modified by adding the following paragraph:

Steel Piling for Integral Abutments will be the total number of meters (linear feet) for each pile driven, accepted, and left in place, measured to the nearest meter (linear foot).

124. 505.08 METHOD OF MEASUREMENT, part (b) Pile Loading Tests, is hereby modified by deleting the word "no" before the word "measurement" and by adding the phrase "or Steel Piling for Integral Abutments, as applicable," after the phrase "Steel Piling" in the second paragraph.

125. 505.08 METHOD OF MEASUREMENT, part (b) Pile Loading Tests, is hereby further modified by adding the following paragraph:

If a test pile is driven outside of foundation limits, no measurement for payment as Steel Piling or Steel Piling for Integral Abutments, as applicable, will be made for the test pile.

126. 505.09 BASIS OF PAYMENT, is hereby modified by adding the following new part (c) immediately after part (b):

(c) Steel Piling for Integral Abutments of the size specified will be paid for at the Contract unit price per meter (linear foot).

127. 505.09 BASIS OF PAYMENT, is hereby further modified by deleting the phrase "for furnishing, transporting, handling, and driving the test pile, complete with tip, end plate, or stinger plate as required;" in the second sentence of the third paragraph.

128. 505.09 BASIS OF PAYMENT, is hereby still further modified by adding the following as the fourth paragraph of the Subsection text:

Payment for furnishing and driving test piling driven outside of foundation limits will be included in the unit price bid for Dynamic Pile Loading Test.

129. 505.09 BASIS OF PAYMENT, is hereby still further modified by adding the following pay items:

<u>Pay Item</u>	<u>Pay Unit</u>
505.10 Steel Piling, HP 250 X 62 (HP 10 X 42)	Meter (Linear Foot)
505.155 Steel Piling, HP 310 X 93 (HP 12 X 63)	Meter (Linear Foot)
505.165 Steel Piling, HP 310 X 125 (HP 12 X 84)	Meter (Linear Foot)
505.25 Steel Piling for Integral Abutments, HP 310 X 79 (HP 12 X 53)	Meter (Linear Foot)
505.255 Steel Piling for Integral Abutments, HP 310 X 93 (HP 12 X 63)	Meter (Linear Foot)
505.26 Steel Piling for Integral Abutments, HP 310 X 110 (HP 12 X 74)	Meter (Linear Foot)
505.265 Steel Piling for Integral Abutments, HP 310 X 125 (HP 12 X 84)	Meter (Linear Foot)
505.27 Steel Piling for Integral Abutments, HP 360 X 108 (HP 14 X 73)	Meter (Linear Foot)
505.28 Steel Piling for Integral Abutments, HP 360 X 132 (HP 14 X 89)	Meter (Linear Foot)
505.29 Steel Piling for Integral Abutments, HP 360 X 152 (HP 14 X 102)	Meter (Linear Foot)
505.30 Steel Piling for Integral Abutments, HP 360 X 174 (HP 14 X 117)	Meter (Linear Foot)

SECTION 506 - STRUCTURAL STEEL

130. 506.18 ERECTION, part (b) Bearings and Anchorages, subpart (3), is hereby modified by adding the following as the last sentence of the first paragraph:

Additional aggregates shall not be added to the material during field mixing.

131. 506.18 ERECTION, part (b) Bearings and Anchorages, subpart (3), is hereby further modified by adding the following as the second, third, fourth, and fifth paragraphs of the Subsection text:

Prior to ordering materials and starting the work, the Contractor shall submit a drilling and mortaring proposal to the Engineer for approval, including a premixed mortar material brand name.

The drilled holes to be mortared shall be thoroughly cleaned, wetted, and free of standing water.

The mortar shall be mixed in a mechanical mixer according to the manufacturer's recommendations and shall be readily pourable so that when poured it completely fills the remaining hole cavities. The placement of mortar for each bearing shall be continuous and complete at all hole locations.

All exposed mortar shall be cured for a period of not less than three (3) days by the wetted burlap method in accordance with Section 501. Curing shall commence as soon as practical after mortar placement. The Contractor shall not apply any forces to the anchor bolts during the curing period.



132. 506.19 BOLTING AND CONNECTIONS, part (a) General, is hereby modified by adding the following paragraph:

Bolt holes shall be fabricated to the requirements of the AASHTO *LRFD Bridge Construction Specifications*, Section 11.4.8, except that holes shall not be punched full-size in curved girder or curved rolled beam cross frames, lateral bracing components, and connection plates. In addition, all gusset plates and splice plates shall be considered main load carrying members and holes shall not be punched full-size.

SECTION 507 - REINFORCING STEEL

133. 507.11 BASIS OF PAYMENT, is hereby modified by deleting the phrase "including grouting of dowels" in the second sentence of the first paragraph and replacing it with the word "specified".

134. 507.11 BASIS OF PAYMENT, is hereby further modified by adding the following as the second paragraph of the Subsection text:

The accepted quantity of Drilling and Grouting Dowels will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for drilling the dowel hole, grouting the dowel in the hole, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 510 - PRESTRESSED CONCRETE

135. 510.13 GROUT, is hereby modified by re-designating part "(a)" to part "(b)", part "(b)" to part "(c)", and part "(c)" to part "(d)".

136. 510.13 GROUT, is hereby further modified by adding the following new part (a):

(a) The Fabricator shall sandblast surfaces to be grouted to ensure a clean, oil-free, roughened surface.

137. 510.16 BASIS OF PAYMENT, is hereby modified by adding the phrase "sandblasting, " after the phrase "repairing," in the second sentence of the first paragraph.

SECTION 513 - PROTECTIVE COATINGS

138. 513.04 SURFACE PREPARATION, part (c) Testing Equipment, is hereby modified by being deleted in its entirety and replaced with the following:

(c) Testing Equipment. For shop or field painting the Contractor shall provide (for the Contractor's use) quality control testing equipment as specified in Subsection 631.07. If required by the Contract for field testing by the Engineer, the Contractor shall provide the testing equipment specified in accordance with Section 631.

139. 513.06 APPLICATION, part (e) Weathered Galvanized Surfaces, is hereby corrected by deleting the phrase "513.04(e)" and replacing it with the phrase "513.04(f)".

140. 513.07 METHOD OF MEASUREMENT, is hereby modified by adding the following paragraph:

Unless otherwise specified in the Contract Documents, no measurement for payment will be made for protective coatings testing equipment provided by the Contractor.

SECTION 516 - EXPANSION DEVICES

141. 516.02 MATERIALS, is hereby modified by adding the following at the end of the Subsection listing:

Epoxy Bonding Compound.....719.02

142. 516.05 INSTALLATION, is hereby modified by deleting the third sentence of the third paragraph in its entirety.

SECTION 522 - LUMBER AND TIMBER

143. 522.04 DRAWINGS, is hereby modified by adding the following paragraphs:

The Contractor shall prepare and submit Construction Drawings for structural timber erection in accordance with Section 105.

The erection plan shall include methods and sequence of structural timber erection, temporary bracing requirements, the equipment to be used for the erection, the necessary computations to indicate the magnitude of stress in the segments during erection and to demonstrate that all of the erection equipment has adequate capacity for the work to be performed, and provisions for all stages of construction, including temporary stoppages. The Contractor shall follow the erection plan as submitted.

144. 522.06 HANDLING, is hereby modified by adding the following paragraph:

Cranes, lifting devices, and other equipment for all structural timber erection shall be of adequate design and capacity to safely erect, align, and secure all members and components in their final positions without damage. The Contractor is solely responsible for the methods and equipment employed for the erection of the structural timber members.

145. 522.07 FRAMING, is hereby modified by adding the following as the last sentence of the first paragraph:

Except as directed by the Engineer, structure framing and boarding shall be constructed square, plumb, and straight.

146. 522.15 METHOD OF MEASUREMENT, is hereby modified by adding the following sentence at the end of the first paragraph:

For longitudinal nail-laminated decking, longitudinal plank decking, and runners, member length will be measured as the overall superstructure length of in place decking and runners, measured to the next 0.25 m (1 foot) increment.

147. 522.16 BASIS OF PAYMENT, is hereby modified by deleting the second sentence of the first paragraph in its entirety and replacing it with the following:

Payment for each quantity will be full compensation for detailing, fabricating, furnishing, transporting, handling, placing or erecting, and painting or treating the material specified, including all hardware and timber connectors; for providing all falsework, forms, bracing, sheeting, or other timber used for erection purposes; for furnishing and implementing the erection plan, when required; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

148. 522.16 BASIS OF PAYMENT, is hereby further modified by deleting the second paragraph of part 2. in its entirety and replacing it with the following:

Payments for the quantity of Structural Glued Laminated Timber will be full compensation for detailing, fabricating, furnishing, transporting, handling, placing or erecting, and painting or treating the material specified, including all hardware and timber connectors; for providing all falsework, forms, bracing, sheeting, or other timber used for erection purposes; for furnishing and implementing the erection plan, when required; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 524 - JOINT SEALER

149. 524.02 MATERIALS, is hereby modified by deleting the third (last) paragraph in its entirety.
150. 524.09 BASIS OF PAYMENT, is hereby modified by adding the phrase ", including saw cutting where required," after the phrase "for preparing" in the second sentence.

SECTION 525 - METAL RAILINGS

151. 525.01 DESCRIPTION, is hereby modified by being deleted in its entirety and replaced with the following:
152. 525.01 DESCRIPTION. This work shall consist of furnishing and erecting hand railing or bridge railing, and performing repairs to existing bridge railing.
153. 525.02 MATERIALS, is hereby modified by adding the following paragraph:

Where required in the Contract Documents, aluminum bridge railing shall be anodized to a black satin finish in accordance with ASTM B 580 following fabrication.

154. 525.03 FABRICATION DRAWINGS, is hereby modified by adding the following paragraph:

These requirements do not apply to work performed under part (e) of Subsection 525.05.

155. 525.05 INSTALLATION, is hereby modified by adding the following new part (e):

(e) Bridge Railing Repair. Bridge railing repair of the Type specified shall be performed at the locations indicated in the Plans and as directed by the Engineer.

(1) Bridge Railing Repair, Type I. Type I bridge railing repair shall consist of installing new heavy duty steel beam panels and offset blocks on existing fascia-mounted or curb-mounted posts spaced at 1.9 meters (6.25 feet) or less.

(2) Bridge Railing Repair, Type II. Type II bridge railing repair shall consist of installing new nested heavy duty steel beam panels and offset blocks on existing fascia-mounted or curb-mounted posts spaced greater than 1.9 meters (6.25 feet).

(3) Bridge Railing Repair, Type III. Type III bridge railing repair shall consist of installing new heavy duty steel beam panels and offset blocks on new fascia-mounted or curb-mounted posts utilizing existing anchor bolts.

156. 525.06 METHOD OF MEASUREMENT, is hereby modified by adding the following paragraph:

The quantity of Bridge Railing Repair of the Type specified to be measured for payment will be the number of meters (feet) of railing repaired in the complete and accepted work, measured within the limits shown on the Plans or as directed by the Engineer. No additional measurement will be made for nested beam panels.

157. 525.07 BASIS OF PAYMENT, is hereby modified by adding the phrase "anodizing," after the phrase "applying grease rustproof compound," in the second (last) sentence of the second paragraph.

158. 525.07 BASIS OF PAYMENT, is hereby further modified by adding the following paragraphs:

The accepted quantity of Bridge Railing Repair of the Type specified will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for detailing, treating, furnishing, handling, and placing railing components; for bolts and hardware necessary for installing railing components; for all work necessary for verifying and adjusting post height and/or bolt spacing of existing posts; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Removal and disposal of existing railing components required for performing Bridge Railing Repair of the Type specified will be paid for under Contract item 525.10.

159. 525.07 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>
525.11 Resetting Railing	Meter (Linear Foot)
525.225 Bridge Railing, Anodized 3 Rail Aluminum	Meter (Linear Foot)
525.235 Bridge Railing, Anodized Aluminum/Pedestrian	Meter (Linear Foot)
525.50 Bridge Railing Repair, Type I	Meter (Linear Foot)
525.55 Bridge Railing Repair, Type II	Meter (Linear Foot)
525.60 Bridge Railing Repair, Type III	Meter (Linear Foot)

SECTION 528 - TEMPORARY BRIDGE

160. 528.04 DESIGN AND CONSTRUCTION DETAILS, part (c) Railing, is hereby corrected by replacing the phrase "621.06" with the phrase "621.07" in the first paragraph.
161. 528.07 BASIS OF PAYMENT, is hereby modified by deleting the third (last) sentence of the second paragraph and replacing it with the following:

When the temporary bridge and its approaches have been removed, a further payment of 15 percent of the lump sum price will be allowed. The remaining 10 percent of the lump sum price will be paid when the site is cleaned up and vegetation has been established to the satisfaction of the Engineer.

SECTION 529 - REMOVAL OF STRUCTURES AND BRIDGE PAVEMENT

162. 529.06 BASIS OF PAYMENT, is hereby modified by deleting the fourth (last) sentence of the first paragraph in its entirety and replacing it with the following:
- Payment will be full compensation for the removal and disposal of the specified items; for removal, salvage, and stockpiling of components and materials specified in the Contract; for excavating, backfilling, regrading, and performing site restoration incidental to the removal of specified items; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.
163. 529.06 BASIS OF PAYMENT, is hereby further modified by deleting the second paragraph in its entirety and replacing it with the following:

Removal of Bridge Pavement, when not included as a separate pay item, will not be paid for directly, but will be considered incidental to either Removal of Structure or Partial Removal of Structure as specified in the Plans.

SECTION 531 - BEARING DEVICES

164. 531.01 DESCRIPTION, is hereby modified by deleting the phrase "and pot bearing devices" and replacing it with the phrase "pot, and elastomeric pad bearing devices."

165. 531.04 FABRICATION, part (a) General, is hereby modified by deleting the fifth paragraph in its entirety and replacing it with the following:

Steel bearings, expansion fabric bearing pads, and fixed and expansion pot bearings shall be designed and fabricated in accordance with Section 14 of the AASHTO *LRFD Bridge Design Specifications* and Section 18 of the AASHTO *LRFD Bridge Construction Specifications*.

166. 531.04 FABRICATION, part (b) Surface Protection, is hereby modified by adding the phrase ", except interior surfaces of pot bearings" after the word "metalized" in the first sentence of the first paragraph.

167. 531.04 FABRICATION, part (c) Finish, is hereby modified by deleting the phrase "Division II of the AASHTO *Standard Specifications for Highway Bridges*" and replacing it with the phrase "the AASHTO *LRFD Bridge Construction Specifications*".

168. 531.04 FABRICATION, part (e) Sliding Surfaces, subpart (1) is hereby modified by being deleted in its entirety and replaced with the following:

- (1) The minimum thickness of TFE material shall be as follows:

For all applications, the thickness of TFE shall be at least 1.6 mm (1/16 inch) after compression. The thickness of recessed sheet TFE shall be at least 4.8 mm (3/16 inch) when the maximum dimension of TFE is less than or equal to 610 mm (24 inches), and at least 6.4 mm (1/4 inch) when the maximum dimension of the TFE is greater than 610 mm (24 inches).

169. 531.04 FABRICATION, part (e) Sliding Surfaces, subpart (2)a. is hereby modified by being deleted in its entirety and replaced with the following:

- a. The thickness of the stainless steel sheet shall be at least 1.9 mm (14 gauge) when the maximum dimension of the surface is less than or equal to 305 mm (12 inches), and at least 3.0 mm (11 gauge) when the maximum dimension is larger than 305 mm (12 inches).

170. 531.04 FABRICATION, part (h) Confined Elastomer (Pot) Bearings, is hereby modified by deleting the phrase "*Standard Specifications for Highway Bridges*" and replacing it with the phrase "*LRFD Bridge Construction Specifications*" in the first paragraph.

171. 531.04 FABRICATION, part (h) Confined Elastomer (Pot) Bearings, subpart (7), is hereby modified by deleting the phrase "Division II of the AASHTO *Standard Specifications for Highway Bridges*" and replacing it with the phrase "the AASHTO *LRFD Bridge Construction Specifications*".

172. 531.04 FABRICATION, is hereby modified by adding the following new part (i):

(i) Elastomeric Pad Bearings. The following shall apply to the design and fabrication of elastomeric pad bearings:

- (1) Alternate configurations may be submitted for approval. Any alternate(s) shall be designed and certified to meet the design loads and criteria specified in the Contract Documents. The alternate(s) shall maintain the anchorage system shown in the Plans and shall be designed per Section 14 of the AASHTO LRFD Bridge Design Specifications. Bridge seat elevations may be revised to accommodate alternate configurations.
- (2) Except as modified within the Contract Documents, all fabrication shall meet the requirements of AASHTO M 251.
- (3) No fabric reinforcement shall be allowed in the fabrication of elastomeric pads for elastomeric bridge bearing devices.
- (4) All required fabrication of steel components of the bearings shall occur before the vulcanization process.
- (5) The steel surfaces to be bonded to elastomeric material during vulcanization shall not be metalized or galvanized.

173. 531.05 INSTALLATION, is hereby modified by adding the following paragraphs:

Elastomeric bridge bearing pads without external load plates may be placed on a concrete or steel surface provided that it is flat to within a tolerance of 0.005 of the nominal dimension for steel reinforced bearings and 0.01 of the nominal dimension for others. Bearings shall be placed on surfaces that are horizontal to within 0.01 radians (0.120 inch/12 inches). Any lack of parallelism between the top of the bearing and the underside of the girder that exceeds 0.01 radians shall be corrected by a method approved by the Engineer.

Exterior plates of the bearing shall not be welded unless at least 38 mm (1 ½ inches) of the steel exists between the weld and the elastomer. In no case shall the elastomer or the bond be subjected to temperature higher than 205°C (400°F).

174. 531.06 METHOD OF MEASUREMENT, is hereby modified by deleting the phrase "materials including bearing pads" and replacing it with the phrase "components" in the second sentence.

175. 531.07 BASIS OF PAYMENT, is hereby modified by deleting the second sentence of the first paragraph in its entirety and replacing it with the following:

Payment will be full compensation for detailing, furnishing, handling, transporting, and placing the material specified, including surface preparation, protective coating, testing, anchor bolt assemblies, drilling for anchor bolts, mortar, proprietary anchoring systems, bearing device components, welding, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

176. 531.07 BASIS OF PAYMENT, is hereby further modified by adding the following paragraph:

Payment for alternate bearing designs and submittals will be considered incidental to the appropriate Section 531 pay item in the Contract.

SECTION 541 - STRUCTURAL CONCRETE

177. 541.02 MATERIALS, is hereby modified by adding the following paragraph:

Precast concrete stay-in-place forms (prestressed deck panels) shall conform to the requirements of Section 510.

178. 541.19 METHOD OF MEASUREMENT, is hereby modified by deleting the period and adding the phrase ", including the volume of superstructure precast concrete stay-in-place forms, but excluding the volume of steel or other stay-in-place forms and form filling materials." after the word "Engineer" at the end of the first sentence of the first paragraph.

SECTION 602 - MASONRY

179. 602.01 DESCRIPTION, is hereby modified by adding the phrase "rebuilding, repairing, or" after the word "or".

180. 602.02 MATERIALS, is hereby modified by adding the following as the second paragraph (after the Subsection listing):

Materials for Rebuilt and Repairing Stone Masonry shall be approved by the Engineer prior to use. New stone, as required, shall match as closely as practical the existing stone masonry color, texture, and size. If required to match the existing stone masonry, chemical treatment processes to aid in providing stone of similar color shall be investigated by the Contractor.

181. 602.06 REBUILT AND REPAIRING STONE MASONRY, is hereby made a new Subsection of this Section as follows:

602.06 REBUILT AND REPAIRING STONE MASONRY.

(a) General.

- (1) Rebuilt Stone Masonry. The stone masonry of the existing substructure and wingwalls shall be mapped, removed, and rebuilt as indicated and specified in the Contract Documents.

Following backfill excavation, the existing stones, tree stumps, roots, and other foreign matter shall be removed in the areas shown on the Plans or where directed by the Engineer. The existing stones shall be re-set in their original locations, removing any gaps that occurred due to previous damage to the walls. Rebuilt Stone Masonry shall match securely into adjacent masonry.

- (2) Repairing Stone Masonry. Earth, minor vegetation, and other foreign matter shall be removed and cavities in the stone substructure and wingwalls filled as indicated and specified in the Contract Documents.



(b) Construction Requirements.

- (1) Rebuilt Stone Masonry. The work shall be performed by a stone mason who is highly knowledgeable and experienced in the construction of dry stone masonry walls and fascia. The Contractor's stone mason performing the work must demonstrate at least five years experience in the construction of dry stone masonry walls. Documentation of experience, including a list of previous projects and references, shall be submitted to the Engineer prior to commencement of the work.

The existing stone masonry in the areas of reconstruction shall be mapped out and documented. Each stone size and location shall be noted. The Contractor, prior to stone removal, shall submit documentation to the Engineer for approval.

Special care and precautions shall be taken during removal and storage of the existing stone masonry to ensure that the stone is not damaged.

All stones shall be carefully removed in the areas shown on the Plans. The Contractor shall shore the remaining portions of the walls to ensure that they do not shift during construction.

The existing stones shall be replaced in their original locations, removing any gaps that occurred due to previous damage to the walls. All joints in the reconstructed stone walls shall be no larger than 19 mm (3/4 inch) between stones. Any existing stones that are not suitable for replacement or missing shall be replaced by the Contractor with stones of similar size and appearance.

(2) Repairing Stone Masonry.

- a. Examination. The Contractor and Engineer shall jointly examine the abutments and wingwalls to field verify the extent of the work.

All work shall be performed by stonemasons with a minimum of three (3) years experience with similar work.

- b. Repair. Gaps between horizontal faces of existing stones less than 25 mm (1 inch) shall not be repaired. The size of these gaps shall equal the approximate diameter of a 22 mm (7/8 inch) diameter steel dowel bar.

Gaps between horizontal faces of existing stones between 25 mm (1 inch) and 150 mm (6 inches) shall have small stone blocks added, with the depth of the blocks as large as possible for good bearing. The minimum width of said blocks shall be 100 mm (4 inches).

Gaps between horizontal faces of existing stones greater than 150 mm (6 inches) shall have crushed gravel and stone blocks added. The crushed gravel shall be placed at the back of the stone and compacted in place up to 300 mm (12 inches) of the exposed wall face. The crushed gravel shall be compacted by tamping rods or other methods acceptable to the Engineer. Stone block(s) shall then be added to achieve a tight fit. New stone blocks shall not extend beyond the face of the stone wall.

182. 602.10 METHOD OF MEASUREMENT, is hereby modified by adding the following paragraphs:

The quantity of Rebuilt Stone Masonry to be measured for payment will be the number of cubic meters (cubic yards) of stone masonry rebuilt in the complete and accepted work, measured in accordance with the dimensions shown on the Plans or as determined by the Engineer.

The quantity of Repairing Stone Masonry to be measured for payment will be the number of square meters (square yards) of stone masonry repaired in the complete and accepted work, measured as the total surface area of the repaired masonry.

183. 602.11 BASIS OF PAYMENT, is hereby modified by adding the phrase "of Cement Masonry, Dry Masonry, Stone Masonry Facing, and Repointing Masonry" after the word "quantities" in the first sentence of the first paragraph.

184. 602.11 BASIS OF PAYMENT, is hereby further modified by adding the following paragraphs:

The accepted quantity of Rebuilt Stone Masonry will be paid for at the Contract unit price per cubic meter (cubic yard). Payment will be full compensation for mapping, documenting, and removing existing stone masonry; furnishing new stone as needed; furnishing, transporting, handling, and placing the materials specified; backfilling when not paid under a separate Contract item; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Excavation adjacent to Rebuilt Stone Masonry and disposal of excess or unsuitable excavated material will be paid for at the Contract unit price per cubic meter (cubic yard) for Structure Excavation. Excavation shall be backfilled with material acceptable to the Engineer. When Granular Backfill for Structures is required for backfill material, it will be paid for at the Contract unit price per cubic meter (cubic yard).

The accepted quantity of Repairing Stone Masonry will be paid for at the Contract unit price per square meter (square yard). Payment will be full compensation for removing material specified from the face of stone masonry; filling cavities; furnishing, transporting, handling, and placing the materials specified; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

185. 602.11 BASIS OF PAYMENT, is hereby still further modified by adding the following pay items:

<u>Pay Item</u>	<u>Pay Unit</u>
602.35 Rebuilt Stone Masonry	Cubic Meter (Cubic Yard)
602.40 Repairing Stone Masonry	Square Meter (Square Yard)

SECTION 604 - DROP INLETS, CATCH BASINS, AND MANHOLES

186. 604.03 GENERAL CONSTRUCTION REQUIREMENTS, is hereby modified by adding the following paragraphs:

Except for components cast using the dry cast process, precast concrete components shall not have the forms removed until a minimum compressive strength of 15 Mpa (2000 psi) has been achieved. Precast components shall not be moved until two hours after they have been cast and until a minimum compressive strength of 15 Mpa (2000 psi) has been achieved. Concrete cylinders shall be made, in accordance with AASHTO T 23, at the last placement of the day.

Reinforced precast sections shall not be shipped from the manufacturing facility until the eighth day from the date of manufacture, except when the supplier provides test results demonstrating that the design strength has been achieved.

187. 604.05 CURING AND PROTECTION, is hereby modified by adding the following paragraphs:

Precast concrete shall be cured using membrane curing compound. The curing compound shall be applied to the concrete surface after finishing, as soon as the free water on the surface has disappeared and no water sheen is visible, but not so late that the liquid curing compound will be absorbed into the concrete. When curing compound cannot be applied as specified herein, the manufacturer shall instead immediately begin wet curing the unit until curing compound can be applied. When this method is used in conjunction with the dry cast process, the curing room shall be kept at 100% humidity until a minimum compressive strength of 15 Mpa (2000 psi) has been obtained.

When the forms are removed prior to 7 days, the exposed concrete surfaces shall be wet with water within one half hour of form removal and shall be kept wet until the curing compound is applied. Before application, the concrete shall be allowed to reach a uniformly damp appearance with no free water on the surface, and then the compound shall be applied immediately.

Precast concrete drainage components shall not be subjected to freezing temperatures prior to attaining the specified 28 day compressive strength. Components which are exposed to freezing before reaching the required 28 day compressive strength shall be rejected without further cause. Any additional testing on the rejected components as determined by the Engineer to gain acceptance will be at the expense of the manufacturer.

SECTION 605 - UNDERDRAINS

188. 605.04 INSTALLATION, part (e) Backfill, is hereby corrected by replacing the phrase "Subsection 704.17" with the phrase "drainage aggregate" in the first sentence of the first paragraph.

SECTION 616 - CURBS AND GUTTERS

189. 616.14 METHOD OF MEASUREMENT, is hereby modified by adding the phrase "Bituminous Concrete Curb of the type specified (linear measure);" after the phrase "Cast-in-Place Concrete Curb of the type specified;" in the first paragraph.
190. 616.14 METHOD OF MEASUREMENT, is hereby further modified by adding the phrase "(volume measure)" after the phrase "Bituminous Concrete Curb of the type specified" in the second paragraph.
191. 616.15 BASIS OF PAYMENT, is hereby modified by adding the phrase "Bituminous Concrete Curb of the type specified (linear measure);" after the phrase "Cast-in-Place Concrete Curb of the type specified;" in the first paragraph.
192. 616.15 BASIS OF PAYMENT, is hereby further modified by adding the phrase "(volume measure)" after the phrase "Bituminous Concrete Curb of the type specified" in the second paragraph.
193. 616.15 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>
616.305 Bituminous Concrete Curb, Type A	Meter (Linear Foot)
616.315 Bituminous Concrete Curb, Type B	Meter (Linear Foot)

SECTION 618 - SIDEWALKS

194. 618.07 BASIS OF PAYMENT, is hereby corrected by replacing the phrase "(square yard)" with the phrase "(square foot)" in the third sentence of the first paragraph.

SECTION 620 - FENCES

195. 620.02 MATERIALS, is hereby modified by changing the period to a colon at the end of the first sentence of the first paragraph (including Subsection listing).
196. 620.02 MATERIALS, is hereby further modified by deleting the word "galvanized" in the third paragraph.
197. 620.02 MATERIALS, is hereby still further modified by deleting the word "galvanized" in the first line, and by replacing the word "galvanized" with the phrase "aluminum-coated" in the second line, of the fourth paragraph.
198. 620.02 MATERIALS, is hereby still further modified by deleting the word "galvanized" before the phrase "snow barrier" in the fifth paragraph.

199. 620.09 METHOD OF MEASUREMENT, is hereby modified by deleting the phrase ", Galvanized" after the phrase "Snow Barrier" in the first sentence of the first paragraph.
200. 620.10 BASIS OF PAYMENT, is hereby modified by deleting the phrase ", Galvanized" after the phrase "Snow Barrier" in the first paragraph.
201. 620.10 BASIS OF PAYMENT, is hereby further modified by deleting the following pay item:

<u>Pay Item</u>	<u>Pay Unit</u>
620.75 Snow Barrier, Galvanized	Meter (Linear Foot)

202. 620.10 BASIS OF PAYMENT, is hereby still further modified by adding the following pay item:

<u>Pay Item</u>	<u>Pay Unit</u>
620.75 Snow Barrier	Meter (Linear Foot)

SECTION 621 - TRAFFIC BARRIERS

203. 621.02 MATERIALS, is hereby modified by adding the following to the Subsection listing in the first paragraph:

Energy Absorption Attenuators.....728.07

204. 621.02 MATERIALS, is hereby further modified by adding the following as the second sentence of the fifth paragraph (beginning "Materials for Aluminum Approach Railing..."):

Where required in the Contract Documents, Aluminum Approach Railing shall be anodized to a black satin finish in accordance with ASTM B 580 following fabrication.

205. 621.03 POSTS AND OFFSET BLOCKS, is hereby modified by adding the following as the second paragraph of the Subsection text:

Posts for Steel Backed Timber Guardrail shall be driven into pilot holes that have been punched or drilled. The dimensions of the pilot hole shall not exceed the dimensions of the post by more than 25 mm (1 inch). If impenetrable material is encountered while placing the post, the pilot shall be enlarged to provide not less than 150 mm (6 inches) of clearance on all sides and a minimum depth of 760 mm (2.5 feet). The post shall be set in concrete, the type as approved by the Engineer, to within 150 mm (6 inches) of the top of the hole. The remaining 150 mm (6 inches) shall be backfilled with a suitable material and compacted to the satisfaction of the Engineer.

206. 621.04 RAIL ELEMENTS, is hereby modified by adding the following new part (d):

(d) Steel Backed Timber Rail. Timber rails shall be cut to produce a close fit at all joints. Field cuts shall be treated with an approved material as determined by the Engineer.

207. 621.06 ENERGY ABSORPTION ATTENUATOR, is hereby modified by adding the phrase "Temporary or permanent" at the beginning of the first paragraph.

208. 621.06 ENERGY ABSORPTION ATTENUATOR, is hereby further modified by adding the phrase "and permanent" after the word "temporary" in the third paragraph.

209. 621.06 ENERGY ABSORPTION ATTENUATOR, is hereby still further modified by adding the following paragraph:

Should an attenuator, or component thereof, in service on the project become damaged and require replacement, as determined by the Engineer, the damaged attenuator, or component thereof, shall be replaced immediately with a backup attenuator, or component thereof, stored on the project in order that there is minimal disruption to incorporating a fully functional attenuator as required by the project traffic control plan.

210. 621.07 TEMPORARY TRAFFIC BARRIER, is hereby modified by deleting the first three paragraphs in their entirety and replacing them with the following:

211. 621.07 TEMPORARY TRAFFIC BARRIER. Temporary traffic barrier shall be one of the barriers included under FHWA's Roadside Hardware Policy and Guidance for crashworthy longitudinal barriers, at the Contractor's discretion, unless otherwise specified. The type of temporary traffic barrier shall be provided to the Engineer prior to use. All temporary traffic barrier and corresponding connections shall meet, unless otherwise specified in the Plans, Test Level 3 (TL-3) criteria as defined in NCHRP Report 350 or the AASHTO *Manual for Assessing Safety Hardware* (MASH). The appropriate resource shall be determined as described in the MASH publication.

Temporary traffic barrier components shall be in a condition satisfactory to the Engineer prior to placement on the project and maintained as such until removed from the project.

The Contractor shall provide to the Engineer verification that the barrier deflection distance is appropriate for the intended use. Where appropriate, temporary traffic barrier shall be adequately anchored to prevent movement if impacted.

212. 621.14 METHOD OF MEASUREMENT, is hereby modified by adding the following as the fourth paragraph of the Subsection text:

The quantity of Steel Backed Timber Guardrail to be measured for payment will be the number of meters (linear feet) installed in the complete and accepted work, measured from end to end along the face of rail, including terminal sections. The measured length will be multiplied by a pay factor of 1.4 for a post spacing of 1.5 m (5 feet).

213. 621.14 METHOD OF MEASUREMENT, is hereby further modified by deleting the phrase "Steel Backed Timber Guardrail," from the first sentence of the fifth paragraph of the Subsection text.

214. 621.14 METHOD OF MEASUREMENT, is hereby still further modified by adding the following as the eleventh paragraph of the Subsection text:

The Contract quantity for Energy Absorption Attenuator includes one backup attenuator to be provided by the Contractor and stored on the project in the event an attenuator, or component thereof, in service is damaged and needs replacement.

215. 621.14 METHOD OF MEASUREMENT, is hereby still further modified by replacing the word "quantity" with the word "quantities" and by adding the phrase "and Aluminum Approach Railing, Anodized" after the phrase "Aluminum Approach Railing" in the twelfth paragraph of the Subsection text.
216. 621.14 BASIS OF PAYMENT, is hereby modified by re-designating the Subsection number from "621.14" to "621.15".
217. 621.15 BASIS OF PAYMENT, is hereby modified by replacing the word "quantity" with the word "quantities" and by adding the phrase "and Aluminum Approach Railing, Anodized" after the phrase "Aluminum Approach Railing" in the fourth paragraph of the Subsection text.
218. 621.15 BASIS OF PAYMENT, is hereby further modified by deleting the eighth paragraph in its entirety and replacing it with the following paragraph:

Payment will be full compensation for furnishing, transporting, handling, and placing the materials specified, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work. For Steel Backed Timber Guardrail, enlarging holes as necessary for placement of posts, furnishing and placing concrete fill and backfill material, and compacting backfill to the satisfaction of the Engineer will not be paid for separately, but will be considered incidental to the unit price bid for Contract item 621.18.

219. 621.15 BASIS OF PAYMENT, is hereby still further modified by deleting the twelfth paragraph in its entirety and replacing it with the following paragraph:

Payment for the backup attenuator will be made as follows:

- (a) 50 percent of the Contract unit price will be paid when the backup attenuator is delivered to and placed in storage at the project site to the satisfaction of the Engineer.
- (b) The remaining 50 percent of the Contract unit price will be paid when the stored attenuator, or component thereof, is installed on the project and/or removed from the project site, when no longer required, as determined by the Engineer.

220. 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>
621.206 Steel Beam Guardrail, Galvanized/Nested	Meter (Linear Foot)
621.207 Steel Beam Guardrail, Galvanized/Nested w/2.4 m (8 feet) Posts	Meter (Linear Foot)
621.216 HD Steel Beam Guardrail, Galvanized/Nested	Meter (Linear Foot)
621.217 HD Steel Beam Guardrail, Galvanized/Nested w/2.4 m (8 feet) Posts	Meter (Linear Foot)
621.745 Aluminum Approach Railing, Anodized	Meter (Linear Foot)

SECTION 625 - SLEEVES FOR UTILITIES

221. 625.03 INSTALLATION, is hereby modified by deleting the phrase "50 mm (2 inches)" and replacing it with the phrase "100 mm (4 inches)" in the fifth line (beginning "Water service lines") of the listing in the fifth paragraph.

SECTION 630 - UNIFORMED TRAFFIC OFFICERS AND FLAGGERS

222. 630.01 DESCRIPTION, part (e) Responsibility of Contractor to Protect Public and Workers, is hereby modified by being re-designated from part "(e)" to part "(f)".

223. 630.01 DESCRIPTION, is hereby modified by adding the following new part (e):

- (e) Use of Railroad Flaggers. Railroad flaggers shall be used within the limits of the project whenever the Contractor's operations are such as to make it necessary as described in the Contract Special Provisions.

Flaggers used in conjunction with railroad operations shall receive approval for use by the operating Railroad. The Contractor may contact the operating Railroad for a listing of approved flaggers.

224. 630.03 CLOTHING AND EQUIPMENT, part (c) For All Traffic Control Personnel, is hereby modified by being re-designated from part "(c)" to part "(d)".

225. 630.03 CLOTHING AND EQUIPMENT, is hereby further modified by adding the following new part (c):

- (c) For Railroad Flaggers.

- (1) Railroad flaggers shall be trained, clothed, and equipped in accordance with guidelines, rules, and/or regulations set forth by the operating Railroad.

226. 630.05 METHOD OF MEASUREMENT, is hereby modified by deleting the phrase "and Flaggers" and replacing it with the phrase ", Flaggers, and Flaggers, Railroad" in the first sentence.

227. 630.06 BASIS OF PAYMENT, is hereby modified by adding the following as the second paragraph of the Subsection text:

The accepted quantity of Flaggers, Railroad will be paid for at the Contract unit price per hour. Payment will be full compensation for labor hours accrued on the project by a railroad flagger in the employ of the operating Railroad. The unit price shall include the costs of any equipment, clothing, and training required for the railroad flagger(s).

228. 630.06 BASIS OF PAYMENT, is hereby further modified by deleting the phrase "and/or Flaggers" and replacing it with the phrase ", Flaggers, and/or Flaggers, Railroad" in the first and third lines of the third (last) paragraph.



229. 630.06 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>
630.20 Flaggers, Railroad	Hour

SECTION 631 - FIELD OFFICE

230. 631.01 DESCRIPTION, is hereby modified by adding the following paragraph:

The equipment furnished for testing of protective coatings shall be used by the Engineer as required by the Contract.

231. 631.06 TESTING EQUIPMENT, BITUMINOUS, is hereby modified by adding the following as the sixth, seventh, and eighth paragraphs (before the paragraph beginning "Black duct tape..."):

- 1 48 inch electronic building level.
- 1 Mechanical measuring wheel.

The electronic building level shall have bubble indicators as well as a digital readout capable of reading in degrees from 0.0 deg to 90.0 deg, in percent slope from 0.0 percent to 100.0 percent, and in pitch in units (inches) of rise per unit (foot) of run. The electronic level shall have the capability of being recalibrated and be accurate to 1/10 of one degree.

The measuring wheel shall have a minimum wheel circumference of 1 m (3 feet) and shall have a sealed counter capable of measuring to a minimum range of 9 999.9 ft or 9 999.9 m specific to the applicable project (Contract) design units.

232. 631.08 METHOD OF MEASUREMENT, is hereby modified by adding the following to the first paragraph:

Unless otherwise specified in the Contract Documents, no measurement for payment will be made for protective coatings testing equipment provided by the Contractor.

233. 631.08 METHOD OF MEASUREMENT, is hereby further modified by deleting the second paragraph in its entirety and replacing it with the following:

The quantity of Field Office Telephone to be measured for payment will be to the nearest hundredth of a dollar for all telephone service supplied.

234. 631.08 METHOD OF MEASUREMENT, is hereby still further modified by deleting the phrase "one with a unit price and a total price set" with the word "dollars" in the first sentence of the third paragraph.

235. 631.09 BASIS OF PAYMENT, is hereby modified by deleting the following pay item:

<u>Pay Item</u>	<u>Pay Unit</u>
631.25 Field Office Telephone	Lump Unit

236. 631.09 BASIS OF PAYMENT, is hereby further modified by adding the following pay item:

<u>Pay Item</u>	<u>Pay Unit</u>
631.26 Field Office Telephone	Dollar

SECTION 649 - GEOTEXTILE FABRIC

237. 649.02 MATERIALS, is hereby modified by adding the following new part (c):

(c) Where woven wire reinforcement is used, the woven wire shall be 14 gauge minimum with a 150 mm (6 inch) maximum mesh opening.

238. 649.04 INSTALLATION, part (a) General, subpart (6) Silt Fence, is hereby modified by adding the phrase ", and when required woven wire reinforcement," after the word "geotextile" in the first sentence of the first paragraph.

239. 649.04 INSTALLATION, part (a) General, subpart (6) Silt Fence, is hereby further modified by deleting the second paragraph in its entirety and replacing it with the following paragraph:

Either wood or steel posts shall be used. The posts shall have a minimum length of 910 mm (3 feet) and shall be embedded a minimum of 405 mm (16 inches) below the ground surface. The spacing of the posts shall be as shown in the Plans, or as determined by the silt fence manufacturer or the Engineer.

240. 649.06 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>
649.515 Geotextile for Silt Fence, Woven Wire Reinforced	Square Meter (Square Yard)

SECTION 651 - TURF ESTABLISHMENT

241. 651.02 MATERIALS, is hereby modified by adding the following as the twelfth entry of the Subsection listing in the first paragraph:

Straw Mulch.....755.10(g)

242. 651.08 SEEDING, part (b) Mulch, is hereby modified by adding the following new subpart 3. directly after the last paragraph of subpart 2. Hydraulic Mulch:

3. Straw Mulch. Straw mulch shall be applied at the locations and rate indicated in the Plans.

243. 651.12 METHOD OF MEASUREMENT, is hereby modified by deleting the phrase "and Hay Mulch" and replacing it with the phrase ", Hay Mulch, and Straw Mulch" in the first sentence of the second paragraph.
244. 651.13 BASIS OF PAYMENT, is hereby modified by deleting the phrase "and Hay Mulch" and replacing it with the phrase ", Hay Mulch, and Straw Mulch" in the first sentence of the second paragraph.
245. 651.13 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>
651.29 Straw Mulch	Metric Ton (Ton)

SECTION 653 - EROSION PREVENTION AND SEDIMENT CONTROL MEASURES

246. 653.02 MATERIALS, is hereby modified by deleting the tenth (Barrier Fence) and eleventh (Project Demarcation Fence) entries in the Subsection listing.
247. 653.02 MATERIALS, is hereby further modified by adding the following paragraphs:

Barrier Fence shall be fluorescent yellow or orange, ultraviolet stabilized, high density polyethylene mesh or grid that will not sag, corrode, rot, or conduct electricity.

Project Demarcation Fence shall be non-adhesive, ultraviolet stabilized, fluorescent yellow or orange vinyl-coated polyester mesh or polyethylene plastic tape that will not sag or tear over time due to natural weather conditions.

248. 653.05 EROSION MATTING, is hereby modified by deleting the first two paragraphs of the Subsection text in their entirety and replacing them with the following:

Temporary erosion matting shall be used to anchor loose mulch and provide temporary erosion control while vegetation is established in those areas where vegetation will provide permanent erosion protection.

Permanent erosion matting shall be used where vegetation will not sustain expected flow conditions or provide sufficient long-term erosion protection. Permanent erosion matting shall provide sufficient thickness and void space to permit soil filling and/or retention to allow for the development of vegetation.

249. 653.13 BARRIER FENCE, is hereby modified by deleting the second, third, and fourth paragraphs in their entirety and replacing them with the following:

Barrier Fence shall be installed on w-shape steel posts. The fence shall have a minimum height of 1.25 meters (4 feet). The posts shall be embedded a minimum of 600 mm (2 feet) into the ground, shall extend above the fabric, and shall be installed at a 1.5 meter (5 foot) spacing.

The Contractor shall select, inspect, and maintain Barrier Fence in accordance with the Contract Documents or as directed by the Engineer.

250. 653.14 PROJECT DEMARCATION FENCE, is hereby modified by deleting the second, third, and fourth paragraphs in their entirety and replacing them with the following:

Project Demarcation Fence shall be installed on hardwood stakes and shall have a minimum width of 75 mm (3 inches). The stakes shall be 25 mm x 25 mm x 1220 mm (1 inch x 1 inch x 4 feet), shall be embedded 300 mm (1 foot) into the ground, shall extend above the fabric, and shall be installed at a 3 meter (10 foot) spacing.

The Contractor shall select, inspect, and maintain Project Demarcation Fence in accordance with the Contract Documents or as directed by the Engineer.

SECTION 675 - TRAFFIC SIGNS

251. 675.17 METHOD OF MEASUREMENT, is hereby corrected by replacing the phrase "(square yards)" with the phrase "(square feet)" in the first paragraph.

SECTION 679 - STREET LIGHTING

252. 679.10 METHOD OF MEASUREMENT, is hereby modified by adding the following as the ninth (last) paragraph:

The accepted quantity of Power Drop Stanchion, Street Lighting to be measured for payment will be the number of each stanchion installed in the complete and accepted work.

253. 679.11 BASIS OF PAYMENT, is hereby modified by deleting the phrase "and Luminaire" and replacing it with the phrase "Luminaire, and Power Drop Stanchion, Street Lighting" in the third paragraph.

254. 679.11 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>
679.55 Power Drop Stanchion, Street Lighting	Each

SECTION 701 - HYDRAULIC CEMENT

255. 701.02 PORTLAND CEMENT, is hereby modified by adding the following:

Portland cements that fail to meet all parts of AASHTO M 85 due to the dilution of the original cement with added limestone will be acceptable, provided the original portland cement used in the product met AASHTO M 85 requirements prior to the addition of limestone.

SECTION 704 - AGGREGATES

256. 704.10 AGGREGATES FOR BITUMINOUS CONCRETE PAVEMENT, part (a) Aggregate for Marshall Bituminous Concrete Pavement, subpart (1) Grading (c) Recycled Asphalt Pavement (RAP), is hereby modified by adding the following to the first paragraph:

The percentage of RAP, when stated as a percentage of the total mix, shall be limited to a maximum of 50.0 percent for both design and production purposes.

257. 704.10 AGGREGATES FOR BITUMINOUS CONCRETE PAVEMENT, part (a) Aggregate for Marshall Bituminous Concrete Pavement, subpart (1) Grading (c) Recycled Asphalt Pavement (RAP), is hereby further modified by adding the following as the fourth sentence of the fifth paragraph:

The recovered RAP binder material shall be graded according to AASHTO R 29 for all samples.

258. 704.10 AGGREGATES FOR BITUMINOUS CONCRETE PAVEMENT, part (b) Aggregate for Superpave Bituminous Concrete Pavement, subpart (1) Grading (c) Recycled Asphalt Pavement (RAP), is hereby modified by deleting the number "15" and replacing it with the number "50.0" in the second (last) sentence of the first paragraph.

259. 704.10 AGGREGATES FOR BITUMINOUS CONCRETE PAVEMENT, part (b) Aggregate for Superpave Bituminous Concrete Pavement, subpart (3) Fractured Faces, Angularity, subpart a. Coarse Aggregate is hereby modified by deleting the phrase "and usage (depth) in the pavement structure" in the first sentence.

260. 704.10 AGGREGATES FOR BITUMINOUS CONCRETE PAVEMENT, part (b) Aggregate for Superpave Bituminous Concrete Pavement, subpart (3) Fractured Faces, Angularity, subpart a. Coarse Aggregate is hereby further modified by deleting the table (retaining the table title), footnote (1), and Note 1 below the first paragraph in their entirety and replacing them with the following:

Traffic (ESALs)	CA1/CA2
<30,000,000	95/90 <sup>(1)</sup>
≥ 30,000,000	100/100

<sup>(1)</sup> 95/90 denotes that 95 percent of the coarse aggregate has one fractured face and 90 percent has two or more fractured faces.

261. 704.10 AGGREGATES FOR BITUMINOUS CONCRETE PAVEMENT, part (b) Aggregate for Superpave Bituminous Concrete Pavement, subpart (3) Fractured Faces, Angularity, subpart b. Fine Aggregate is hereby modified by deleting the phrase "and usage (depth) in the pavement structure" in the first sentence.

262. 704.10 AGGREGATES FOR BITUMINOUS CONCRETE PAVEMENT, part (b) Aggregate for Superpave Bituminous Concrete Pavement, subpart (3) Fractured Faces, Angularity, subpart b. Fine Aggregate is hereby further modified by deleting the table (retaining the table title) and Note 1 below the first paragraph in their entirety and replacing them with the following:

Traffic (ESALs)	Uncompacted Void Content
All	45

263. 704.10 AGGREGATES FOR BITUMINOUS CONCRETE PAVEMENT, part (b) Aggregate for Superpave Bituminous Concrete Pavement, subpart (8) Clay Content is hereby modified by deleting the table (retaining the table title) below the first paragraph in its entirety and replacing it with the following:

Traffic (ESALs)	Sand Equivalent
≤ 30,000,000	45
> 30,000,000	50

264. 704.16 DRAINAGE AGGREGATE, part (a), TABLE 704.16A - DRAINAGE AGGREGATE text is hereby corrected by deleting the phrase "0 to 10" from the Percent By Mass (Weight) Passing the Square Mesh Sieves requirement for the 2.36 mm (No. 8) Sieve Designation and replacing it with the phrase "0 to 5".

SECTION 707 - JOINT MATERIALS

265. 707.301 MORTAR, TYPE I, Subsection heading, is hereby corrected by re-designating the Subsection number from "707.301" to "707.01".
266. 707.10 POLYVINYL CHLORIDE (PVC) WATERSTOP, part (a) Physical Properties, TABLE 707.10A - PVC WATERSTOP, ASTM Procedure, is hereby modified by deleting the entries for Tensile Strength, kPa (psi) and Ultimate Elongation, % of "D 412" and replacing them with entries of "D 638 (Type IV)".

SECTION 708 - PAINTS, STAINS, AND TRAFFIC MARKING MATERIALS

267. 708.05 COATINGS FOR WOOD, is hereby modified by adding the following new parts (b) and (c):
- (b) Insecticide/Fungicide. Insecticide/fungicide coatings for interior applications shall be water/glycol-based solutions per the manufacturer's specifications. Acceptable coatings shall be those on the Approved Products List on file with the Agency's Materials and Research Section.
- (c) Fire Retardant. Fire retardant coatings for interior and exterior applications shall be non-toxic, non-hazardous, and water-based solutions passing ASTM E 84/NFPA 255/UL 723 "Standard Test Method for Surface Burning Characteristics of Burning Materials." Acceptable coatings shall be those on the Approved Products List on file with the Agency's Materials and Research Section.

268. 708.08 PAINT FOR PAVEMENT MARKINGS, part (d) Waterborne Traffic Paint, subpart (2) Composition, chart text is hereby corrected by deleting the phrase "25% min." from the Total Volatile Content requirement for both WHITE and YELLOW/GREEN/BLUE paints and replacing it with the phrase "25% max."
269. 708.08 PAINT FOR PAVEMENT MARKINGS, part (d) Methyl-methacrylate Paint, is hereby corrected by being re-designated from part "(d)" to part "(e)".
270. 708.09 GLASS BEADS, part (a) Properties, is hereby modified by adding the following paragraph:

All glass beads shall have a concentration of less than 75 parts per million arsenic and less than 100 parts per million lead as determined by EPA Methods 6010B and 3520.

SECTION 712 - CRIBBING MATERIALS

271. 712.03 TIMBER CRIBBING, part (c) Preservative Treatment, is hereby modified by deleting the phrase "C1, C2, and C14" in the first paragraph.

SECTION 714 - STRUCTURAL STEEL

272. 714.05 HIGH-STRENGTH BOLTS, NUTS, AND WASHERS, is hereby modified by deleting the second and third paragraphs in their entirety and replacing them with the following:

Bolts installed in painted structural components shall be Type 1, shall be provided with appropriate nuts and washers, as required, and the combination of bolt, nut, and washer shall be mechanically galvanized in accordance with AASHTO M 298, Class 50, Type I.

Bolts installed in unpainted weathering steel structural components shall be Type 3 and shall be provided with appropriate nuts and washers, as required.

SECTION 715 - MISCELLANEOUS METALS

273. 715.01 IRON CASTINGS, part (a) General Requirements, is hereby modified by adding the following as the first sentence of the first paragraph:

Castings shall conform to the requirements of AASHTO M 306.

274. 715.01 IRON CASTINGS, part (a) General Requirements, is hereby further modified by adding the following to the third paragraph:

The dimensions of the frames and covers shall substantially conform to the dimensions for cast iron covers and frames as shown in the Contract Documents. The covers shall be flush with the upper surface of the frame when seated. The seatings shall be machined or made quiet by the use of a gasket cushioning insert or supported by a three point triangular suspension. The minimum depth of insertion of the cover into the frame shall be no less than 50 mm (2 inches).

275. 715.01 IRON CASTINGS, part (a) General Requirements, is hereby still further modified by adding the following as the fourth and fifth paragraphs:

As a minimum, the covers and frames shall meet the M-18 (H 20) loading requirements of AASHTO and the proof load requirements of Federal Specification A-A-60005.

Covers shall be identified by the words "STORM SEWER", "WATER", "SEWER", "ELECTRIC", or other as applicable, in raised cast letters as indicated in the Contract Documents or as directed by the Engineer.

276. 715.01 IRON CASTINGS, part (b) Gray Iron Castings, is hereby modified by deleting the phrase "30B, unless otherwise specified" and replacing it with the phrase "35B".

277. 715.01 IRON CASTINGS, part (c) Ductile Iron Castings, is hereby modified by being deleted in its entirety and replaced with the following:

(c) Ductile Iron Castings. Ductile iron castings for frames and covers shall conform to the requirements of ASTM A 536, Grade 80-55-06.

278. 715.01 IRON CASTINGS, part (d) Certification, is hereby modified by deleting the phrase "Type A" and replacing it with the phrase "Type D".

279. 715.05 STAY-IN-PLACE CORRUGATED METAL FORMS (SIPCMF) FOR SUPERSTRUCTURE SLABS, is hereby made a new Subsection of this Section as follows:

280. 715.05 STAY-IN-PLACE CORRUGATED METAL FORMS (SIPCMF) FOR SUPERSTRUCTURE SLABS.

(a) General. Forms and form supports shall be in conformance with ASTM A 653/A 653M, Grades A thru E, Coating Designation G165. Fabrication shall be in conformance with ASTM A 924/A 924M. Prior to the fabrication of forms, the Contractor shall submit to the Engineer certification for conformity of steel and galvanizing to ASTM A 653/A 653M.

(b) Certification. A Type D Certification shall be furnished in accordance with Subsection 700.02.

281. 715.06 METAL ROOFING, is hereby made a new Subsection of this Section as follows:

282. 715.06 METAL ROOFING.

(a) Roofing. Metal roofing shall be baked enamel, double lock standing seam metal roofing, galvanized steel ASTM A 653/A 653M Grade CS G90 coating or aluminum, 24 gauge minimum thickness. As approved by the Engineer, an alternate base coating for steel roofing may be allowed. The installer shall provide certificates of compliance for each specification.

The metal roofing system shall meet UL-580, Class 90 (wind uplift) and ASTM E 1646-95(2003) (water penetration). The installer shall provide certificates of compliance for each specification, or computation of an alternate wind load acceptable to the Engineer.



The Contractor shall provide manufacturer's color samples to the Engineer for approval. The Engineer, in consultation with the owner, will determine which, if any, of the samples are acceptable.

- (b) Trim. The trim shall be of the type and size recommended by the roofing manufacturer(s).
- (c) Fasteners. Fasteners shall be pancake head screws, or other low profile fasteners, with a minimum nominal penetration length of 25 mm (1 inch) into the roof boards. A minimum ultimate pullout strength shall be provided to meet uplift requirements.
- (d) Certification. A Type A Certification shall be furnished in accordance with Subsection 700.02.

#### SECTION 719 - EPOXY RESIN MATERIALS

- 283. SECTION 719 - EPOXY RESIN MATERIALS, is hereby made a new Section of the Specifications.
- 284. 719.01 THIS SUBSECTION RESERVED
- 285. 719.02 EPOXY BONDING COMPOUND, is hereby made a new Subsection of the Specifications as follows:
- 286. 719.02 EPOXY BONDING COMPOUND. Epoxy bonding compound shall meet the requirements of AASHTO M 235M/M 235 for the type, grade, and class corresponding to the application and temperature range for which it is to be used.

Certification. A Type A Certification will be furnished in accordance with Subsection 700.02(c).

#### SECTION 720 - GEOTEXTILES

- 287. 720.04 SAMPLING, TESTING, AND ACCEPTANCE REQUIREMENTS, part (d) Minimum Average Roll Value, TABLE 720.04A - VAOT MINIMUM AVERAGE ROLL VALUES FOR GEOTEXTILES (METRIC) and TABLE 720.04A - VAOT MINIMUM AVERAGE ROLL VALUES FOR GEOTEXTILES (ENGLISH) are hereby modified by changing the column heading "Pay Item 649.51 For Silt Fence" to "Pay Items 649.51 and 649.515 For Silt Fence".
- 288. 720.04 SAMPLING, TESTING, AND ACCEPTANCE REQUIREMENTS, part (d) Minimum Average Roll Value, TABLE 720.04A - VAOT MINIMUM AVERAGE ROLL VALUES FOR GEOTEXTILES (ENGLISH), Pay Item 649.31 Under Stone Fill, ≥50%, is hereby corrected by deleting the entries for 1. Grab Tensile Strength (lbs.), 2. Burst Strength (psi), 3. Puncture (lbs.), and 4. Trapezoidal Tear Strength (lbs.) of "315", "510", "110", and "110", respectively, and replacing them with entries of "200", "250", "80", and "80", respectively, and by correcting the description of Geotextile Property 7. by deleting the phrase "(% Strength" and replacing it with the phrase "(% Strength Retained)".
- 289. 720.05 PREFABRICATED CHECK DAM, is hereby modified by deleting the phrase "approved list" and replacing it with the phrase "Approved Products List".

290. 720.06 INLET PROTECTION DEVICE, TYPE II, is hereby modified by deleting the phrase "approved list" and replacing it with the phrase "Approved Products List".
291. 720.07 FILTER BAG, is hereby modified by deleting the phrase "approved list" and replacing it with the phrase "Approved Products List".

SECTION 725 - CONCRETE CURING MATERIALS AND ADMIXTURES

292. 725.01 CONCRETE CURING MATERIALS, part (d) Liquid Membrane-Forming Compounds, is hereby modified by deleting subpart (2) Certification in its entirety.
293. 725.02 CHEMICAL ADMIXTURES, is hereby modified by deleting part (a) General, subpart (3) Certification in its entirety.

SECTION 726 - PROTECTIVE COATINGS AND WATERPROOFING MATERIALS

294. 726.01 TIMBER PRESERVATIVE, is hereby modified by deleting the second sentence of the first paragraph in its entirety and replacing it with the following:

Acceptable preservatives and AWPAs Preservative Standards are as follows:

295. 726.01 TIMBER PRESERVATIVE, is hereby further modified by deleting the second paragraph (beginning with "Glued laminated timber") in its entirety and replacing it with the following:

For wood components, AWPAs Product Use and Commodity Specifications shall be as listed below:

Component	AWPA Use Category	AWPA Commodity Spec.
Sawn Guardrail Post	UCB4	6A
Sawn Bollard, Marker Post, Guide Post, and Fence Post	UC4B	6A
Sawn Sign Post	UC4A	6A
Sawn Structural Lumber and Timber	UC4B	6A
Sawn Nonstructural Lumber	UC4B	6A
Sawn Timber Cribbing	UC4B	6A
Structural Glued Laminated Timber	UC4B	6F
Round Fence Post	UC4B	6B
Round Timber Pole	UC4B	6D

296. 726.01 TIMBER PRESERVATIVE, is hereby still further modified by adding the word "Miscellaneous" after the phrase "AWPA" in the first sentence of the third paragraph.

SECTION 727 - FENCING MATERIALS

297. 727.01 WOVEN WIRE FENCE, part (c) Wood Posts and Braces, is hereby modified by deleting the word "Wood" at the beginning of the first paragraph and replacing it with the phrase "Round wood".

298. 727.01 WOVEN WIRE FENCE, part (c) Wood Posts and Braces, is hereby further modified by deleting the third paragraph in its entirety and replacing it with the following:

If sawn posts are used they shall be rough sawn and conform to the requirements of Subsection 728.01. The nominal dimensions shall be at least 100 mm (4 inches) square and of the length shown on the Plans.

299. 727.02 CHAIN LINK FENCE, part (a) Chain-Link Fabric, is hereby modified by adding the following sentence:

When the Contract Documents specify a 3.76 mm (0.1483 inch) diameter (9 gauge) wire woven into a 25 mm (1 inch) mesh, an aluminum-coated steel conforming to the requirements of AASHTO M 181, Type II will be allowed.

300. 727.03 BARRIER FENCE, is hereby modified by being deleted in its entirety.

301. 727.04 PROJECT DEMARCATION FENCE, is hereby modified by being deleted in its entirety.

SECTION 728 - GUARDRAIL, GUIDE POSTS, AND BARRIERS

302. 728.01 POSTS AND POST ACCESSORIES, part (a) Wood Posts and Offset Blocks for Rail, Guardrail, Barriers, and Guide Posts, is hereby modified by adding the phrase "straight and sound" before the phrase "seasoned Red (Norway) Pine" and by deleting the phrase ", straight, sound, and cut from live timber" in the first sentence of the first paragraph.

303. 728.01 POSTS AND POST ACCESSORIES, part (a) Wood Posts and Offset Blocks for Rail, Guardrail, Barriers, and Guide Posts, is hereby further modified by adding the word "stress" before the phrase "grade requirements" in both the second and third sentences of the first paragraph.

304. 728.01 POSTS AND POST ACCESSORIES, part (a) Wood Posts and Offset Blocks for Rail, Guardrail, Barriers, and Guide Posts, is hereby still further modified by adding the phrase "and care" before the phrase "of treated material" in the fourth (last) sentence of the first paragraph.

305. 728.01 POSTS AND POST ACCESSORIES, part (a) Wood Posts and Offset Blocks for Rail, Guardrail, Barriers, and Guide Posts, is hereby still further modified by deleting the word "saturated" and replacing it with the word "treated" in the second sentence of the fifth paragraph.

306. 728.01 POSTS AND POST ACCESSORIES, part (a) Wood Posts and Offset Blocks for Rail, Guardrail, Barriers, and Guide Posts, is hereby still further modified by deleting the phrase "American Lumber Standards Committee (ALSC) approved grading standards" and replacing it with the phrase "the American Softwood Lumber Standard (ASLS) developed by the American Lumber Standards Committee" in the first sentence of the sixth paragraph.

307. 728.01 POSTS AND POST ACCESSORIES, part (a) Wood Posts and Offset Blocks for Rail, Guardrail, Barriers, and Guide Posts, is hereby still further modified by deleting the phrase "ALSC" and replacing it with the phrase "ASLS" in the second (last) sentence of the sixth paragraph.

308. 728.01 POSTS AND POST ACCESSORIES, part (a) Wood Posts and Offset Blocks for Rail, Guardrail, Barriers, and Guide Posts, is hereby still further modified by deleting the seventh paragraph in its entirety.
309. 728.01 POSTS AND POST ACCESSORIES, part (a) Wood Posts and Offset Blocks for Rail, Guardrail, Barriers, and Guide Posts, is hereby still further modified by deleting the phrase "for soil use specified in AWPA Standard C2" and replacing it with the phrase "specified in AWPA Standards" in the first sentence of the tenth paragraph.
310. 728.02 RAIL ELEMENTS, part (f) Certification, is hereby modified by being re-designated from part "(f)" to part "(g)".
311. 728.02 RAIL ELEMENTS, is hereby modified by adding the following new part (f):
- (f) Steel Backed Timber Guardrail. Timber for rail shall have a minimum allowable bending stress of 10 Mpa (1450 psi). Steel rails and splice plates shall conform to AASHTO M 270M/M 270 Grade 345 (Grade 50) steel and shall be galvanized in accordance with AASHTO M 111M/M 111.
312. 728.02 RAIL ELEMENTS, part (g) Certification, is hereby modified by adding the phrase "and steel backed timber guardrail" after the phrase "plank rail" in the second sentence.
313. 728.02 RAIL ELEMENTS, part (g) Certification, is hereby further modified by deleting the phrase "For cable, beam, and box beam rail," in the third (last) sentence and replacing it with the phrase "For beam and box beam rail,".
314. 728.03 HARDWARE, part (e) Certification, is hereby modified by being re-designated from part "(e)" to part "(f)".
315. 728.03 HARDWARE, is hereby modified by adding the following new part (e):
- (e) Hardware for Steel Backed Timber Guardrail. Bolts and lag screws shall conform to ASTM F 568M, Class 4.6 (ASTM A 307 Grade A). Washers shall conform to ASTM F 844. Nuts shall conform to AASHTO M 291M (AASHTO M 291). All fastener hardware shall be galvanized in accordance with AASHTO M 232M/M 232.
316. 728.06 MANUFACTURED TERMINAL SECTIONS, is hereby modified by adding the following as the second paragraph of the Subsection text:
- Unless noted otherwise on the Plans, Manufactured Terminal Sections shall meet as a minimum the requirements of NCHRP 350 for TL-3.
317. 728.07 ENERGY ABSORPTION ATTENUATORS, is hereby made a new Subsection of the Specifications as follows:
318. 728.07 ENERGY ABSORPTION ATTENUATORS. Acceptable stationary Energy Absorption Attenuators permanently incorporated into the work shall be one of the Energy Absorption Attenuators on the Approved Products List on file with the Agency's Materials and Research Section.

SECTION 729 - CURB MATERIALS

319. 729.01 VERTICAL GRANITE CURB, part (b) Finish and Surface Dimensions, fourth paragraph, is hereby modified by deleting the first sentence in its entirety and replacing it with the following:

The top front arris line shall be rounded to a 13 mm (1/2 inch) radius as shown in the Contract Documents.

320. 729.02 GRANITE BRIDGE CURB, part (b) Finish and Surface Dimensions, third paragraph, is hereby modified by deleting the first sentence in its entirety and replacing it with the following:

The top front arris line shall be rounded to a 13 mm (1/2 inch) radius as shown in the Contract Documents.

321. 729.05 BITUMINOUS CONCRETE CURB, part (b) Performance-Graded Asphalt Binder, is hereby modified by deleting the phrase "as directed by the Engineer" and replacing it with the phrase "as specified on the Plans or in the Contract Documents".

322. 729.06 TREATED TIMBER CURB, part (a) Miscellaneous Hardware, is hereby modified by adding the phrase "fasteners," after the phrase "spikes," in the first sentence.

SECTION 731 - BEARING PADS FOR STRUCTURES

323. 731.02 BEARING PADS, is hereby made a new Subsection of the Specifications as follows:

324. 731.02 BEARING PADS. Bearing pads shall be manufactured from all new materials comprised of high quality elastomer with a random distribution of synthetic fibers in proper proportion to maintain strength and stability. The finished product shall withstand a compressive load perpendicular to the plane of laminations of 48.2 MPa (7000 psi). The surface hardness shall have a Shore A Durometer of 80 ± 10 in accordance with ASTM D 2240.

Certification. A Type A Certification shall be furnished in accordance with Subsection 700.02.

325. 731.03 ELASTOMERIC MATERIAL, is hereby modified by deleting the first paragraph in its entirety and replacing it with the following:

Unless otherwise shown in the Plans or specified in the Contract Documents, the elastomeric compound for pot bearings shall be neoprene conforming to AASHTO *LRFD Bridge Design Specifications* Subsection 14.7.4.2.

SECTION 732 - RAILING MATERIALS

326. 732.02 ALUMINUM BRIDGE RAILING, part (b) Stainless Steel Bolts, Nuts, Washers, and Set Screws, is hereby corrected by deleting the phrase "ASTM A 593" and replacing it with the phrase "ASTM F 593" in the first and fourth paragraphs, and by deleting the phrase "ASTM A 594" and replacing it with the phrase "ASTM F 594" in the fourth paragraph.

SECTION 750 - TRAFFIC SIGNS

327. 750.01 SIGN POSTS, part (c) Wood Posts, is hereby modified by deleting the first paragraph in its entirety and replacing it with the following:

Wood posts shall be seasoned, straight, and sound sawn timber comprised of either Oak, Cedar, Spruce, Western Fir, or other approved wood. The posts shall conform to the dimensions shown on the Plans or requirements specified in the Contract Documents.

SECTION 752 - TRAFFIC CONTROL SIGNALS

328. 752.02 STRAIN POLES, part (a) Wood Poles, is hereby modified by deleting the first paragraph in its entirety and replacing it with the following:

Wood poles for span wire mounted signal heads shall be either Douglas Fir or Southern Pine. The poles to be used shall be Class 3 and shall be a minimum of 11 mm (35 feet) in length, unless otherwise specified. Wood poles shall meet the specification requirements of ANSI 05.1 "Piles and Poles, Wood."

329. 752.06 TRAFFIC SIGNAL CONTROLLERS, part (a) General, subpart (1) Controller/Auxiliary Equipment, is hereby modified by deleting the phrase "(April: first Sunday; October: last Sunday)" in the last sentence of the first paragraph.

SECTION 755 - LANDSCAPING MATERIALS

330. 755.10 MULCH MATERIALS, is hereby modified by adding the following new part (g):

(g) Straw Mulch. Straw mulch shall consist of threshed plant residue of oats, wheat, barley, rye, or rice from which the grain has been removed. The material shall be free of noxious weeds, undesirable grasses and plants, and rot or mold, and shall be approved by the Engineer prior to use.

331. 755.11 EROSION MATTING, is hereby modified by being deleted in its entirety and replaced with the following:

332. 755.11 EROSION MATTING.

(a) Temporary Erosion Matting. Temporary erosion matting shall conform to one of the following specifications and corresponding properties found in Table 755.11A.

(1) Mulch Control Netting. A temporary biodegradable rolled erosion control product (RECP) composed of planar woven natural fiber.

- (2) Erosion Control Blanket. A temporary all natural biodegradable rolled erosion control product composed of processed fibers mechanically bound together to form a continuous matrix.
- (b) Permanent Erosion Matting. Permanent erosion matting shall be a long-term non-degradable rolled erosion control product composed of ultraviolet stabilized, non-degradable, synthetic fibers, filaments, nettings, and/or wire mesh processed into three dimensional reinforcement matrices conforming to one of the specifications and corresponding properties found in Table 755.11B.
- (c) Certification. A Type A Certification shall be furnished in accordance with Subsection 700.02 for both temporary and permanent erosion matting.

TABLE 755.11A - STANDARD SPECIFICATION FOR TEMPORARY  
ROLLED EROSION CONTROL PRODUCTS  
 (For use where natural vegetation will provide  
 permanent erosion protection)

Product Description	Material Composition	Longevity (months)	Slope Applications*		Channel Applications*	Minimum Tensile Strength <sup>1</sup> kN/m(lbs/ft)
			Maximum Gradient (h:v)	C Factor <sup>2</sup> <sub>,5</sub>	Maximum Shear Stress <sup>3,4,6</sup> Pa(lbs/ft <sup>2</sup> )	
Mulch Control Nets	All natural biodegradable mesh or woven netting.	3	5:1	≤ 0.10	12 (0.25)	0.073 (5)
		12	5:1	≤ 0.10	12 (0.25)	0.073 (5)
		24	5:1	≤ 0.10	12 (0.25)	0.36 (25)
Netless Rolled Erosion Control Blankets	All natural biodegradable fibers mechanically interlocked together to form a continuous matrix.	3	4:1	≤ 0.10	24 (0.5)	0.073 (5)
		12	4:1	≤ 0.10	24 (0.5)	0.073 (5)
Single-net Erosion Control Blankets	All natural processed, biodegradable fibers mechanically bound together by a single net of yarn or twine woven into a continuous matrix.	3	3:1	≤ 0.15	72 (1.5)	0.73 (50)
		12	3:1	≤ 0.15	72 (1.5)	0.73 (50)
Double-net Erosion Control Blankets	All natural processed, biodegradable fibers mechanically bound together between two nets of yarn or twine woven into a continuous matrix.	3	2:1	≤ 0.20	84 (1.75)	1.09 (75)
		12	2:1	≤ 0.20	84 (1.75)	1.09 (75)
		24	1.5:1	≤ 0.25	96 (2.00)	1.45 (100)
		36	1:1	≤ 0.25	108 (2.25)	1.82(125)

Notes:

- \* "C" factor and shear stress for mulch control nettings must be obtained with netting used in conjunction with pre-applied mulch material.
- 1 Minimum Average Roll Values, Machine direction using Erosion Control Technology Council (ECTC) Mod. ASTM D 5035.
- 2 "C" Factor calculated as ratio of soil loss from RECP protected slope (tested at specified or greater gradient, h:v) to ratio of soil loss from unprotected (control) plot in large-scale testing. These performance test values should be supported by periodic bench scale testing under similar test conditions using ECTC Test Method # 2.
- 3 Required minimum shear stress RECP (unvegetated) can sustain without physical damage or excess erosion (> 12.7 mm (0.5 in) soil loss) during a 30-minute flow event in large-scale testing. These performance test values should be supported by periodic bench scale testing under similar test conditions and failure criteria using ECTC Test Method #3.
- 4 The permissible shear stress levels established for each performance category are based on historical experience with products characterized by Manning's roughness coefficients in the range of 0.01 - 0.05.
- 5 Acceptable large-scale test methods may include ASTM D 6459, ECTC Test Method # 2, or other independent testing deemed acceptable by the Engineer.
- 6 Per the Engineer's discretion. Recommended acceptable large-scale testing protocol may include ASTM D 6460, ECTC Test Method #3 or other independent testing deemed acceptable by the Engineer.



TABLE 755.11B - STANDARD SPECIFICATION FOR PERMANENT  
 ROLLED EROSION CONTROL PRODUCTS  
 (For applications where vegetation alone will not  
 provide sufficient long-term erosion protection)

PERMANENT <sup>1</sup> - All categories of Turf Reinforcement Mat (TRM) must have a minimum thickness of 6.35 mm(0.25 inches) per ASTM D 6525 and ultraviolet stability of 80% per ASTM D 4355 (500 hours exposure).					
Type	Product Description	Material Composition	Slope Applications	Channel Applications	Minimum Tensile Strength <sup>2,3</sup> kN/m (lbs/ft)
			Maximum Gradient (h:v)	Maximum Shear Stress <sup>4,5</sup> Pa (lbs/ft <sup>2</sup> )	
A	Turf Reinforcement Mat	Non-degradable synthetic fibers, filaments, nets, wire mesh and/or other elements, processed into a permanent, three-dimensional matrix of sufficient thickness.*	0.5:1	288 (6.0)	1.82 (125)
B	Turf Reinforcement Mat		0.5:1	384 (8.0)	2.19 (150)
C	Turf Reinforcement Mat		0.5:1	480 (10.0)	2.55 (175)

Notes:

- \* TRMs, which may be supplemented with degradable components, are designed to impart immediate erosion protection, enhance vegetation establishment and provide long-term functionality by permanently reinforcing vegetation during and after maturation. Note: TRMs are typically used in hydraulic applications, such as high flow ditches and channels, steep slopes, stream banks, and shorelines, where erosive forces may exceed the limits of natural, unreinforced vegetation or in areas where limited vegetation establishment is anticipated.
- 1 For TRMs containing degradable components, all property values must be obtained on the non-degradable portion of the matting alone.
- 2 Minimum Average Roll Values, machine direction only for tensile strength determination using ASTM D 6818 (Supersedes Mod. ASTM D 5035 for RECPs).
- 3 Field conditions with high loading and/or high survivability requirements may warrant the use of a TRM with a tensile strength of 44 kN/m(3,000 lb/ft) or greater.
- 4 Required minimum shear stress TRM (fully vegetated) can sustain without physical damage or excess erosion [ $>12.7$  mm (0.5 in.) soil loss] during a 30-minute flow event in large scale testing. These performance test values should be supported by periodic bench scale testing under similar test conditions and failure criteria using ECTC Test Method #3.
- 5 Acceptable large-scale testing protocol may include ASTM D 6460, ECTC Test Method #3, or other independent testing deemed acceptable by the Engineer.

SECTION 780 - CONCRETE REPAIR MATERIALS

333. 780.03 RAPID SETTING CONCRETE REPAIR MATERIAL, part (b) Time of Setting, is hereby corrected by deleting the second sentence in its entirety.

***APPENDIX J***

BID BOND

PERFORMANCE BOND

PAYMENT BOND

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**APPENDIX J**

**BID BOND**

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SURETY (Name and Address of Principal Place of Business): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Owner (Name and Address): Town of Hartford, Vermont  
171 Bridge Street  
White River Junction, VT 05001

**BID**

Bid Due Date: \_\_\_\_\_

Project: Beginning at a point in the Town of Hartford, on Bridge Street (TH 8), approximately 0.2 miles south of the intersection with Maple Street (US4). Work to be performed under this project includes railroad bridge rehabilitation and ancillary improvements to sidewalks, roadway, and adjacent railroad infrastructure.

**BOND**

Bond Number: \_\_\_\_\_

Date (Not later than Bid due date): \_\_\_\_\_

Penal Sum: \_\_\_\_\_ (Words) \_\_\_\_\_ (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

**BIDDER**

**SURETY**

\_\_\_\_\_  
Bidder's Name and Corporate Seal (Seal)

\_\_\_\_\_  
Surety's Name and Corporate Seal (Seal)

By: \_\_\_\_\_  
Signature and Title

By: \_\_\_\_\_  
Signature and Title  
(Attach Power of Attorney)

Attest: \_\_\_\_\_  
Signature and Title

Attest: \_\_\_\_\_  
Signature and Title

Note: Above address are to be used for giving required notice

## **APPENDIX J**

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder any difference between the total amount of the Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder who submitted a responsive Bid as determined by Owner for the work required by the Documents, provided that:

1.1. If there is no such next Bidder, and Owner does not abandon the Project, then Bidder and Surety shall pay to Owner the penal sum set forth on the face of this Bond, and;

1.2. In no event shall Bidder's and Surety's obligation hereunder exceed the penal sum set forth on the face of this Bond.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner), the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner), the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or;

3.2. All Bids are rejected by Owner, or;

3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to be Surety when required by Paragraph 5 hereof.

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses on or arising out of any time extension to issue Notice of Award agreed to in writing by the Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the State in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

**APPENDIX J**

**PERFORMANCE BOND**

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_

(Name of Contractor)

\_\_\_\_\_

(Address of Contractor)

a \_\_\_\_\_, hereinafter called Principal,  
(Corporation, Partnership or Individual)

and \_\_\_\_\_

(Name of Surety)

\_\_\_\_\_

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

\_\_\_\_\_

Town of Hartford, Vermont  
(Name of Owner)

\_\_\_\_\_

171 Bridge Street, White River Junction, VT 05001  
(Address of Owner)

hereinafter called Owner, in the penal sum of \_\_\_\_\_ dollars,  
\$(\_\_\_\_\_) in lawful money of the United States, for the payment of  
which sum well and truly to be made, we bind ourselves, successors, and assigns,  
jointly and severally, firmly by these presents.

**APPENDIX J**

The condition of this obligation is such that whereas, the Principal entered into a certain contract with the Owner, dated the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, a copy or which is hereto attached and made a part hereof for the construction of:

Hartford STP HTFD(1) – Bridge Street Bridge Project: Beginning at a point in the  
Town of Hartford on Bridge Street (TH 8), approximately 0.2 miles south of the  
intersection with Maple Street. Work to be performed under this project includes:  
railroad bridge rehabilitation and ancillary improvements to sidewalks, roadway,  
and adjacent railroad infrastructure.

Now, therefore, if the principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if they shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

Provided, further, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the Work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the Work or to the Specifications.

Provided, further, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

**APPENDIX J**

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_ counterparts, each one of which shall be deemed an original, this the \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

ATTEST:

_____	_____
(Principal Secretary)	Principal
	By: _____ (s)
(SEAL)	Address: _____
	_____
_____	
Witness as to Principal	
_____	
Address	
_____	_____
	Surety
	By: _____
	Attorney-in-Fact
_____	_____
Witness as to Surety	Address
_____	_____
Address	

**NOTE:** Date of Bond must not be prior to date of Contract.

If Contractor is a Partnership, all partners should execute the Bond.

**IMPORTANT:** Surety companies executing Bonds must appear on the Treasury Departments' most current list (Circular 570) as amended and be authorized to transact business in the State where the Project is located.



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**APPENDIX J**

**PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_

(Name of Contractor)

\_\_\_\_\_

(Address of Contractor)

a \_\_\_\_\_, hereinafter called Principal,  
(Corporation, Partnership or Individual)

and \_\_\_\_\_

(Name of Surety)

\_\_\_\_\_

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

\_\_\_\_\_

Town of Hartford, Vermont  
(Name of Owner)

\_\_\_\_\_

171 Bridge Street, White River Junction, VT 05001  
(Address of Owner)

hereinafter called Owner, in the penal sum of \_\_\_\_\_ dollars,  
\$(\_\_\_\_\_) in lawful money of the United States, for the payment of  
which sum well and truly to be made, we bind ourselves, successors, and assigns,  
jointly and severally, firmly by these presents.

**APPENDIX J**

The condition of this obligation is such that whereas, the Principal entered into a certain contract with the Owner, dated the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, a copy or which is hereto attached and made a part hereof for the construction of:

Hartford STP HTFD(1) – Bridge Street Bridge Project: Beginning at a point in the  
Town of Hartford on Bridge Street (TH 8), approximately 0.2 miles south of the  
intersection with Maple Street. Work to be performed under this project includes:  
railroad bridge rehabilitation and ancillary improvements to sidewalks, roadway,  
and adjacent railroad infrastructure.

Now, therefore, if the principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the Work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such Work and all insurance premiums on said Work, and for all labor performed in such Work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in force and effect.

Provided, further, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the Work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the Work or to the Specifications.

Provided, further, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

**APPENDIX J**

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_ counterparts, each one of which shall be deemed an original, this the \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

ATTEST:

_____	_____
(Principal Secretary)	Principal
	By: _____ (s)
(SEAL)	Address: _____
	_____
_____	
Witness as to Principal	
_____	
Address	
_____	_____
	Surety
	By: _____
	Attorney-in-Fact
_____	_____
Witness as to Surety	Address
_____	_____
Address	

**NOTE:** Date of Bond must not be prior to date of Contract.

If Contractor is a Partnership, all partners should execute the Bond.

**IMPORTANT:** Surety companies executing Bonds must appear on the Treasury Departments' most current list (Circular 570) as amended and be authorized to transact business in the State where the Project is located.

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***APPENDIX K***

**CHANGE ORDER FORM**

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**APPENDIX K**

**CHANGE ORDER**

Date: \_\_\_\_\_

Change Order No: \_\_\_\_\_

Name of Project: \_\_\_\_\_

Municipality: \_\_\_\_\_

Contractor: \_\_\_\_\_

The following changes are hereby made to the Contract:

Justifications:

Change to Contract Price: \$ \_\_\_\_\_

Original Contract Price: \$ \_\_\_\_\_

Current Contract Price adjusted by previous Change Order: \$ \_\_\_\_\_

The Contract Price due to this Change Order will be (increased) decreased by: \$ \_\_\_\_\_

New Adjusted Contract Price: \$ \_\_\_\_\_

Change to Contract Time: \_\_\_\_\_

The Contract Time will be (increased) decreased by \_\_\_\_\_ Calendar days

The date for completion of all work will be \_\_\_\_\_

**APPROVALS**

Contractor: \_\_\_\_\_

Construction Inspector: \_\_\_\_\_

Municipality: \_\_\_\_\_

VTrans Project Manager: \_\_\_\_\_



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***APPENDIX L***

NOTICE OF AWARD

NOTICE TO PROCEED

AGREEMENT

CERTIFICATE OF SUBSTANTIAL COMPLETION

CONTRACTOR'S AFFIDAVIT

CONTRACTOR RELEASE

[ blank sheet ]

**APPENDIX L**

**NOTICE OF AWARD**

**TO:** \_\_\_\_\_  
(BIDDER)  
\_\_\_\_\_  
\_\_\_\_\_

**PROJECT DISCRPTION:** Hartford STP HTFD(1) – Bridge Street Bridge Project: Beginning at a point in the Town of Hartford on Bridge Street (TH 8), approximately 0.2 miles south of the intersection with Maple Street. Work to be performed under this project includes: railroad bridge rehabilitation and ancillary improvements to sidewalks, roadway, and adjacent railroad infrastructure.

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dates \_\_\_\_\_, 20\_\_\_\_\_, and

Instructions to Bidders. You are hereby notified that your BID has been accepted for lump sum in the amount of \$ \_\_\_\_\_ .

You are required by the Instructions to Bidders to execute the Agreement and finish the required CONTRACTOR'S certificates of insurance within ten (10) calendar days from the date of the Notice to you, and prior to the commencement of work.

You are required to return an acknowledged copy of the NOTICE TO AWARD to the OWNER.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_ .

\_\_\_\_\_  
Town of Hartford, VT  
(OWNER)

**By:** \_\_\_\_\_

**Title:** \_\_\_\_\_

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE OF AWARD is hereby acknowledged

**By:** \_\_\_\_\_

This \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_ .

**By:** \_\_\_\_\_

**Title:** \_\_\_\_\_

**[ blank sheet ]**

**APPENDIX L**

**NOTICE TO PROCEED**

TO: \_\_\_\_\_ DATE OF ISSUANCE: \_\_\_\_\_  
(BIDDER)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ Project: HARTFORD STP HTFD(1)  
\_\_\_\_\_  
\_\_\_\_\_

You are hereby notified to commence work in accordance with the agreement

Dated \_\_\_\_\_, 20\_\_\_\_\_ .

The date of substantial completion is Friday, November 1, 20 13 .

The date of completion of all work is Friday, May 23, 20 14 .

\_\_\_\_\_  
Town of Hartford, VT  
(OWNER)

By: \_\_\_\_\_

Title: \_\_\_\_\_

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by \_\_\_\_\_

This the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_ .

By: \_\_\_\_\_

Title: \_\_\_\_\_

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**APPENDIX L**

**AGREEMENT**

THIS AGREEMENT, is made this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_,

By and between Town of Hartford, VT, hereinafter called the "OWNER" and

\_\_\_\_\_, doing business as (an individual) or (a partnership) or (a corporation) hereinafter called "CONTRACTOR". WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of **HARTFORD STP HTFD(1)** Project as described in the CONTRACT DOCUMENTS.
2. The CONTRACTOR will furnish all the material, supplies, tools, equipment, labor, traffic control measurements, and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR will commence the WORK required by the CONTRACT DOCUMENTS on the date of issuance of the NOTICE TO PROCEED and will complete the same by Friday, May 23, 20 14, unless the period of completion is extended otherwise by the CONTRACT DOCUMENTS. The CONTRACTOR acknowledges that the date of beginning and the time for substantial completion and completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the CONTRACTOR further agrees to pay liquidated damages, as defined in Section 108.12 of the 2006 Standard Specifications for Construction for each consecutive calendar day that the CONTRACTOR shall be in default after the time specified in the Agreement.
4. The CONTRACTOR agrees to perform all the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein as shown in the BID schedule. The CONTRACTOR shall perform a minimum of 50% of the work with their own forces.
5. The term "CONTRACT DOCUMENTS" means and includes each and every one of the following, in their individual entireties:
  - (A) PROJECT MANUAL – includes Bidding Requirements, Contract Forms, Special Provisions, and Supplemental Specifications and permits.
  - (B) DRAWINGS PREPARED BY: Parsons Brinckerhoff, NUMBERED 1 THROUGH 30 AND DATED August 2012.
6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.
7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.



**APPENDIX L**

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in duplicate, each of which shall be deemed an original on the date first above written.

**OWNER: TOWN OF HARTFORD, VT**

Name: \_\_\_\_\_  
(Please Type)

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

(SEAL)

Attest: \_\_\_\_\_

Name: \_\_\_\_\_  
(Please Type)

Title: \_\_\_\_\_

**CONTRACTOR:**

Firm: \_\_\_\_\_

Name and Title: \_\_\_\_\_  
(Please Type)

Signature: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

(SEAL)

Attest: \_\_\_\_\_

Name: \_\_\_\_\_  
(Please Type)

Title: \_\_\_\_\_

**APPENDIX L**

**CONTRACTOR'S AFFIDAVIT**

STATE OF  Vermont

COUNTY OF  Windsor

Before me, the undersigned, a \_\_\_\_\_  
(Notary Public, Justice of Peace, Alderman)

in and for said County and State personally appeared, \_\_\_\_\_  
Individual, Partner, or Duly

\_\_\_\_\_ who being  
Sworn, according to law, Authorized Representative of Corporate Contractor)

deposed and says that the cost of all the Work, and outstanding claims and indebtedness of whatever nature arising out of the performance of the contract between:

\_\_\_\_\_ Town of Hartford, VT \_\_\_\_\_  
(OWNER)

and \_\_\_\_\_ of \_\_\_\_\_  
(Contractor)

Dated \_\_\_\_\_ for the construction of

\_\_\_\_\_ HARTFORD STP HTFD(1) \_\_\_\_\_,  
(Project Name & Number)

construction and necessary appurtenant installations have been paid in full.

\_\_\_\_\_  
(Individual, Partner, or Duly Authorized  
Representative of Corporate Contractor)

Sworn to and subscribed before me

This \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

\_\_\_\_\_  
(Notary Public)

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**APPENDIX L**

**CERTIFICATE OF SUBSTANTIAL COMPLETION**

OWNER'S Project Name & No.: HARTFORD STP HTFD(1)

=====

CONTRACTOR: \_\_\_\_\_

Contract For: \_\_\_\_\_ Contract Date: \_\_\_\_\_

=====

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

To: Town of Hartford, VT  
(OWNER)

And To: \_\_\_\_\_  
(CONTRACTOR)

=====

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR, ENGINEER AND STATE, and the Work is hereby declared to be substantially complete in accordance with the Documents on

\_\_\_\_\_  
(Date of Substantial Completion)

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by

**APPENDIX L**

CONTRACTOR within \_\_\_\_\_ calendar days of the above date of Substantial Completion.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as follows:

RESPONSIBILITIES:

OWNER: \_\_\_\_\_  
\_\_\_\_\_

CONTRACTOR: \_\_\_\_\_  
\_\_\_\_\_

=====

The following documents are attached to and made a part of this Certificate:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

=====

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR'S obligation to complete the Work in accordance with the Contract Documents.

=====

Executed by ENGINEER on \_\_\_\_\_, 20 \_\_\_\_  
\_\_\_\_\_  
Parsons Brinckerhoff  
(ENGINEER)

By: \_\_\_\_\_

CONTRACTOR accepts this Certificate of Substantial Completion on \_\_\_\_\_, 20 \_\_\_\_.

\_\_\_\_\_  
(CONTRACTOR)

By: \_\_\_\_\_

OWNER accepts this Certificate of Substantial Completion on \_\_\_\_\_, 20 \_\_\_\_.

(OWNER) \_\_\_\_\_

By: \_\_\_\_\_

**APPENDIX L**

**CONTRACTOR'S RELEASE**

KNOW ALL MEN BY THESE PRESENT that \_\_\_\_\_

\_\_\_\_\_  
(CONTRACTOR)

of \_\_\_\_\_, County of \_\_\_\_\_

and State of \_\_\_\_\_ do hereby acknowledge that

\_\_\_\_\_  
(CONTRACTOR)

has \_\_\_\_\_ this day had, and received of and from \_\_\_\_\_

\_\_\_\_\_  
Town of Hartford, VT  
(OWNER)

The sum of One Dollar and other valuable considerations in full and complete satisfaction and payment of all sums of money owed, payable and belonging to

\_\_\_\_\_  
(CONTRACTOR)

BY ANY MEANS WHATSOEVER, FOR ON ACCOUNT OF A Contract Agreement between

\_\_\_\_\_  
Town of Hartford, VT  
(OWNER)

and

\_\_\_\_\_  
(CONTRACTOR)

Dated \_\_\_\_\_ for \_\_\_\_\_ HARTFORD STP HTFD(1)  
(PROJECT NAME)

NOW, THEREFORE, the said \_\_\_\_\_  
(CONTRACTOR)

(for myself, my heirs, executors and administrators) (for itself, its successors and assigns)  
(do/does) by these presents remise, release, quit-claim and forever discharge

\_\_\_\_\_  
Town of Hartford, VT \_\_\_\_\_, (OWNER), of and from all claims and

Demands, arising from or in connection with the said contract dated \_\_\_\_\_,

and of and from all, and all manner of action and actions, cause and causes of action and actions, suits, debts, dues, duties, sum and sums of money, accounts, reckonings, bonds, bills, specialties, covenants, contracts, agreements, promises, variances, damages, judgments, extents, executions, claims and demand, whatsoever in law or equity, or otherwise, against

**APPENDIX L**

\_\_\_\_\_  
Town of Hartford, VT \_\_\_\_\_, (OWNER), its successors and assigns, which (I, my heirs, executors, or administrators) (it, its successors and assigns) ever had, now have or which (I, my heirs, executors, or administrators) (it, its successors and assigns) hereafter can, shall or may have, for, upon or by reason of any matter, cause, or thing whatsoever, from the beginning of recorded time to the date of these presents.

IN WITNESS WHEREOF, \_\_\_\_\_

\_\_\_\_\_  
(CONTRACTOR)

Has caused these presents to be duly executed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_ .

Signed, Sealed and Delivered in the presence of:

\_\_\_\_\_  
(INDIVIDUAL – CONTRACTOR) (SEAL)

=====

\_\_\_\_\_  
(PARTNERSHIP – CONTRACTOR) (SEAL)

\_\_\_\_\_  
By: \_\_\_\_\_  
(PARTNER)

=====

Attested:

\_\_\_\_\_  
(CORPORATION)

\_\_\_\_\_  
(SECRETARY) By: \_\_\_\_\_  
(PRESIDENT OR VICE PRESIDENT)

(Corp. Seal)

***APPENDIX M***

**PROJECT PERMITS**



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# OFF-SITE ACTIVITY SUBMITTAL



- **This form is to be completed in its entirety by the Contractor/District Tech** when proposing any waste, borrow, or staging area or any work outside the defined Contract construction limits.
- **Submit to Karen Spooner:** [karen.spooner@state.vt.us](mailto:karen.spooner@state.vt.us), Phone: (802)828-2169, Fax: 802-828-2334, VTrans Program Development Division, Environmental Section, One National Life Drive, Montpelier, VT 05633-5001
- **Submit a copy to the Resident Engineer**
- **Allow 15 days for review once the application is administratively complete.**

▪ **SUBMITTAL INFORMATION**

**Project Name/District:** \_\_\_\_\_ **Contractor/District Tech:** \_\_\_\_\_  
**Contact:** \_\_\_\_\_ **Phone:** \_\_\_\_\_ **Fax:** \_\_\_\_\_ **E-mail:** \_\_\_\_\_  
**Resident Engineer:** \_\_\_\_\_ **Phone:** \_\_\_\_\_ **Fax:** \_\_\_\_\_

- **PROPOSAL INFORMATION** (Select one type of area being proposed for use per submittal and describe associated characteristics)

Waste                       Borrow                       Staging                       Other (ex. dewatering location): \_\_\_\_\_  
 Material: Type (asphalt, concrete, earthen, etc.) \_\_\_\_\_ Quantity (yds<sup>3</sup>) \_\_\_\_\_  
 Total Area of Land Disturbance (sq ft) \_\_\_\_\_  
 Additional Info: \_\_\_\_\_

- **LANDOWNER/PROPERTY INFO** (Fill all applicable boxes; attach a Location Map and Sketch of Area)

**Name:** \_\_\_\_\_ **Address:** \_\_\_\_\_ **Phone:** \_\_\_\_\_  
Print Name  
 Private Residential/Commercial                       Town/State Owned Facility                       Other  
 Additional Info: \_\_\_\_\_  
 Are there other users of this site?                       Yes                       No  
 Known past uses: \_\_\_\_\_  
 Location Map (must be USGS Geological Survey Map (7.5'))  
 Sketch of Area:                       North arrow                       Approx scale                       Recognizable features  
**Permit Info:**  
 Act 250 Permit Exists?     Yes                       No    If Yes, # \_\_\_\_\_ Copy Enclosed?  Yes     No  
 List of Other Existing Permits: \_\_\_\_\_  
**Landowner Agreement** (Signature is required for all private, town, and state owned properties.)  
 I, \_\_\_\_\_, verify the above permit information to be accurate and allow use of the proposed area by  
Landowner / Facility Manager Signature  
 \_\_\_\_\_ as shown on the attached sketch and in accordance with VTrans specifications and  
Name of Contractor  
 requirements. Date: \_\_\_\_\_

- **EPSC PLAN** (Except for operating pits, if the proposed area involves erodible materials or earth disturbance you must provide an EPSC Plan with this submittal)

Attached                       Not Applicable

# Off-Site Activity Exemption Record

**To be completed by the Contractor and filed with the Resident Engineer.**

Check the appropriate exemption category from the boxes below.

## Staging Area Exemptions

The placement of construction trailers, equipment, and/or non-erodible materials

- On existing paved or gravel surfaces which will not require any additional earth disturbance

## Borrow Site Exemptions

- Existing, in-use gravel pits which have an Act 250 Permit as long as the use does not modify the conditions of said permit (Act 250 Permit # provided by Contractor)
- Existing, in-use, commercial gravel pits that are "Grandfathered" from the Act 250 Permit Review Process as long as a landowner signature is provided.
- Inter-project Material Usage - The use of surplus materials from one project as borrow for another in which the owner and contractor are the same in both projects and neither involve work outside the respective contract construction limits

## Waste Disposal Exemptions

- The use of project generated Solid Wastes to build the same project, or another project owned by the same entity.
- Batch plants for recycling of materials and subsequent re-use
- The disposal of any (erodible or non-erodible) materials in an existing shed at any public transportation facility to which the material will be stored for later re-use
- Existing, in-use gravel pits which have an Act 250 Permit as long as the use does not modify the conditions of said permit (Act 250 Permit # provided by Contractor)
- Existing, in-use, commercial gravel pits that are "Grandfathered" from the Act 250 Permit Review Process as long as a landowner signature is provided.
- Inter-project Material Usage - The use of surplus materials from one project as borrow for another in which the owner and contractor are the same in both projects and neither involve work outside the respective contract construction limits
- The disposal of hazardous materials at a facility which has been reviewed and approved by the Agency's Hazardous Materials Specialist.

**Project Name:** \_\_\_\_\_

**Proposed Area Name:** \_\_\_\_\_

**Act 250 Permit # (for Existing, In-use sites)** \_\_\_\_\_

**Act 250 Grandfathered Signature** \_\_\_\_\_  
(Owner or authorized representative)

## Off-Site Activity Frequently Asked Questions

- 1) Do I have to submit every waste, borrow, and staging site to the VTrans Environmental Section?

No, there is an EXEMPTION LIST which allows Contractors to utilize certain sites for certain activities without needing further approvals by the VTrans Environmental Section. If proposed site does not qualify for the exemption then it needs to be submitted for review.

- 2) When do I have to complete an Offsite Activity Form?

You need to complete an Offsite Activity Form for every proposed site unless it meets the exemption criteria. The form should be submitted well in advance of needing to use a site for staging equipment, wasting material, or excavating materials. Essentially, if it involves any area outside of the previously cleared project impact limits, the form needs to be completed. However, certain activities are EXEMPT from needing to be review. See EXEMPTION List.

- 3) When does the review process begin?

The review process begins when the VTrans Environmental Section has deemed the submittal complete. The form must be completely filled out and all necessary information (maps, sketches, etc.) attached.

- 4) How long does the review process take?

Due to the large volume of work, Contractors need to anticipate a 15-working day turn-around time once the application is deemed complete. The review time is generally much less than this, but there is no guarantee that it will be. Contractors should therefore plan ahead, and submit the information as soon as possible. Finding a site that meets the exemption form would help speed up the process. See EXEMPTION List.

- 5) What are the most common reasons that a proposed site is rejected?

There are a variety of reasons. Each site is reviewed for its potential impact on both cultural and natural resources, which include, but are not limited to:

- archaeological and/or historic sites
- wetlands and wetland buffers
- floodplain and riparian buffer zone encroachments
- potential impact to nearby species/habitats of special concern
- presence of existing violations such as:
  - i. evidence of unpermitted wetland filling
  - ii. presence of existing (non-permitted) solid waste disposal

- 6) What happens if the information provided is not complete?

If the information request is not complete, the VTrans Environmental Section will request the additional information from the contact person listed on the form. Once all of the information has been fully submitted, the 15-working day review “clock” will begin.

- 7) If I propose to use state-owned right-of-way for waste, borrow or staging, do I still need to submit the request to the VTrans Environmental Section?

Yes, unless Exempt, all areas must be reviewed for potential impacts on the environment. Right of way limits are unrelated to whether or not an area has the potential to contain resources.

- 8) What causes delays in review or clearance of my proposed site?

Delays can happen if the proposed site is rejected due to resource issues, or when the usable site is too small to accept all of the wastes from the project. Delays also happen when submittal information is incomplete or if additional information is needed. To avoid this, Contractors are

encouraged to submit more than one site and again Contractors should plan ahead, and submit the information as early as possible.

9) Are there some areas of the state that are more difficult to clear for waste, borrow, and staging?

Yes, the Champlain Valley below elevation 800 is particularly difficult given the richness of the area for cultural and natural resources. For projects in this region of the state, early and multiple submittals will be the best defense against delays. Generally, the more waste that needs disposal, the more difficult it will be to find an approvable site.

10) Can I use a site that was previously cleared for another project?

Previously cleared sites which were used in previous years or by other Contractors may be used, but a full submittal form is still required.

11) If a farmer's field has been plowed is it considered disturbed?

No. The plow only turns over soil to about a depth of 6 inches (25 centimeters). Generally soil below that point is intact and may contain archaeological features and/ or artifacts. Also a plow does not usually carry artifacts that far from its original location so even if the top few inches is disturbed, the soil may still contain important material relating to the site.

12) Can we stage equipment or trailers on an archaeologically sensitive area if we aren't disturbing the ground?

This is generally discouraged although sometimes staging of equipment, trailers and material are allowed by the Archaeologist on sensitive areas but this is dependent on a number of factors. These activities are not usually allowed in upland locations where artifacts may be very close to the surface. In all cases where allowed, ground protective measures must be used such as Geotextile fabric.

You may always submit a site like this but do not count on it as your only site in case it is rejected.

13) Can we waste material on or fill over an archaeologically sensitive area?

No. You are not allowed to fill over a sensitive area. If an area is archaeologically sensitive, it will be rejected for use.

14) Doesn't filling over a sensitive area or archaeological site "protect" it? (generally termed "intentional site burial")

At this time, the Division for Historic Preservation for whom our Archaeologist must answer to does not allow this practice. At minimum a Phase I study would be necessary as we would need to be able to identify and evaluate a site before burying it anyway. In addition, there is insufficient information on this subject as to the long- term effects of permanent intentional site burial. For example there are concerns about the effects of weight and compaction of fill on features and artifacts contained within an archaeological site.

***APPENDIX N***

WORK ZONE SAFETY AND MOBILITY  
GUIDANCE DOCUMENT

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# WORK ZONE SAFETY & MOBILITY GUIDANCE DOCUMENT

August 2007



Prepared by:

Vermont Agency of Transportation





The following document was drafted in response to updates made to the work zone regulations at 23 CFR 630 Subpart J, published by the Federal Highway Administration. This document applies to all federal aid projects that have a pre-final contract administration/step submittal date after January 1, 2008.

### **Work Zone Safety and Mobility Vision**

Current and future work zone safety and mobility issues mean that transportation practitioners need to minimize and manage the work zone impacts of transportation projects. In order to meet safety and mobility needs during highway maintenance and construction, and to meet the expectations of the traveling public, it is important to systematically analyze and assess the work zone impacts of projects and take appropriate action to manage these impacts.

The following has been adopted as the Vermont Agency of Transportation's (VTrans) work zone safety and mobility vision statement: *To provide optimum safety for workers and the traveling public while maintaining acceptable levels of mobility in an efficient environment for the contractors to complete the project work in accordance with their contracts.*

### **Work Zone Safety and Mobility Goals and Strategies**

Goal: To provide a safe work zone for motorists, pedestrians, bicyclists (the traveling public) and construction personnel.

Strategy: Development of site-specific traffic control plans, while ensuring compliance with the Manual on Uniform Traffic Control Devices (MUTCD) and state design standards and specifications.

Goal: To minimize construction-related delays.

Strategy: Construction-related delays will be monitored. A change to the traffic management plan will be considered for construction-related delays greater than ten minutes.

Goal: To gain further knowledge of work zone procedures applicable to the State of Vermont.

Strategy: Summarize the work zone field evaluations to identify the effectiveness of implemented safety measures and to improve future Transportation Management Plans (TMP).

Goal: To ensure that the appropriate personnel have the necessary knowledge, skills, and abilities to design and/or implement a TMP.

Strategy: Management will be responsible for ensuring that their personnel has been provided appropriate training in accordance with their defined roles. Training to include but not limited to: flagger certification, NHI courses, AGC training, and the Vermont Local Roads Program courses.

### **Project Classification**

The purpose of the Work Zone Safety and Mobility Guidance document is to allow VTrans to better anticipate the impacts associated with individual projects. Examples of impacts include internal project coordination, project scheduling and overall cost. Every federally funded project will require a TMP. The classification of the project will determine the complexity of the TMP. All transportation projects must be classified into one of three types of projects: significant, moderate, or minor projects. To accurately classify a project, several design characteristics must be analyzed to provide **guidance** in determining the appropriate project classification. The following characteristics should be evaluated when determining any project classification. These characteristics include but are not limited to:

- Project Location (Urban/Rural Setting)
- Primary Network (Interstate, Interchanges, Major State Roads, Major Intersections, NHS, Truck Network)
- Construction Duration (Months, Years)
- Access Management Category (Driveway Density, Business/Industry Density)
- Traffic Volumes (Average Annual Daily Traffic, Peak Hour Traffic, Existing Crash Rates, Car-Truck-Pedestrian-Bicycle Volumes)
- Proximity To Other Construction Projects
- Available Detour Routes

A project classification should be identified by the appropriate Project Manager<sup>1</sup>, and confirmed by their respective Program Manager as early as the scoping process. This classification should be analyzed periodically throughout the design process to ensure that any design changes or site characteristic changes will not require a classification modification. Project classification is used to help identify the impacts associated with different types of transportation projects. This classification is used to determine what TMP should be applied to the project. The following definitions closely follow FHWA's Work Zone Self Assessment, [http://www.ops.fhwa.dot.gov/wz/docs/wz-sa-docs/sa\\_guide\\_s4.htm](http://www.ops.fhwa.dot.gov/wz/docs/wz-sa-docs/sa_guide_s4.htm).

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<sup>1</sup> Please note that the position titles used in this document are typical Program Development Division titles. Applicable Operations Division titles as well as alternate VTrans Division titles may be substituted as necessary.

Significant Projects: Significant projects have a high level of public interest and will likely impact a large number of travelers. This impact must be analyzed individually and also in combination with concurrent active projects. It will have moderate to high user-cost impacts and the duration is usually moderate to long. These characteristics create work zone impacts that fall outside of the typical work zone safety and mobility thresholds. Examples of this work type may include: major corridor reconstruction, high impact intersection reconstruction, full closures on high volume facilities, major bridge reconstruction or repair, repaving projects that require long term lane closures, etc (e.g. Shelburne-South Burlington US 7 Reconstruction Project). It is important to note that significant projects are unique in that they have considerable impacts to the project area as well as the surrounding community.

Moderate Projects: Moderate projects have the potential to affect the level of public interest and may impact a modest number of commuters. These projects would include typical roadway, bridge, and paving projects.

Minor Projects: Minor projects have a minimal impact to the traveling public and a short duration. Typical projects within this category include sign installation, bridge inspection, pavement marking, and various maintenance activities.

### **Transportation Management Plans (TMPs)**

TMPs are strategies/methodologies that will be implemented to ensure safe and mobile work zones within transportation projects. The project classification will determine the detail level required for the TMP. There are three major components of a TMP;

Temporary Traffic Control Plan (TTC): A TTC plan describes temporary traffic control measures to be used for facilitating road users through a work zone or an incident area. The TTC plan plays a vital role in providing continuity of reasonably safe and efficient road user flow and highway worker safety when a work zone, incident, or other event temporarily disrupts normal road user flow. The TTC plan shall be consistent with the provisions of the MUTCD and AASHTO Roadside Design Guide.

Transportation Operations Component (TO): The TO component shall include the identification of strategies to mitigate impacts of the work zone on the operation of the transportation system within the work zone impact area. The work zone impact area consists of the immediate work zone as well as affects to the surrounding roadways and communities. Examples of practices that may be used to satisfy the TO component may be found at [http://www.ops.fhwa.dot.gov/wz/rule\\_guide/sec6.htm#sec63](http://www.ops.fhwa.dot.gov/wz/rule_guide/sec6.htm#sec63).

Public Information Component (PI): The PI component shall include communication strategies that seek to inform the general public of work zone impacts and the changing condition of the project. The general public may

include road users, area residences and businesses, and other public entities. Examples of communications strategies that may be used to satisfy the PI component may be found at [http://www.ops.fhwa.dot.gov/wz/rule\\_guide/sec6.htm#sec63](http://www.ops.fhwa.dot.gov/wz/rule_guide/sec6.htm#sec63).

**Significant Projects:** The TMP for significant projects shall consist of a TTC, a TO, and a PI.

**Moderate/Minor Projects:** The TMP for moderate and minor projects shall consist of a TTC. A TO and a PI are not required, but may be applicable to certain projects as determined by the Project Manager.

### **Design Strategies**

The development of a TMP is an iterative process that may vary significantly between projects. Work on a TMP should begin early in the project development process. There are numerous resources available to the designer to assist in the development of this plan: several of these are listed in the reference section of this document. The following outlines the key components of the TMP development process.

**Preliminary Data Collection:** As early as scoping, the project design team collects, analyzes, and documents all applicable project data.

**Determine Project Classification:** A project classification is determined based on the initial data that was collected. The project classification defines what components are required in the TMP.

**Develop TMP:** Work zone management strategies should be identified based on the project characteristics and used to develop all necessary aspects of the TMP. Applicable resources should be contacted during this step to obtain their input. This may include utilization of previous work zone feedback provided by the Construction Section. Plans and contract documents shall be based on standard specifications and include necessary pay items.

**Update/Revise TMP:** As a project progresses through all of the design stages the TMP should be re-evaluated to ensure that any project changes do not affect the TMP. It is possible that the project classification could change during the project design stages.

**Finalize TMP:** Ensure that the contract plans, special provisions, and estimate include all of the applicable elements of the TMP and allow the flexibility to develop or modify a TMP.

## **Roles and Responsibilities**

- Step 1: A preliminary analysis will be performed by the *Design Team* to determine project classification. This preliminary analysis will be documented in the project's design file.
- Step 2: The *Project Manager* will have the responsibility of monitoring the project and proposed classification and informing the respective *Program Manager*.
- Step 3: The *Design Team* will develop a transportation management plan. The *Project Manager* will monitor the classification status. If there are significant changes, the project classification may be modified.
- Step 4: The *Construction Resident Engineer* will be responsible for identifying and documenting deficiencies in the TMP that compromise the effectiveness of the work zone and coordinating any improvements with the Contractor/State safety representative. Examples of data that may be included in the work zone documentation includes; crashes or other traffic incidents, traffic delay, traffic conflicts, and public comments. The *Project Manager* may assist in addressing any proposed modifications to the TMP during the construction process.
- Step 5: The *Regional Construction Engineer* will complete a work zone summary of TMP effectiveness based on the work zone documentation and any applicable work zone reviews performed by Traffic Operations.
- Step 6: The *Work Zone Safety and Mobility Committee* will consist of representatives from multiple sections within VTrans. This committee will review the work zone summary and will be responsible for updating the Work Zone Safety and Mobility Guidance document based on feedback from the year's construction projects. This committee will be responsible for sharing all applicable information throughout the Agency as well as with additional working groups and committees.

## **Application/Feedback**

The Construction Engineer will submit a summary of TMP effectiveness and recommendations for improvements at the end of the construction season based on the work zone documentation provided by the Regional Engineers. The Work Zone Safety and Mobility Committee will meet annually to discuss these summaries. These summaries will serve to identify common TMP practices that are not working effectively, and will also assist in identifying TMP practices that are successful. The Work Zone Safety and Mobility Guidance document and supporting documentation will be revised to reflect the field evaluation summaries.

## **References**

A Policy on Geometric Design of Highways and Streets. American Association of State Highway and Transportation Officials, Current Edition.

Developing and Implementing Transportation Management Plans for Work Zones. U.S. Department of Transportation Federal Highway Administration, December 2005.

Engineering Operations Manual. Vermont Agency of Transportation, Current Edition.

Highway Capacity Manual. Transportation Research Board of the National Academies, Current Edition.

Implementing the Rule on Work Zone Safety and Mobility. U.S. Department of Transportation Federal Highway Administration, September 2005.

Manual on Uniform Traffic Control Devices for Streets and Highways. U.S. Department of Transportation Federal Highway Administration, Current Edition.

Road Design Manual. Vermont Agency of Transportation, Current Edition.

Roadside Design Guide. American Association of State Highway and Transportation Officials, Current Edition.

Standard Specifications for Construction. Vermont Agency of Transportation, Current Edition.

Structures Manual. Vermont Agency of Transportation, Current Edition.

The State of Vermont Agency of Transportation Safety Manual. Vermont Agency of Transportation, Current Edition.

Traffic Design Manual. Vermont Agency of Transportation, Current Edition.

“Vermont Agency of Transportation Standard Drawings.” Vermont Agency of Transportation, Current Edition.

Work Zone Impacts Assessment: An Approach to Assess and Manage Work Zone Safety and Mobility Impacts of Road Projects. U.S. Department of Transportation Federal Highway Administration, May 2006.

Work Zone Public Information and Outreach Strategies. U.S. Department of Transportation Federal Highway Administration, November 2005.

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***APPENDIX O***

VERMONT AGENCY OF TRANSPORTATION  
PROMPT PAY COMPLIANCE INFORMATION



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## Vermont Agency of Transportation Prompt Pay Compliance Information

In order to meet all federal and state prompt payment requirements, the Vermont Agency of Transportation (VTrans) has developed a comprehensive plan for providing educational outreach, monitoring and enforcement on all VTrans contracts.

### Applicable Statutes and Regulations:

- **Vermont's Prompt Pay Statute requires payment from primes to subs within 7 days of primes receiving payment:** Vermont State Statutes, Commerce and Trade, T.9 §4003 (c), provides: "Notwithstanding any contrary agreement, when a subcontractor has performed in accordance with the provisions of its contract, **a contractor shall pay to the subcontractor, and each subcontractor shall in turn pay to its subcontractors**, the full or proportional amount received for each such subcontractor's work and materials based on work completed or service provided under the subcontract, **seven days after receipt of each progress or final payment or seven days after receipt of the subcontractor's invoice, whichever is later.**"
- **USDOT's DBE Regulations (as revised in 1999) require monitoring and enforcement by State DOTs:** United States Department of Transportation Regulations, Section 26.37 of 49 CFR Part 26 requires VTrans to implement appropriate mechanisms to ensure compliance with Part 26 requirements, including prompt payment. To do so, **VTrans must use legal and contract remedies available under Federal, state, and local law.**

### All VTrans Contracts Require Monthly Reporting:

- **Type and Form of Information Required from Prime Contractors:** To enable VTrans to monitor compliance with the prompt payment requirements, on all contracts, our prime contractors are contractually required to submit certain documentation on a monthly basis to the VTrans Office of Civil Rights. Specifically, **prime contractors must submit by the 10<sup>th</sup> day of each month a list of all payments to all subcontractors during the preceding month.** For each payment, the **required information** includes:
  - **The project name and number**
  - **The subcontractor**
  - **The date and amount paid**
- **Electronic reporting format:** For convenience and efficiency, all required information can be submitted online, at a secure site, using a contractor password and PIN (Personal Identification Number). Instructions and the reporting form are available at <http://www.aot.state.vt.us/dbe/login.asp>

- **Alternate reporting format:** Contractors without access to the internet may obtain and submit manual reports to the VTrans Office of Civil Rights. Forms and information can be requested by calling: (802) 828-2715.

### **Enforcement:**

- **Sanctions for Noncompliance:** Any payments made to subcontractors more than seven days after receipt of a corresponding progress payment by VTrans to the Contractor, or seven days after receipt of the subcontractor's invoice, whichever is later, is a violation of contract and state and federal law.
  - **Interest Penalties:** In accordance with 9 V. S. A. Section 4003 and 12 V. S. A. Section 2903, **interest accrues on the unpaid balance at the statutory rate of 12 percent per year.**
  - **Progressive Enforcement:** Any late payments or other violations should be reported to the VTrans Office of Civil Rights, DBE Program Manager, Colleen Montague, at: [colleen.montague@state.vt.us](mailto:colleen.montague@state.vt.us), or (802) 828-2715.
  - A prompt investigation of all allegations of noncompliance will be initiated. Failure to promptly resolve all disputes may result in a complaint made to the VTrans Pre-qualification Committee. In this event, **failure to comply may result in suspension, reduction or revocation of the contractor's pre-qualification rating.**
  - **Claims Procedure:** Subcontractors may be protected by the surety bond required of all prime contractors, if they comply with all statutory requirements of 19 V. S. A. Section 10(9). **In order to obtain the protection of the statute, claims must be filed within 90 days after acceptance of the project and must be notarized.** In addition to the statutory remedy, VTrans is authorized, but not required, to withhold payment to a contractor until any claim of any type is settled to the satisfaction of the subcontractor, pursuant to the Standard Specifications for Construction which are incorporated in all construction contracts. (See Sections 107.16, 109.03 and 109.08). **Claim forms can be obtained by contacting the VTrans Financial Operations Section or the VTrans Construction Section.**

### **For More Information and Assistance:**

- For additional information and useful links on prompt payment requirements, please visit the VTrans DBE website at: <http://www.aot.state.vt.us/CivilRights/dbe.htm>
- Please contact the VTrans DBE Program Manager, Colleen Montague, with any additional questions and comments, as follows:

**Colleen Montague, Office of Civil Rights,  
Vermont Agency of Transportation, National Life Building - Drawer 33, Montpelier, VT 05633-5001;  
Telephone: (802) 828-2715 or (800) 356-1965; Fax: (802) 828-1047;  
e-mail: [colleen.montague@state.vt.us](mailto:colleen.montague@state.vt.us).**

***APPENDIX P***

US DEPARTMENT OF LABOR DAVIS-BACON RATES  
AS AMENDED BY THE STATE OF VERMONT ACT 54  
(for Windsor County)

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GENERAL DECISION: VT20100037 03/12/2010 VT37

Date: March 12, 2010

General Decision Number: VT20100037 03/12/2010

Superseded General Decision Number: VT20080037

State: Vermont

Construction Type: Highway

County: Windsor 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	03/12/2010

\* SUVT2005-021 09/01/2005

	Rates	Fringes
Carpenter (includes form work).....	\$ 13.21	
Ironworker, reinforcing.....	\$ 13.29	.52
Ironworker, structural.....	\$ 21.15	15.54
Laborers:		
Blaster, demolition.....	\$ 20.38	2.60
Concrete worker.....	\$ 12.46	
Driller.....	\$ 14.50	2.60
Flagger.....	\$ 11.15	4.40
Guardrail installer.....	\$ 9.88	
Highway line striping.....	\$ 14.38	
Landscape laborer.....	\$ 10.19	1.03
Sign installer.....	\$ 11.70	4.26
Unskilled.....	\$ 12.01	
Power equipment operators:		
Auger.....	\$ 15.16	
Backhoe.....	\$ 15.54	
Broom.....	\$ 14.50	3.72
Bulldozer.....	\$ 16.22	3.35
Cold planer.....	\$ 16.20	
Crane.....	\$ 17.58	2.63
Excavator.....	\$ 15.97	1.36
Grader.....	\$ 16.44	3.50
Loader.....	\$ 15.13	
Mechanic.....	\$ 14.00	6.05
Paver.....	\$ 15.16	
Pounder.....	\$ 15.16	

Roller.....	\$ 15.92	6.05
Screed.....	\$ 14.85	4.09
Traffic signal installer.....	\$ 10.94	3.20
Truck drivers:		
2-axle.....	\$ 13.00	4.47
3-axle.....	\$ 13.27	4.61
4-axle.....	\$ 13.62	4.74
Dump.....	\$ 12.53	1.14

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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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In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

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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



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***APPENDIX Q***

**RIGHT OF WAY AND UTILITY CLEARANCES**

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**TOWN OF HARTFORD, VERMONT  
BRIDGE CONSTRUCTION AGREEMENT  
GRADE SEPARATION  
AGREEMENT NO.: NECR #120524  
TOWN OF HARTFORD PROJECT NO.: STP HTFD (1)  
FEDERAL PROJECT NO.:**

**THIS AGREEMENT** made and entered into this 4<sup>th</sup>, day of September, 2012, by and between the Town of Hartford, Vermont, acting by and through the Town of Hartford Town Manager, as First Party, hereinafter referred to as the TOWN, and the New England Central Railroad, Inc., a Delaware Corporation, as the Second Party, hereinafter referred to as the COMPANY.

**WITNESSETH:**

**WHEREAS**, the TOWN proposes to reconfigure a public roadway identified by the TOWN as Bridge Street (AAR\DOT# 247816T), crossing on COMPANY's land and right-of-way and under two (2) railroad tracks of the COMPANY at Mile Post 14.94, designated by the Project Number STP HTFD (1), in accordance with plans prepared by the TOWN and approved by the COMPANY, hereinafter referred to as the PLANS; and

**WHEREAS**, Bridge Street now passes underneath the tracks of the COMPANY by means of one or more existing roadway underpass structures (AAR\DOT #247816T) at COMPANY milepost 14.94, hereinafter referred to as the "Old Bridge", and is now deemed inadequate for roadway purposes in the Town of Hartford, Windsor County, Vermont; and

**WHEREAS**, the TOWN desires to phase the removal and replacement of the Old Bridge with one or more new structures identified by the COMPANY as New England Central Railroad Bridge Number 8, which will carry the COMPANY's tracks over Bridge Street (AAR\DOT# 247816T), together with roadway and drainage improvements to effectively conduct motor vehicle traffic on Bridge Street (AAR\DOT# 247816T) and underneath the COMPANY's tracks on the land and right-of-way of the COMPANY hereinafter referred to as the "Roadway Underpass Structure". The construction of the Roadway Underpass Structure and related work will hereinafter be referred to as the "PROJECT"; and

**WHEREAS**, in order to complete the PROJECT, the TOWN seeks permission from COMPANY to enter COMPANY's property to (1) install temporary structures necessary to buttress the COMPANY's track structures during the PROJECT, (2) remove the Old Bridge, (3) construct the Roadway Underpass Structure, and (4) later remove the temporary structures as may be necessary to facilitate safe operation of rail and motor traffic during the construction of the PROJECT; and

**WHEREAS**, the TOWN intends to turn over to the COMPANY the parts that currently make up the "Old Bridge", including but not limited to the railroad track structure, its rail, fastenings, and all steel railroad components, delivered to a location as specified in Section 2.6 hereof, upon completion of construction; and

**WHEREAS**, the TOWN intends to remove from the PROJECT, all other non steel materials including construction spoils, ballast, asphalt, cross ties, etc. from COMPANY right-of-way within the city limits,

and said materials shall be properly disposed at a certified disposal facility, and documentation of proper disposal must be provided, upon completion of construction to the COMPANY; and

**WHEREAS**, no existing COMPANY grade crossing will be eliminated as a result of the proposed construction; and

**WHEREAS**, under such conditions, grade crossing elimination laws of the TOWN and State of Vermont, do not apply to the PROJECT herein considered; and

**WHEREAS**, the TOWN, or designated regulatory agency or committee is empowered generally by Local and State Ordinance and Code, as applicable, for roadway improvements of the type herein contemplated; and

**WHEREAS**, the Federal-Aid Highway Act of 1956, as amended, and Local and State Ordinance and Code, as applicable, provides funding for the construction costs of projects such as is contemplated herein; and

**WHEREAS**, it is desired by the parties hereto to carry out and accomplish the phased removal and replacement of the Old Bridge at the point hereinbefore mentioned and to determine and agree upon the manner of doing said work and the portion of said work to be done by each of said parties respectively, and the proportion of costs and expenses to be paid by each of said parties, and the mode and time of payment therefore.

**NOW THEREFORE**, for and in consideration of the mutual covenants hereinafter stipulated to be kept and performed, it is agreed between the parties as follows:

#### **SECTION 1 PRELIMINARY ENGINEERING, PLANS AND SPECIFICATIONS**

- 1-1. The TOWN shall have general charge of the engineering work on the PROJECT, but the COMPANY shall provide such engineering services as the TOWN may require. Nothing herein shall deny the COMPANY the right to place inspectors on work being done on its property or facilities as reasonably required or consistent with industry practices. Preliminary engineering and inspection costs incurred by the COMPANY subsequent to June 1, 2011, the date of first communication with the COMPANY, may be charged against the PROJECT at the TOWN's expense. As of April 1, 2012, such expenses are approximately \$8,380 and, going forward through completion of the PROJECT, such additional expenses are estimated to be in accordance with Exhibit "A" attached hereto. Any expenses prior to June 1, 2011 shall be governed by that certain agreement entitled "Part 1 of Right-of-Way, Finance and Maintenance Agreement" and dated March 13, 2006, as amended and supplemented.
- 1-2. Construction engineering and inspection costs incurred by the COMPANY subsequent to the award of a construction contract by the TOWN may be charged against the PROJECT at the TOWN's expense.
- 1-3. The PLANS of the TOWN for the said improvement are identified by title as follows:

**"Town of Hartford, Vermont, Proposed Improvement, Bridge Project, Town of Hartford, County of Windsor, New England Central Railroad (NECR) Bridge NO. 8, Project Number STP HTFD (1) 100% Submission January 2012"**

Before this Agreement shall be in force and effect, the foregoing PLANS have met the approval of the parties hereto, but are still subject to final approval by the state and federal agencies providing the funding for the PROJECT. Such approval or approvals are a precondition to this Agreement and upon such approval or approvals, it or they, as the case may be, shall become a part of this agreement by reference.

- 1-4. Within thirty (30) days after receipt, the COMPANY shall perform its final inspection, if not already performed, and deliver acceptance of completion of the PROJECT in writing to the TOWN. Such written acceptance letter shall be dated and delivered in accordance with SECTION 20, hereinafter the "ACCEPTANCE DATE". Within sixty (60) days after the completion of the PROJECT and final payment, the TOWN shall provide as-built plans to the COMPANY, including all design plans, specifications, special provisions and design calculations for the Roadway Underpass Structure.
- 1-5. The Roadway Underpass Structure is made up of two distinguishable parts, which are the "Superstructure" and the "Substructure". The Superstructure is made up of the components that actually span the obstacle or roadway the bridge is intended to cross and includes (1) bridge deck (2) structural members and (3) parapets (bridge railings), walkway (for railroad personnel) and handrails. The Substructure consists of all of the parts that support the Superstructure, the main components being abutments or end-bents, piers or interior bents, footings, and piling. The parties acknowledge and agree that the TOWN's design for the Roadway Underpass Structure is a non standard design, and, therefore, the TOWN will accept sole liability for any claim, damage, expense, fine, penalty, suit, attorneys' fees or any other loss resulting from the design parameters for a period of ten (10) years after the ACCEPTANCE DATE. In addition to the obligations in SECTION 10 and for the foregoing time period, if any design parameter of the PROJECT is deemed to be the cause for any maintenance, repair, inspection and/or failure of the structure or its components, it will be the TOWN's sole responsibility for the costs incurred by the COMPANY for any maintenance, repair, and/or inspections required. Additionally, if any design parameter of the PROJECT is found to be the cause of a structure or component failure by an arbitrator after utilization of the process described in Section 21, the designs for the repair or replacement of the Roadway Underpass Structure, in whole or in part, must be acceptable to the COMPANY and at the sole cost to the TOWN.
- 1-6. Any work not specifically provided for in SECTION 3 or SECTION 4 shall be done by one of the parties hereto as may be mutually agreed upon from time to time during progress of the PROJECT, as provided for by the rules and regulations of the State of Vermont or the Federal Highway Administration, as then in effect.
- 1-7. All work to be done by the parties under the provisions of this Agreement shall be done in accordance with the PLANS, together with such other plans and specifications, detailed and supplementary thereto, as may be mutually agreed upon and as may be necessary to complete the PROJECT fully in accordance with the intent of this Agreement and in accordance with good engineering practice, which the Parties agree is not to be less than those required by AREMA standards of railroad construction.

- 1-8. In case any action or threat of action involving the PROJECT, the Old Bridge or the Roadway Underpass Structure is brought by or against any party hereto, said party shall promptly notify the other party of the pendency of such action.

## SECTION 2 SCOPE OF WORK

- 2-1. The work to be done under this Agreement and shown on the PLANS consists of the reconfiguration of Bridge Street and the phased removal and replacement of the Old Bridge.
- 2-2. Said work will consist of replacement of the superstructure of the Old Bridge, increasing the profile grade of the existing railroad tracks to provide additional vertical clearance on Bridge Street under the Roadway Underpass Structure, removal of the existing center pier, repair and modification of both stone masonry abutments to support the new superstructure, and roadway and sidewalk improvements on Bridge Street. Further, during construction, the PROJECT will include the temporary installation of a structure or structures as may be necessary to facilitate safe operation of both rail traffic on the COMPANY's property and motor traffic on Bridge Street during the removal of the Old Bridge and construction of the Roadway Underpass Structure.
- 2-3. It is understood that temporary minimum construction clearances of 12.5 vertically from bottom of the Old Bridge to the finish pavement of Bridge Street and 9.0 horizontally from centerline of tracks are targeted for the temporary structures that will be installed before removal of the Old Bridge.
- 2-4. The construction of the Roadway Underpass Structure and the necessary earth work to effect the final clearances, the grading, draining and paving of the roadway, the settlement of claims for property purchased, appropriated or damaged by such construction, and the maintenance of railroad traffic and rearrangement and restoration of railroad facilities made necessary by the work herein contemplated and the allowance by the COMPANY to permit temporary track outages as agreed to by the COMPANY and TOWN, as stipulated in the PLANS, shall be considered as necessary items to be included as part of this improvement. Except from the foregoing, and as referenced in Section 2.6, it is the agreement of the parties that the PROJECT does not at any time require or permit any interruption or delay in rail operations over Bridge Street.
- 2-5. Responsibility for the several necessary items of the PROJECT shall be as follows:
  - a. The following items shall be let in contract by the TOWN after competitive bidding as provided by law, at the TOWN's expense, subject to the provisions of this Agreement:
    1. Construction of a temporary shoring to support the COMPANY's tracks during the phased removal and replacement of the Old Bridge.
    2. Phased removal of the Old Bridge and construction of the Roadway Underpass Structure.
    3. Grading, draining and paving the public roadway, including constructing any curbing, sidewalks and drainage facilities.

4. Construction of all associated track in the superstructure of the Roadway Underpass Structure.
- b. The following items shall be done or caused to be done by the COMPANY with its own forces, at the TOWN's expense, subject to the provisions of this Agreement.
1. Changes in communication and signal lines, interlocking and signal apparatus.
  2. Provision of flagmen, watchmen and other protective services and devices to promote safety and insure continuity of train operations as may be necessary in connection with the work required herein for the PROJECT and performed by the COMPANY's forces. Subject to the sole discretion of the COMPANY, guidelines for when flagmen and watchmen are to be provided are attached as Exhibit "B".
  3. Construction management and inspection services as may be necessary in connection with the work performed hereunder by the TOWN's forces.
  4. Project administration and engineering services as may be necessary in connection with the work performed hereunder by the TOWN's forces.
- 2-6. The TOWN intends to turn over to the COMPANY the parts that currently make up the "Old Bridge", including but not limited to the railroad track structure, its rail, fastenings, and all steel railroad components, delivered to approximately five hundred (500) feet North of the project on the west side of the rail yard tracks, upon completion of construction.

### **SECTION 3 TOWN'S RESPONSIBILITIES**

- 3-1. The TOWN will provide, furnish or have furnished, all necessary materials required for, and will construct or have constructed the Roadway Underpass Structure(s) and the necessary approaches thereto at its sole expense. Said work to be done and materials to be furnished in accordance with PLANS. Upon completion of the structure(s), the COMPANY will maintain the same in a good and safe condition as outlined in Sections 8 and 9 of this document.
- 3-2. In addition to the requirements of Paragraph 2-5(b), the parties agree that such protective personnel are to be provided when the TOWN's contractor is carrying out work adjacent to COMPANY's tracks and whenever the Contractor is performing work requiring the movement of employees, trucks or other equipment across the tracks of the COMPANY, or when at other times the COMPANY and TOWN shall agree that such a service is necessary. Such costs shall be accrued and billed directly to the TOWN. The foregoing is included in that certain "Right-of-Entry Agreement" referred to in SECTION 5-3 hereof entered into by the TOWN's contractor.
- 3-3. The parties agree that it would be difficult or inconvenient to quantify the damages that would be suffered by the COMPANY if the TOWN's contractors were to disrupt train traffic. Accordingly, the TOWN agrees to pay liquidated damages to the COMPANY on an incremental, per diem basis for freight and/or passenger service delays at the amounts described below, except as allowed or occurring as a result of the Allowable Railroad Closure Periods as referenced in the Attachment.



**Initial:** Each delay that does not exceed a maximum duration of five minutes per train \$0.00  
**Incremental:** Each additional delay that extends beyond five minutes to twenty minutes per train \$2,000.00  
**Successive:** Each additional fifteen minute period of time delay per train \$1,500.00

Note – If an Amtrak train is delayed, causing such to miss its on-time arrival at the NECR checkpoint location, the TOWN must reimburse the COMPANY for the lost checkpoint revenue in addition to the above damages.

- 3-4. The TOWN intends to remove and dispose of, all other non steel materials not delivered to the COMPANY in accordance with SECTION 2, including construction spoils, ballast, asphalt, cross ties, etc. from COMPANY right-of-way within the city limits, and said materials shall be properly disposed at a certified disposal facility, and documentation of proper disposal must be provided, upon completion of construction, to the COMPANY.

#### SECTION 4 THE COMPANY'S RESPONSIBILITIES

- 4-1. The COMPANY, to the extent that its present rights, title and interests permit or enable it to do so, (i) does hereby grant a temporary construction license to TOWN upon, over and across the land and right-of-way of the COMPNAY, as shown in blue on Exhibit "C" attached hereto, for such purposes as may be directly related to the implementation and performance of the PROJECT and(ii) will enter into perpetual license agreement in which COMPANY shall grant to the TOWN the right to cross the land and right-of-way of the COMPANY for a public roadway, subject to the terms and conditions set forth in this Agreement including but not limited to SECTION 8. The foregoing license is granted pursuant to that certain Public Road Crossing License between the parties of even date. The COMPANY does not warrant title to the described premises for which the foregoing easements and licenses are granted and does not undertake to defend the TOWN in the peaceful enjoyment thereof, but the grant of the easement and license shall be subject to the continuing lien of all lawful outstanding liens and superior rights, if any, in and to said premises.
- 4-2. The COMPANY hereby agrees to adjust the necessary parts of its facilities along Bridge Street in accordance with the attached detailed statement of the work, plans and specifications, and in accordance with the provisions set forth in the Federal Highway Administration Federal-Aid Policy Guide, 23 C.F.R. Subchapter B, Part 140, Subpart I; and 23 C.F .R. Subchapter G, part 646, Subpart B, and any supplements thereto or revisions thereof, which, by reference hereto, are made a part hereof. The TOWN further agrees to do all of such work with its own forces or by a contractor paid under a contract let by the TOWN, all under the supervision and approval of the COMPANY and the Federal Highway Administration, when applicable.

- 4-3. The COMPANY or its contractor, during construction of the temporary and permanent structures described herein shall perform routine inspections of (a) the temporary roadway underpass structures described herein and (b) the superstructure of the Roadway Underpass Structure construction, to include span bearing and bearing support conditions in accordance with its own policies for such inspections and shall advise the TOWN of results of such inspections. The TOWN shall perform any required repair or maintenance to the bridge as identified in the inspection report, if any. In the event the TOWN fails to timely accomplish repairs or maintenance that it has been notified of, or in the event of an emergency repair or maintenance condition, the COMPANY may accomplish such repair or maintenance at the cost of the TOWN.
- 4-4. The COMPANY agrees to comply with other terms and conditions expressed elsewhere herein, including but not limited to SECTION 17, SECTION 18 and SECTION 19.

## **SECTION 5 THE TOWN'S CONTRACTOR**

- 5-1. The TOWN shall require its contractor at all times to use all reasonable care and diligence and to cooperate with the officials of the COMPANY in order to avoid accidents, damage or unnecessary delay to or interference with trains upon the tracks of the COMPANY.
- 5-2. Any of the COMPANY's equipment, such as work trains, locomotive cranes, cars or other rolling stock used for the PROJECT by the TOWN's contractor in carrying out his contract shall not be chargeable to the parties hereto, but the TOWN shall require the contractor to bear the cost of the rental of such equipment as part of the contract price for the PROJECT.
- 5-3. If at any time the TOWN's contractor requires a temporary crossing over the COMPANY's tracks, the TOWN shall require said contractor to arrange with the COMPANY for such crossing. Also, prior to entering onto COMPANY's property, the general contractor for the TOWN shall enter into a separate right-of-entry agreement with COMPANY ("Right-of-Entry Agreement"). Among other terms and conditions, the Right-of-Entry Agreement shall list each subcontractor with contact names and emergency telephone numbers. Company acknowledges receipt of payment in the amount of \$1,500 to cover the administration and expense of issuing the permit to the general contractor for the Right-of-Way Agreement, a copy of which shall be in the possession of each subcontractor when on COMPANY's property.
- 5-4. The contract for PROJECT construction services is being administered and managed by the TOWN, including all COMPANY related components. The COMPANY requires that the contractor awarded the PROJECT be an approved COMPANY track contractor and that all workers, involved in any and all functions of the PROJECT, where work is within 25 feet of AND inside the COMPANY right-of-way, to be Bridge Worker Safety Certified and Roadway Worker Certified in accordance with the regulations of the Federal Railroad Administration (hereinafter referred to as "FRA"), Parts 214(b) and (c), respectively.
- 5-5. The TOWN shall require of its contractor a bond, conditioned according to Local and State Ordinance and Code, as applicable, in favor of the TOWN, and shall further require its contractor to take out before such contractor's work is commenced, and keep in effect until such work is completed and accepted, a policy of Railroad Protective Liability Insurance

described more specifically in the "Special Clauses in the Proposal" attached hereto and included in this Agreement by reference and from an insurance company authorized to do business in the State of Vermont, to protect the COMPANY against loss or damage to property and injury to or death of persons, and against all claims, demands, expenses, suits or judgments arising because of, or resulting from the operations of the contractor, his subcontractor, agents or employees.

## **SECTION 6 SOURCE OF FUNDING AND TERMINATION**

- 6-1. It is understood that the construction costs of the PROJECT herein contemplated are to be financed from funds provided by the Federal Highway Administration, Vermont Agency of Transportation and TOWN and expended in accordance with local, state or federal regulations, that all plans, specifications, estimates of costs, awards of contracts, acceptance of work and procedure in general will at all times conform to these laws, rules, and regulations, and the TOWN shall reimburse the COMPANY for costs in accordance with these laws, rules, and regulations.
- 6-2. In the event that delays or difficulties arise in securing necessary approvals or in securing necessary rights of way or settling damages or damage claims which, in the opinion of the TOWN, render it impracticable to utilize funds from the current appropriation for the construction of the PROJECT, the TOWN may serve formal notice of cancellation upon the COMPANY and this agreement shall, with the exception of the obligations set forth in the following sentence, become null and void. The TOWN shall reimburse the COMPANY for all costs and expenses incurred by it at the request of the TOWN, on account of the PROJECT prior to such cancellation, and shall restore the COMPANY's property to the condition existing prior to the initiation of the PROJECT construction.

## **SECTION 7 INVOICING AND PAYMENT**

- 7-1. At the time of signing this Agreement, the financial obligation of the TOWN under this Agreement is estimated to be \$ 317,700 which is understood to be an estimate only; actual final amounts may vary.
- 7-2. The TOWN hereby agrees to reimburse the COMPANY for its actual costs associated with project management, construction inspections, and attending meetings for the PROJECT. Such costs shall be accrued and billed directly to the TOWN as specified herein.
- 7-3. The COMPANY agrees to bill the TOWN as a part of its regular force account work the actual cost for protective services and devices described in SECTION 3-2, including the actual rate of pay, plus the amount paid for overtime, insurance, railroad retirement, vacation allowance, holidays, health and welfare, transportation, deadhead and turn-around time, accounting and billing.
- 7-4. The COMPANY has determined that the method to be used in developing the relocation or installation cost shall be as specified for the method checked and described hereafter:

\_\_\_\_ (a) Actual and related indirect costs accumulated in accordance with a work order accounting procedure prescribed by the applicable Federal or State regulatory body,

X  (b) Actual and related indirect costs accumulated in accordance with an established accounting procedure developed by the COMPANY and approved by the TOWN.

\_\_\_\_ (c) An agreed lump sum \$ \_\_\_\_\_, as supported by a detail analysis of estimated cost attached hereto. (NOTE: This method is not applicable where the estimated cost of the proposed adjustment exceeds \$100,000).

- 7-5. All labor, services, materials, and equipment furnished by the COMPANY in carrying out the work to be performed hereunder shall be billed by the COMPANY directly to the TOWN. Separate records as to the costs of contract bid items and force account items performed for the COMPANY shall also be furnished by the COMPANY to the TOWN ("Supporting Documentation").
- 7-6. The COMPANY may bill the TOWN monthly or periodically for its force account when costs exceed \$1,000. Progressive invoices may be submitted for work done during the previous month or period showing the portion of estimated cost completed. A final bill covering actual cost of work and showing all details shall be submitted to the TOWN within 180 days after completion of said work. The TOWN shall pay all bills that have been approved within sixty (60) days after receipt thereof.
- 7-7. Upon completion of the work, the COMPANY shall, within one hundred eighty (180) days, furnish the TOWN with two (2) copies of its final and complete billing of all costs incurred in connection with the work performed hereunder, such statement to follow as closely as possible the order of the items contained in the estimate attached hereto. The totals for labor, overhead, travel expense, transportation, equipment, materials and supplies, handling costs and other services shall be shown in such a manner as will permit ready comparison with the approved PLANS and estimates, Materials shall be itemized when they represent major components of cost in the relocation following the pattern set out in the approved estimate as closely as is possible. The final billing shall show the description and site of the Project; the date on which the first work was performed, or, if preliminary engineering or right-of-way items are involved; the date on which the earliest item of billed expense was incurred; the date on which the last work was performed or the last item of billed expense was incurred; and the location where the records and accounts billed can be audited. Adequate reference shall be made in the billing to the COMPANY'S records, accounts and other relevant documents. All cost records and accounts shall be subject to audit by a representative of the TOWN. Upon receipt of invoices, prepared in accordance with the provisions of the above indicated Reimbursement Policy, the TOWN agrees to reimburse the COMPANY in the amount of such actual costs as approved by the TOWN's policies.

## **SECTION 8 ACQUISITION AND USE OF PROPERTY**

- 8-1. The TOWN shall acquire or settle all property, property rights and all damages to property affected by the PROJECT. The cost of said property, property rights and damages to property shall be included as a part of the PROJECT expense and paid by the TOWN.

- 8-2. The COMPANY, insofar as it has the legal right so to do, shall permit the TOWN and/or its contractor during the PROJECT to enter upon lands owned or operated by the COMPANY as specified by SECTION 4-1 and so long as (i) with regards to the TOWN, its employees follow the notice requirements and all applicable rules of the COMPANY when entering the COMPANY's right-of-way and (ii) with regards to the TOWN's contractors, the TOWN has consummated with each contractor an agreement containing the "Special Clauses in the Proposal" attached hereto.
- 8-3. Any price to be paid by the TOWN for property conveyances (representing the fair market value thereof plus damages, if any, to the residue) shall be concluded and paid within nine (9) months from the commencement date of the PROJECT, and if agreement as to price is reached, an additional period of ninety (90) days shall be allowed for settlement; it being agreed however, that if no Agreement as to price is reached within the aforesaid nine (9) month period, the TOWN will within ninety (90) days thereafter institute an eminent domain proceeding authorized by law for the determination of the value of same. The provisions of this Agreement shall survive the institution of such eminent domain proceeding.
- 8-4. The TOWN shall furnish at its expense the plans and descriptions for any such conveyance. It is understood however, that the right of entry granted pursuant to SECTION 4-1 is a permissive use only, and this SECTION is not intended to convey or obligate the COMPANY to convey any interest in its land.
- 8-5. The TOWN shall give the COMPANY at least five (5) days' notice in advance of any work done upon or adjacent to the COMPANY's property under this Agreement. The TOWN shall notify the COMPANY's General Manager at the COMPANY's address, #2 Federal Street, Suite 201, St. Albans, VT 05478, phone 802-527-3401, in advance of the start of the work and give the General Manager notification of the date said work is completed. Upon completion of any work performed pursuant to this provision, the TOWN shall promptly remove from the COMPANY's property all tools, equipment and materials placed thereon by the TOWN and the TOWN's agents or contractors. The TOWN shall restore the COMPANY's property to the same state and condition as when the TOWN entered thereon and shall leave said property in a clean and presentable condition.
- 8-6. The TOWN, after completion of construction or termination of the PROJECT, at its sole cost, hereby agrees to restore in a good and workman like manner all property disturbed by the TOWN use or construction or maintenance activities from the date of execution of this document. Said restoration shall include, but not be limited to, any and all harm, damage or injury done to the COMPANY's property and/or to any other public or private property by acts or occurrences subject to federal, state or local environmental enforcement or regulatory jurisdiction, and shall include necessary and appropriate testing and clean up.

## **SECTION 9 INSPECTION AND MAINTENANCE**

- 9-1. The TOWN and the COMPANY shall perform joint inspections of the Roadway Underpass Structure each year or as otherwise required for the first ten (10) years after the ACCEPTANCE DATE. Such inspections must take place within ninety (90) days of the anniversary of the ACCEPTANCE DATE.

- 9-2. Subject to the following sentence, the TOWN will be responsible for all maintenance and repair of the entire Roadway Underpass Structure for years Zero (0) through Ten (10) including its superstructure. Except where damage is caused by a third party, any repairs or full or partial failures found will be the responsibility of the TOWN and repairs will be completed at the TOWN's sole expense, whether repairs are performed by the COMPANY or the TOWN.
- 9-3. From years 10 and later, the TOWN will be responsible for all maintenance and repair of the Roadway Underpass Structure, except the Superstructure and railroad track components, which shall be the responsibility of the COMPANY; PROVIDED HOWEVER, that such maintenance or repair was not caused by roadway conditions, activity, and/or vehicular motorist. The TOWN will have responsibility for all maintenance and repair for all aspects of the roadway surface and pedestrian sidewalks including but not limited to the roadway surface, roadway signage and markings, the sidewalks, handrails for the pedestrian sidewalks, lighting and drainage.
- 9-4. For the avoidance of doubt, after the tenth (10<sup>th</sup>) anniversary of the ACCEPTANCE DATE, the TOWN will be responsible for any maintenance and repair of the Roadway Underpass Structure (except the Superstructure and railroad track components), and costs associated therewith, for the life of the Roadway Underpass Structure caused by roadway conditions, activity, and/or vehicular motorist being the direct cause or event requiring said maintenance and repair of the Roadway Underpass Structure.

#### **SECTION 10 LIABILITY**

- 10-1. To the extent permitted by Vermont law, the TOWN assumes responsibility and indemnifies the COMPANY for the construction of the Roadway Underpass Structure, its temporary work and all other roadway and drainage improvements on the COMPANY'S right-of-way and land and nothing contained herein will be construed to place upon the COMPANY liability for injury to or death of persons or loss or destruction or damage to property arising from or in any manner connected with any failure to properly construct the Roadway Underpass Structure, the temporary work or other roadway and drainage improvements. The TOWN will not indemnify or hold harmless the COMPANY for its own negligence.

#### **SECTION 11 INSURANCE**

- 11-1. The insurance requirements to be provided by the TOWN's contractor are more specifically set forth in the "Special Clauses in the Proposal" which are attached hereto and included in this Agreement by reference.
- 11-2. The TOWN will also require its contractors to furnish the COMPANY with Certificates of Insurance showing the insurance (applicable to the job in question) obtained.

#### **SECTION 12 TERM**

- 12-1. The PROJECT shall be commenced by the parties hereto within sixty (60) days from the latter of the following: (1) the date on which this Agreement becomes effective, (2) the date on which the COMPANY has been notified by the TOWN to proceed, (3) the letter from the Auditor per Section 13-19 or (4) the date on which all funds necessary therefore on the part of

the TOWN have been properly certified and made available; and the PROJECT shall be completed within a reasonable time thereafter but no later than December 31, 2013. Buying and assembling of materials shall be construed as compliance with the foregoing sixty (60) day provision.

12-2. The parties agree that time is of the essence to complete the PROJECT.

12-3. All financial obligations of the TOWN as provided for in this Agreement are subject to the provisions of Local and State Ordinance and Code, as applicable; however, the TOWN will be liable for any expenses arising from any Local and State Ordinance and Code this Agreement after it has been signed by both parties.

### **SECTION 13 OWNERSHIP AND USE**

13-1. During its construction, the TOWN will own and maintain the entire Roadway Underpass Structure, including its superstructure. During such time, the COMPANY will own and maintain the track rail, cross ties, fastenings and ballast thereon.

13-2. Once the PROJECT is complete, the COMPANY will own the Superstructure portion of the Roadway Underpass Structure in whole, including but not limited to all track, ballast, sub-ballast, signal lines and drainage structures on the COMPANY's property constructed or changed under the terms of this Agreement and after the tenth (10<sup>th</sup>) anniversary of its completion, the COMPANY will be responsible for and bear the costs of all inspection, maintenance, and repair of the Roadway Underpass Structure to the extent such inspection, maintenance and repair is directly caused by the COMPANY's railroad activities.

13-3. The TOWN shall have the right to attach to the bottom of the Roadway Underpass Structure, such signal, electric and communication wires as may be requisite or useful in the operation of the TOWN roadway; any such attachments which are not a part of the PROJECT shall be made and maintained by the TOWN at its own expense. No such attachments shall be made without the approval by the COMPANY of the TOWN's detailed plans.

13-4. The TOWN acknowledges that the COMPANY and other entities under agreement with the COMPANY have or may construct and operate certain communication facilities ("Communication Facilities") located in the railroad right-of-way where the PROJECT will be constructed. The TOWN shall be responsible for all costs, if any of adjusting or relocating the Communication Facilities to accommodate the PROJECT. Nothing in this Agreement prohibits the COMPANY from allowing Communication Facilities or other facilities or utilities to be built on, over or under its right-of-way, provided this subsequent use does not interfere with the TOWN's facilities or ability to maintain its facilities. The TOWN is prohibited from permitting or seeking to permit any third party Communications Facilities or other utilities from using Bridge Street or the Road Underpass to cross or traverse the COMPANY's property.

13-5. The TOWN hereby agrees to reimburse the COMPANY, as detailed in this Agreement for all costs incurred by it in the adjustment of the COMPANY's or other Communications Facilities existing at the time of signing of this Agreement.

- 13-6. All work occurring on the COMPANY's property shall at all times be subject to the approval of the COMPANY's Chief Engineer or his authorized representative. The TOWN, or the TOWN'S Contractor, shall give the COMPANY's Division Engineer and/or Superintendent at least *seventy-two (72)* hours notice of its intent to perform any work within the limits of the COMPANY's right-of-way. No work of any character will be commenced on the right-of-way or land of the COMPANY until the contractor or TOWN has been notified by the COMPANY that the contractor may begin said work. Such work will at all times be subject to the inspection and approval of the COMPANY, and the TOWN will require the contractor to comply with the requirements of the special provisions governing or controlling temporary work and protection to the operations of the COMPANY as approved by the TOWN and the COMPANY.
- 13-7. [Intentionally omitted].
- 13-8. Records of costs incurred under the terms of this Agreement shall be maintained and made available upon request to the TOWN at all times during the period of this Agreement and for three years after final payment is made. Copies of these documents and records shall be furnished to the TOWN upon request. Records of costs incurred includes the Contractor's general accounting records and the PROJECT records, together with the Supporting Documentation and other records, of the Contractor and all subcontractors performing work on the project, and all other records of the Contractor and subcontractors considered necessary by the TOWN for a proper audit of costs.
- 13-9. In the event this contract is for services in excess of the approved estimated cost, and a term for a period of more than one year, the following provisions, are hereby incorporated: The TOWN, during any fiscal year, shall not expend money, incur any liability, or enter into any contract which, by its terms, involves the expenditure of money in excess of the amounts budgeted as available for expenditure during such fiscal year. Any contract, verbal or written, made in violation of this subsection is null and void, and no money may be paid on such contract. The TOWN shall require a statement from the Auditor of the TOWN that such funds are available prior to entering into any such contract or other binding commitment of funds. Nothing herein contained shall prevent the making of contracts for periods exceeding one year, but any contract so made shall be executory only for the value of the services to be rendered or agreed to be paid for in succeeding fiscal years; and this paragraph shall be incorporated verbatim in all contracts of the TOWN which are for an amount in excess of the approved estimated cost, and which have a term for a period of more than one year.
- 13-10. In accordance with the TOWN's policy, the following provisions are included in this Agreement: A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity and may not transact business with any public entity associated with this project.
- 13-11. In the event the use of the license granted herein across the COMPANY'S right-of-way or land for the purposes expressed herein is abandoned or otherwise discontinued, the license shall thereupon cease and terminate. Upon termination of the license for any reason



whatsoever, the land and right-of-way of the COMPANY shall be restored to its original condition before the Roadway Underpass Structure existed, insofar as the same may be practicable in the opinion of the COMPANY'S Chief Engineer or his authorized representative. Any such required restoration shall be performed by, and at the sole cost of, the TOWN.

#### **SECTION 14 TAXES AND ASSESSMENTS**

14.1. The TOWN agrees that no assessment or other charges or any nature whatsoever shall be levied or made against the COMPANY or against its property on account of the installation or existence of the Roadway Underpass Structure at this location.

#### **SECTION 15 THIRD PARTY BENEFICIARIES**

15-1. This agreement shall be for the benefit of the parties hereto only and no person, firm or corporation shall acquire any rights whatsoever by virtue of this agreement, except the TOWN and COMPANY and the successors and assigns of the COMPANY.

#### **SECTION 16 NO BENEFITS TO COMPANY**

16-1. The Federal Highway Administration's Federal-Aid Policy Guide 646(B) classifies this PROJECT in Classification No. 2 resulting in no ascertainable benefits to the COMPANY. The Parties signatories to this agreement accept this classification as applicable in this instance. The COMPANY's contribution shall be zero dollars.

#### **SECTION 17 LEGAL COMPLIANCE**

17-1. The COMPANY agrees to adhere to the requirements of Local and State Ordinance and Code, as applicable. In accordance with said Local and State Ordinance and Code, a TOWN official or employee shall be prohibited from receiving compensation, other than from his own agency, for personal services rendered in a case, proceeding application, or other matter before any TOWN agency. Additionally TOWN officials and employees shall be prohibited from selling goods or services to TOWN agencies, except by competitive bidding.

17-2. It is understood by the parties that non-elected TOWN officials and employees may qualify for an exemption if, (1) the agency with which the official or employee seeks to do business is an agency other than the one with which he serves; and, (2) prior to rendering personal services or selling or agreeing to sell goods or services, the official or employee files a statement with the agency with which he serves, and the agency with which he seeks to do business. The statement must include a declaration that the non-elected TOWN official or employee disqualifies himself for a period of two years from any participation in his official capacity as a board or commission member in any matter involving any official or employee of the agency with which he seeks to do business.

17-3. It is expressly understood and agreed to by the parties that a failure by the COMPANY to file a declaration statement as required by Local and State Ordinance and Code, as applicable, may be considered by the TOWN, a breach of material condition of this agreement and the TOWN may, if it so elects, void this agreement.

## **SECTION 18 NON-DISCRIMINATION**

- 18-1. In carrying out this contract, the COMPANY shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, disability, age, or Vietnam-era veteran status. The COMPANY will ensure that applicants are hired and that employees are treated during employment without regard to their race, religion, color, sex, national origin, disability, age, or Vietnam-era veteran status.
- 18-2. Such action shall include, but not be limited to, the following: 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.

## **SECTION 19 DRUG-FREE WORKPLACE**

- 19-1. COMPANY agrees to comply with all applicable State, County and federal laws regarding drug-free workplace. COMPANY shall make a good faith effort to ensure that all COMPANY employees, while working on TOWN property, will not purchase, transfer, use or possess illegal drugs or alcohol or abuse prescription drugs in any way.

## **SECTION 20 NOTICES**

- 20-1. Any and all notices or other communications hereunder shall be in writing and shall be deemed given if delivered personally or mailed by certified mail, postage prepaid, upon date delivered to or deposited in the U.S. mail to the persons at the following addresses:

If to COMPANY, send to:

Mr. Larry Romaine  
Assistant Vice President – Engineering Services  
New England Central Railroad  
7411 Fullerton Street, Suite 203  
Jacksonville, FL 32356

If to TOWN, send to:

Mr. Richard Menge, P.E.  
Director of Public Works  
Town of Hartford  
173 Airport Road  
White River Junction, VT 05001

## **SECTION 21 ARBITRATION**

- 21-1. Any dispute arising between the parties hereto with respect to any of the provisions hereof which cannot be settled by the parties themselves within thirty (30) calendar days of either party giving the other notice of the dispute shall be settled under the Commercial Arbitration Rules of the American Arbitration Association. The arbitration will be held in St. Albans, VT. There shall be a single arbitrator with at least ten (10) years of experience in engineering and construction. The arbitrator

shall apply Vermont law to resolve legal matters in dispute. The decision of the arbitrator shall be final and conclusive upon the parties hereto and shall be enforceable in a court of competent jurisdiction. Each party to the arbitration shall pay the compensation, costs, fees and expenses of its own witnesses, exhibits and counsel. The compensation, costs and expenses of the arbitrator, if any, shall be borne equally by the parties hereto. The arbitrator shall not have the power to award consequential or punitive damages or to determine violations of criminal laws or antitrust laws.

ACKNOWLEDGEMENT OF ARBITRATION

THE PARTIES UNDERSTAND THAT THIS AGREEMENT BETWEEN TOWN OF HARTFORD, VERMONT AND NEW ENGLAND CENTRAL RAILROAD, INC. CONTAINS AN AGREEMENT TO ARBITRATE. AFTER SIGNING THIS DOCUMENT, THE PARTIES UNDERSTAND THAT THEY WILL NOT BE ABLE TO BRING A LAWSUIT CONCERNING ANY DISPUTE THAT MAY ARISE WHICH IS COVERED BY THE ARBITRATION AGREEMENT, UNLESS IT INVOLVES A QUESTION OF CONSTITUTIONAL OR CIVIL RIGHTS. INSTEAD, THE PARTIES AGREE TO SUBMIT SUCH DISPUTE TO AN IMPARTIAL ARBITRATOR.

IN WITNESS WHEREOF, the parties hereunto have caused this agreement to be duly executed in duplicate by their duly authorized officers, as of the day and year first above written.

TOWN OF HARTFORD, VERMONT

BY: Hunter F. Riesberg

WITNESS: Richard Henry

TITLE: TOWN MGR.

STATE OF VERMONT  
COUNTY OF WINDSOR, SS.

At Hartford in said county and state on this 20th day of SEPT, 2012 personally appeared Hunter Riesberg, Town Manager for the Town of Hartford, Vermont, and he acknowledged that he executed the foregoing instrument, by him sealed and subscribed, in his capacity as aforesaid as his free act and deed, and as the free act and deed of The Town of Hartford, Vermont.

[Signature]

Notary Public  
My Comm. Exp. 2/10/15

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NEW ENGLAND CENTRAL RAILROAD, INC.

BY: Michael Bagley

WITNESS: Mary Puzos

TITLE: AVP Real Estate

Manager, Real Estate

STATE OF FLORIDA

COUNTY OF DUVAL

The foregoing instrument was acknowledged before me this 11<sup>th</sup> SEPT. 2012 by MICHAEL O. BAGLEY, AVP REAL ESTATE of the New England Central Railroad, Inc., a Delaware corporation, on behalf of the corporation. He/she is personally known to me or has produced \_\_\_\_\_ as identification.

Kathy A. Petroglou

KATHY A. PETROGLOU

(Name typed, printed or stamped)  
(Serial number, if any)



KATHY A. PETROGLOU  
MY COMMISSION # DD 892195  
EXPIRES: August 1, 2013  
Bonded Thru Budget Notary Services

**TOWN OF HARTFORD, VERMONT  
RAILROAD REIMBURSEMENT AGREEMENT  
GRADE SEPARATION  
AGREEMENT NO.: NECR #120524  
TOWN OF HARTFORD PROJECT NO.: STP HTFD (1)  
FEDERAL PROJECT NO.:**

**SPECIAL CLAUSES IN THE PROPOSAL**

The bidder, if awarded the contract for this improvement agrees:

1. To cooperate at all times with the local officials of the railroad company.
2. To perform the work in order to avoid accidents or damage. Also, to perform the work in compliance with the "ALLOWABLE ROAD CLOSURE PERIODS" in order to avoid delay to or interference with the trains and other property of the railroad company.
3. To conduct his work in a manner satisfactory to the Chief Engineer of the railroad company or his authorized representative, to perform his work in such manner and at such time as not to unnecessarily interfere with the movements of trains or railroad traffic, and to hold his work at all times open to inspection of railroad company inspectors.
4. To cooperate with any public utility, railroad or other organizations having occasion to do work on or in connection with the improvement.
5. To avoid unnecessary use of railroad property without written permission of the railroad company and to leave railroad roadbed and property in a condition acceptable to the Chief Engineer of the railroad company.
6. All contractors hired by the TOWN for the PROJECT will be required to indemnify and save harmless the railroad company, and the TOWN, their respective successors and assigns, and their agents and employees, against all loss, cost, damage and expense, including damage to the railroad company's property, or the property of others, injury or death the railroad company's employees or to others due directly in any way to the work done by the contractor while working within the railroad right-of-way during the construction of this PROJECT, as covered by this Agreement.
7. To execute a bond conditioned according to Local and State Ordinance and Code, as applicable, in favor of the TOWN, and further to carry insurance of the following kinds and amounts:

a) **Railroad Protective Liability Insurance.**

He shall furnish evidence to the public works department that, with respect to the operations he or any of his sub-contractors perform, he has provided for and in behalf of New England Central Railroad, Incorporated, in the amount of \$2,000,000 per occurrence and subject to that limit per occurrence, an aggregate limit in the amount of \$6,000,000 for each annual period.

The above railroad protective policy of insurance shall conform to the Railroad Liability requirements prescribed by the Federal Highway Administration in Federal-Aid Policy Guide 23 CFR 646A as amended.

The corporate name and address of the "Named Insured" as listed on the policy shall be as follows:

New England Central Railroad, Inc. (NECR)  
2 Federal Street  
Suite 201  
St. Albans, Vermont 05478-2003

Common Policy Conditions form

Any other endorsement/form not specifically authorized above.

**The number of trains operating through the improvement is estimated to be:**

2  Passenger trains per day @  30  miles per hour.

6  Freight trains per day @  25  miles per hour.

**(b) General Insurance Requirements**

The insurance hereinbefore specified shall be with an acceptable insurance company authorized to do business in the State of Vermont, and shall be taken out before execution of the Contract and kept in effect until all work required to be performed under the terms of the contract is satisfactorily completed as evidenced by the formal acceptance by the State. Such policies shall include thirty (30) days canceling notice. The cost of insurance hereinbefore specified in subsection (a) will be a specific bid item.

8. The Railroad Company will assign, at the sole cost and expense of the Town, railroad flagmen or other protective services and devices as necessary to insure the safety and continuity of the work to be performed as a part of this contract. Said services and devices will be provided when necessary, as determined by the railroad company, because of any of the Contractor's operations over, under or adjacent to tracks over which trains are operating. The provision of such protective personnel and devices does not relieve the Contractor from the liability of payment for damage caused by his operations.

Such protection will be required when men or equipment are working within clearances limits of 25 feet of a rail or when work being performed adjacent to operating tracks may present hazards to tracks, train operation, or when equipment does or may infringe upon such limits.

The Contractor will not be permitted to operate any of his own equipment on or near railroad tracks except under an acceptable arrangement with the railroad company. Such equipment and the operation of such equipment, or equipment rented from the railroad company, shall be arranged for by the Contractor with the railroad and the cost for its use, including protection or railroad traffic, shall be borne by the Contractor.

The Contractor shall notify the following named individual for each railroad company at least 30 days, or as directed by the authorized representative of the Railroad, in advance of starting any work which might require protection:

New England Central Railroad, Inc.  
2 Federal Street  
Suite 201  
St. Albans, Vermont 05478-2003 ("NECR")  
Telephone: (802) 527-3415

The Contractor shall notify the railroad at least 5 working days in advance of suspending or ceasing operations that require a flagger.

Railroad protective personnel assigned to the project will be responsible for notifying the Engineer upon arrival at the job site on the first working day that protective services begin and on the last day that he performs such services. This will be required for each separate period that such services are provided. The Engineer will document such notification in the project diary.

The Contractor will be responsible for protective services provided at his request and not utilized due, in the opinion of the Engineer, to a change in the Contractor's construction schedule or if it is determined by the Engineer that the requested services were not necessary. The actual costs for such protective services so assessed to the Contractor will be deducted from the Contract.

The decision of the Town of Hartford Director of Public Works shall be final in the event of controversy as to the necessity for any protection services provided and not utilized by the Contractor as described in the preceding paragraph.

9. The TOWN will pay the railroad or owning company for any changes, requested for his convenience, to railroad property, facilities, wire, fiber optic and/or pipe lines other than shown on the PLANS for the project after TOWN has submitted formal request, and RAILROAD has reviewed and accepted requested changes.
10. If at any time the contractor desires a temporary crossing of the railroad's tracks, he shall make a request for a temporary crossing from the railroad. If approved, he shall arrange with the railroad company, execute its regular form of private grade crossing agreement covering the crossing desired, paying all construction, maintenance, removal, protection and other costs.
11. If at any time the contractor desires a temporary closing of the railroad's tracks, he shall adhere to the requirements as specified in the bid proposal notes entitled "**ALLOWABLE RAILROAD CLOSURE PERIODS**".
12. Methods and procedures for performing work on property of **New England Central Railroad, Inc.** must be approved by:

Robert Richardson, Assistant General Manager  
2 Federal Street  
Suite 201  
St. Albans, Vermont 05478-2003  
(802) 527-3415

13. Methods and procedures affecting the construction of the temporary crossing and/or the permanent roadway underpass structure must be approved by New England Central Railroad, Incorporated:

Mr. W. S. Riehl, III, P.E.  
Director Structures  
Rail America, Inc.  
7411 West Fullerton Street, Suite 300  
Jacksonville, FL 32256  
904-538-6062

End of Special Clauses



**TOWN OF HARTFORD, VERMONT  
RAILROAD REIMBURSEMENT AGREEMENT  
GRADE SEPARATION  
AGREEMENT NO.: NECR #120524  
TOWN OF HARTFORD PROJECT NO.: STP HTFD (1)  
FEDERAL PROJECT NO.:**

**ALLOWABLE RAILROAD CLOSURE PERIODS**

The construction of the temporary and permanent bridges will require the full closure of the railroad in the project vicinity for brief periods. The contractor will be responsible to obtain and submit the train schedule to the Town of Hartford project engineer on a weekly basis for the period two weeks in advance. The contractor shall contact:

The New England Central Railroad (NECR)  
Robert Richardson, Assistant General Manager  
2 Federal Street  
Suite 201  
St. Albans, Vermont 05478-2003  
(802) 527-3415  
Email: [Robert.Richardson@railamerica.com](mailto:Robert.Richardson@railamerica.com)

When scheduling their work, the contractor will be able to take into account the following full railroad track closures as allowed by the NECR:

For the installation of relief slabs (remove track sections, excavate, place rebar, place concrete, cure, backfill, and replace tracks) – the trains shall be shifted to share one track for a TWO DAY maximum duration.

For the track bridge (install both yard track relief slabs and mainline track relief slabs) – the track closure shall be FOUR DAYS maximum.

For the half section removal of existing bridge (two occurrences – one for each half) – The track closure shall be TWO NIGHTS total.

All work will be limited to one track being non operational at a time. While working on one track, the other track will allow for the movement of trains. Both tracks shall not be made non operational simultaneously at any time without the written consent of NECR and signed by the General Manager.

The track closure periods will be further determined by the Contractors method and Construction schedule. The Contractor must provide advanced notice for requested dates for track closure periods. Additionally, request for modifications or adjustments to the track closure periods must be submitted in advance for review and approval by NECR. The NECR will coordinate with the TOWN and the Contractor to accommodate the track closure periods requested. The NECR will have the final authority and approval of all closure periods.

All of these allowable railroad track closure periods as stated above must be completed by September 1, 2014, and the dates for all of these railroad track closures must be approved by the NECR. In addition, the contractor, when planning and scheduling their work, must not assume that specific closure period dates will be available and must allow for flexibility. The contractor will not be granted a time extension based on not meeting their preferred railroad closure dates. The September 1, 2014 completion date for railroad track closure periods is considered an Interim Completion Date. Failure to complete said work shall result in the assessment of separate and possibly cumulative Liquidated Damages per the methods and schedules contained in Local and State Ordinance and Code, as applicable.

There is a possibility that the railroad schedule will allow longer periods of railroad track closure to take place or additional full railroad track closure periods. This will need to be determined well in advance of the additional desired closure and must be accepted by the NECR. The contractor cannot assume that there will be additional full railroad track closure periods.

The contractor will be expected to work extended hours a day during the full closure periods as permitted and agreed to by all local ordinances. The contractor will adhere to the acceptable work hours as stated in the plans and proposal notes for all other construction days outside the allowable full railroad closures. Pile driving or any other operation that will create substantial noise above acceptable limits will not be permitted between the hours of 9:00 p.m. to 7:00 a.m.

**EXHIBIT "A"**  
**ESTIMATION OF COMPANY'S**  
**EXPENSES**



Estimate No.: 247816T - 08/27/2012

**New England Central Railroad (NECR)**

Town of Hartford (Windsor), VT - Bridged Street

DOT#: 247816T  
RR MP.: 14.94

St. Lawrence Division Region  
Roxbury Subdivision Subdivision

RAILROAD # : TBD  
XORAIL# : VEM11-28414

**Summary**

<b>CROSSING WARNING SYSTEM</b> (Includes all design, requisition, labor, materials, shop wiring, and installation)	\$0.00
<b>CROSSING SURFACE/RESURFACE</b> (Includes all design, requisition, labor, materials, and installation)	\$0.00
<b>TRACK GRADE AND REHABILITATION</b> (Includes all design, requisition, labor, materials, and installation)	\$0.00
<b>RAILROAD ENGINEERING</b> (Includes RAILROAD Labor for Reviewing Engineering Authorizations, Field Inspections and Administrative Labor)	\$0.00
<b>PRELIMINARY ENGINEERING (Phase 1)</b> (Includes CONTRACT Labor for all Engineering, Agency Coordination, and Project Management)	\$0.00
<b>AGREEMENTS &amp; APPROVALS (Phase 2)</b> (Includes CONTRACT Labor for all Engineering, Agency Coordination, and Project Management)	\$2,450.00
<b>CONSTRUCTION ENGINEERING (Phase 3)</b> (Includes CONTRACT Labor for all Engineering, Agency Coordination, and Project Management)	\$14,000.00
<b>CONSTRUCTION ENGINEERING INSPECTION</b> (Estimated Construction Engineering Inspection cost based on 102 days @ \$1500 per day)	\$153,000.00
<b>UTILITY CROSSING</b> (0 new utility crossings @ \$4000 per crossing, includes application, engineering review, and right of entry)	\$0.00
<b>RIGHT OF ENTRY FEE</b> (Right of Entry Fee of \$1,500 is valid for 60 days, after 60 days, additional fees of \$750 per 30 days are required.)	\$6,760.00
<b>FLAGGING SERVICES</b> (Estimated Flagging Services cost based on 130 days @ \$1050 per day) Flagging to be scheduled and invoiced directly with the GEXR RR Office)	\$136,500.00
<b>AG POWER SERVICE</b> (Includes all Power Service Charges not included in other costs)	\$0.00
<b>MISC. SIGNAL WORK</b> (Estimated cost for Track Connection / Signal Work necessary to complete track shifts)	\$5,000.00
<b>TOTAL ESTIMATE COST</b>	<b>\$317,700.00 (USD)</b>

DATE: 08/27/2012

**RESPONSIBLE PARTY:**

Name: Town of Hartford  
Number: STP HTFD (1)  
Contact: Rich Menge, PE Director of Public Works

NOTE: This Estimate has been prepared based on site conditions, anticipated work duration periods, material prices, labor rates, manpower, resource availability, and other factors known as of the date prepared. The actual cost for Railroad work may differ based upon the agency's requirements, their contractors work procedures, and/or other conditions that become apparent once construction commences or during the progress of the work. If any extended time elapses from the date of this Estimate, the Railroad will reserve the right to update the estimate to current price values, and require agency's approval before any work by Railroad will commence.

## EXHIBIT "B"

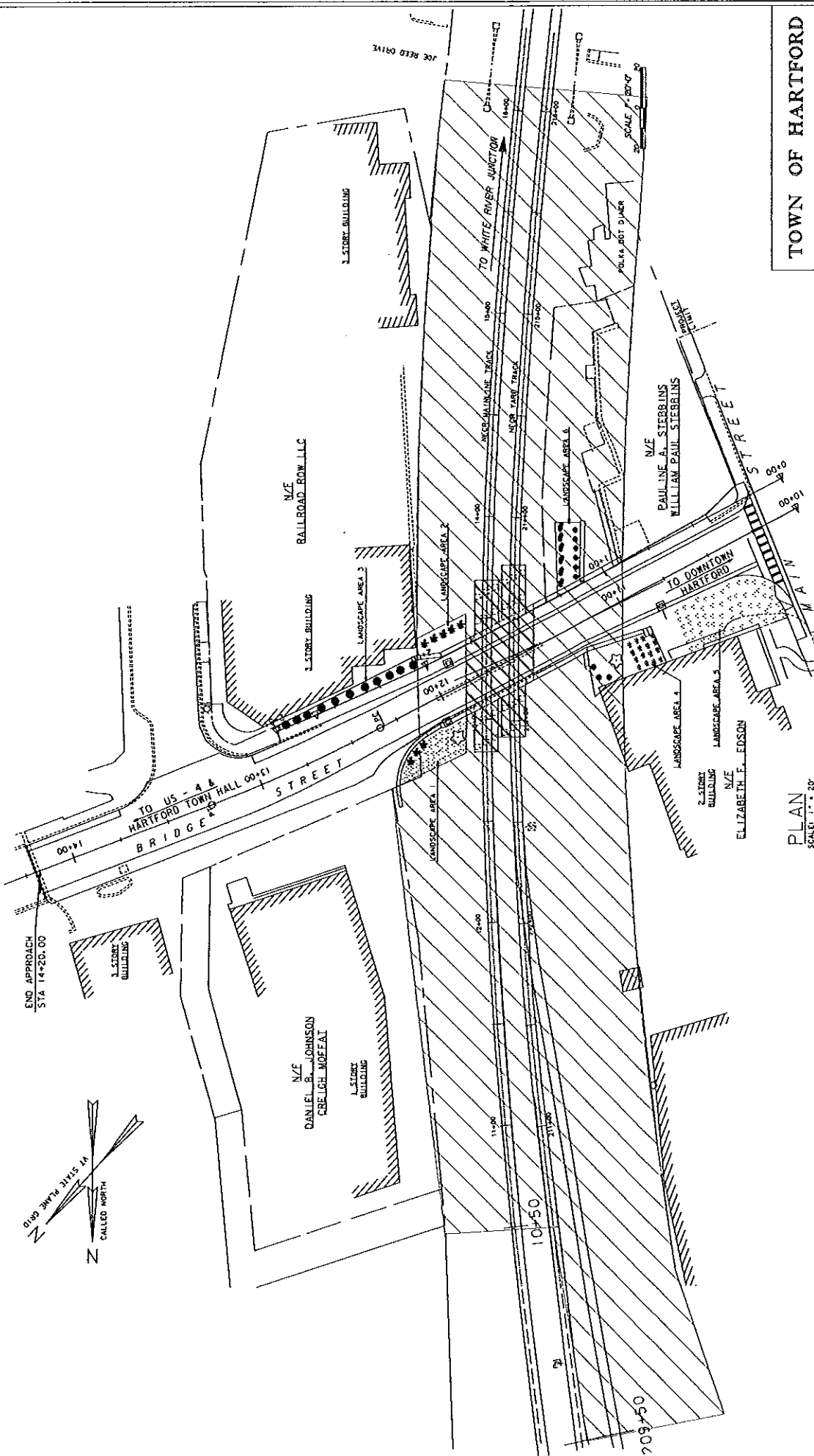
### Guidelines when Flagmen, Protective Services and Devices or other appropriate personnel are needed on Railroad Right-of-Way

- A. COMPANY flagmen will be required for, but not limited to, the following conditions:
1. When, in the sole opinion of COMPANY, protection is necessary to safeguard COMPANY'S trains, engines, facilities and property.
  2. When work is performed, in any way, over, under, or in close proximity to tracks or any COMPANY facilities.
  3. When work in any way interferes with the operation of trains at usual speeds or threatens, damages, or endangers track or COMPANY facilities.
  4. When any hazard is presented to COMPANY communications, signal, electrical, or other facilities due to persons, material, equipment, or blasting in the vicinity.
  5. When and where material is being hauled across tracks. Provided, however, special clearance must be obtained from COMPANY before moving heavy or cumbersome objects and equipment which might result in making the track impassable for any period of time.
- B. Protective Services and Devices, Other Specialized Personnel shall be provided when, in the sole opinion of COMPANY, such are necessary in addition to flagging.
- C. Cost of Flagging and Other Protective Services and Devices
- i. Flagging Service charges shall be billed at the then-prevailing flagging rate per any existing agreement between COMPANY and the Vermont Agency of Transportation or, if such agreement does not exist, the **actual cost incurred by COMPANY** for each day, or for any portion thereof, for up to eight hours in one shift Monday through Friday, excepting holidays recognized by COMPANY in its personnel policy manual.
  - ii. Communications Linemen, Signalmen, Protective Services and Devices

All services required shall be billed at COMPANY'S contracted rate with service provider.

**EXHIBIT "C"**

SEE PLAN ATTACHED



**TOWN OF HARTFORD**

TOWN OF HARTFORD, VERMONT	BRIDGE No.
HIGHWAY No. BRIDGE STREET	LOG 576
N.E.R. BRIDGE OVER BRIDGE STREET	DATE 11/20/10
TEMPORARY CONSTRUCTION LICENSE	NO. 2010-002

AREA OF TEMPORARY CONSTRUCTION LICENSE

PLAN  
SCALE: 1" = 20'

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***APPENDIX R***

**TRAFFIC CONTROL PLAN**

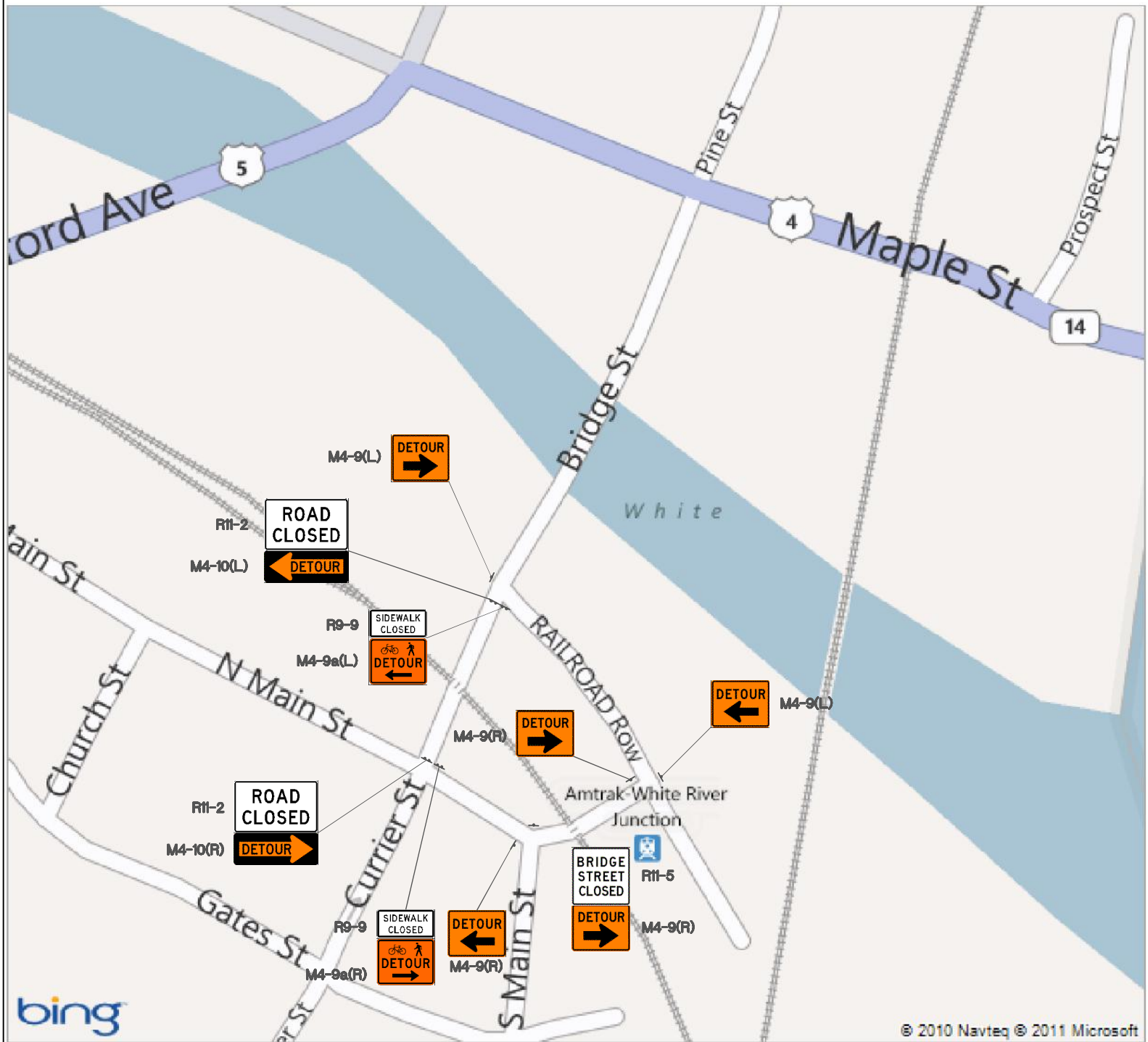


**[ blank sheet ]**

# Hartford, VT - STP HTFD(1): Traffic Control Plan

- R11-2: MUTCD Standard (Mounted on Type III Barricade)
- M4-10(R): MUTCD Standard (Mounted on Type III Barricade)
- M4-10(L): MUTCD Standard (Mounted on Type III Barricade)
- R9-9: MUTCD Standard (Mounted on Type II Barricade)
- M4-9a(R): MUTCD Standard (Mounted on Type II Barricade)
- M4-9a(L): MUTCD Standard (Mounted on Type II Barricade)
- M4-9a(L): MUTCD Standard (Mounted on Type II Barricade)
- M4-9(R): MUTCD Standard (Post Mounted)
- M4-9(L): MUTCD Standard (Post Mounted)

NOTE: The detour shown and any other required traffic control shall be paid for under Item 641.10 - Traffic Control.





R4-1 STD; 1.5" Radius, 0.6" Border, 0.4" Indent, Black on White;  
 "BRIDGE" D 125% spacing; "STREET" D; "CLOSED" D 60% spacing;

***APPENDIX S***

**GEOTECHNICAL REPORT**

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**Golder Associates Inc.**

670 North Commercial Street, Suite 103  
Manchester, NH USA 03101  
Telephone (603) 668-0880  
Fax (603) 668-1199  
www.golder.com

REC'D NOV 18 2008



October 31, 2008

Our Ref.: 083-86958

*Revised November 14, 2008*

Parsons Brinkerhoff  
650 Elm Street  
Manchester, NH 03101

Attn: G. Keith Donington, P.E.

**RE: REVISED GEOPHYSICAL AND GEOTECHNICAL INVESTIGATION REPORT  
NEW ENGLAND CENTRAL RAILROAD BRIDGE REPLACEMENT  
TOWN OF HARTFORD, VERMONT**

Dear Mr. Donington:

Golder Associates Inc. (Golder) is pleased to submit this revised letter report to Parsons Brinkerhoff (PB) on geophysical, probe drilling and geotechnical investigations for the Hartford Railroad Bridge Replacement project in Hartford, Vermont. The revisions incorporate your comments summarized in your e-mail message dated November 7, 2008. The location of the project is shown on Figure 1. This report summarizes the findings of the investigations to assess the arrangement of stone blocks in the abutment, the results of the geotechnical evaluation of allowable bearing pressure of existing foundations, and an assessment of earth pressure behind the abutment. In addition the report provides recommendations regarding potential disposal of contaminated material, if encountered during construction.

**GEOPHYSICAL INVESTIGATION**

Golder conducted a geophysical investigation at the Bridge Street railroad bridge abutment in June 2008. The objective of the investigation was to assess the configuration of the stone block abutment. The data generated by this investigation was expected to help determine if additional measures will be required to provide adequate bearing capacity for the new bridge configuration. A detailed report on the geophysical study is included as Appendix A and describes the methodology and instrumentation, field procedures, the results and the limitations.

**Ground Penetrating Radar (GPR) Methodology**

The GPR method uses electromagnetic (radar) pulses that are directed into the ground from an antenna. Reflections of these pulses are produced from subsurface features where there is a contrast between the electrical properties of subsurface materials and the surrounding soil. Water or air filled voids can produce good reflections. In contrast, materials that are electrically conductive, such as clay, tend to attenuate the GPR signal, resulting in a decrease in subsurface penetration. The reflected electromagnetic pulses are received by the antenna, converted into an electric signal, and recorded by the GPR unit. The GPR unit compiles these pulses to produce a cross section or profile image of the subsurface beneath the path of the antenna.



## **GPR Survey and Results**

Prior to surveying, Golder calibrated the GPR reflection depth using a granite block of known thickness adjacent to the bridge. The target depth for this study was approximately 4 to 6 feet (ft) behind the exposed face of the abutment walls. For both abutments, Golder collected GPR data in vertically-oriented scans taken at two-foot intervals from near the top to the bottom of the abutments. A positioning mark was placed in the electronic record of each scan where the GPR antenna crossed the block joints. Golder performed a total of 77 vertical GPR scans for the investigation.

A summary of our interpreted thickness of the stone blocks from the geophysical survey is provided in Table 1 of Appendix A. (For this report we are considering thickness to be the wall dimension measured perpendicular to the wall face.) The table shows the interpreted thickness of each block from top to bottom for each vertical scan. In general, the block thickness appears to vary from 1.5 ft to 5.5 ft. It should be noted that because GPR does not penetrate gaps or joints between blocks, the measured thicknesses represent only the first stack of blocks and not necessarily the entire thickness of the abutments at any height. However, the observation that the thickness of the block at the top of the abutment at many scans appears to be greater than the thickness at the bottom strongly suggests presence of further stack(s) of blocks behind the surficial blocks. The number and the thickness of these hidden stacks were not verifiable by GPR study.

## **PROBE DRILLING INVESTIGATION**

### **Probe Drilling Locations**

As the GPR investigation results indicated the likely presence of additional stacks of blocks but could not ascertain the total abutment wall thickness, it was decided to conduct a probe drilling survey behind the abutments to further determine the extent of the abutment walls. On October 15, 2008, Golder's drilling subcontractor, Maine Test Borings, Inc. (MTB) (using a drill rig subcontracted through New Hampshire Boring, Inc.) conducted probe drilling at the four corners of the bridge from the rail grade. Engineers Construction Inc. (ECI), under contract with the Town of Hartford, provided flagging and rail traffic control during drilling on the bridge. MTB conducted the probe drilling using a propane-fueled Dietrich D-50 drill rig mounted on a rubber-tire tracked chassis. MTB performed the drilling at four locations determined by an on-site representative of PB. The drilling methods consisted of 4.25-inch diameter (outer) hollow stem augers or 1.5-inch diameter driven drive point (with a 140 pound hammer).

At each location, MTB conducted three to five probes spaced two to three feet apart, starting at one foot back from the edge of a baseline measured from the ends of each bridge curb. For the probes conducted at the northeast and northwest corners of the bridge, PB located the probes about four feet north from the northernmost rail. For the probes conducted at the southeast and southwest corners of the bridge PB located the probes about four feet south of the southernmost rail. The probe locations extended from the baseline in a line parallel to the rails. At each location, MTB advanced drilling tools from the ground surface (i.e., rail bed ballast) until refusal. Golder and MTB interpreted refusal depths based on the halt of advancement of the augers or driven probes and on drill rig behavior. A sketch of the approximate probe locations is provided in Figure 2. Golder measured boring locations using a measuring tape from referenced landmarks, but did not survey the probe locations using precise surveying methods, as surveying was not included in our scope.

At the direction of PB, MTB attempted to drill two probes at the toe of the west abutment in the street to try to determine the depth to the footing (if present). The Town of Hartford provided a detour for vehicular traffic on Bridge Street while MTB conducted the drilling. In both probes, MTB encountered refusal on concrete at 0.9 ft below the top of asphalt. The concrete may indicate the presence of an unmarked utility or may be a thick concrete pavement section beneath the asphalt overlay. PB elected to halt probe drilling at this location due to concerns with disturbing a potential unmarked utility.

### Probe Drilling Results

The tables below provide the results of the probe drilling behind the abutments. The depth reference is the top of rail.

Northwest Corner				
Probe	Distance from Baseline Parallel to Rail (ft)	Distance from Baseline Perpendicular to Abutment (ft)*	Depth to Refusal (ft)	Estimated Abutment Thickness (ft)**
NW-1	2.0	1.8	8.7	3.5
NW-2	5.0	4.4	23.0	6.1
NW-3	8.0	7.1	> 24.5	<8.7

Northeast Corner				
Probe	Distance from Baseline Parallel to Rail (ft)	Distance from Baseline Perpendicular to Abutment (ft)*	Depth to Refusal (ft)	Estimated Abutment Thickness (ft)**
NE-1	1.0	0.9	2.3	2.6
NE-2	3.0	2.6	7.3	4.3
NE-3	5.0	4.4	14.5	6.1
NE-4	7.0	6.2	16.3	7.9
NE-5	9.0	7.9	> 25	<9.6

Southwest Corner				
Probe	Distance from Baseline Parallel to Rail (ft)	Distance from Baseline Perpendicular to Abutment (ft)*	Depth to Refusal (ft)	Estimated Abutment Thickness (ft)**
SW-1	1.0	0.9	5.6	2.6
SW-2	3.0	2.6	10.5	4.3
SW-3	5.0	4.4	16.9	6.1
SW-4	7.0	6.2	> 20.6	<7.9

Southeast Corner				
Probe	Distance from Baseline Parallel to Rail (ft)	Distance from Baseline Perpendicular to Abutment (ft)*	Depth to Refusal (ft)	Estimated Abutment Thickness (ft)**
SE-1	1.0	0.9	2.4	2.6
SE-2	3.0	2.6	16.1	4.3
SE-3	5.0	4.4	> 20	<6.1

**Notes:**

\*Corrected for skew, i.e., distance from baseline parallel to rail multiplied by sine of angle between abutment and rail (62 degrees).

\*\*Includes 1.7 ft thickness from abutment face to baseline as determined by PB added to distance from baseline corrected for skew.

ft - Feet

n/a - Not applicable, i.e., refusal not encountered.

The dashed line indicates our estimate of the top of the lower-most course of blocks.

The probe drilling results indicate the abutment walls likely have a variable thickness. PB has determined that for both abutments the distance from the baseline used as a reference for the probe drilling to the abutment face is 20 inches or 1.7 feet<sup>1</sup>. Adding this thickness to the probe drilling results indicates that at the toe, the west abutment thickness is at least 6.1 feet at both the northwest and southwest corners. Likewise, the east abutment thickness at the toe ranges from at least 7.9 ft at

<sup>1</sup> E-mail message from PB to Golder dated October 20, 2008.



the northeast corner to at least 4.3 ft at the southeast corner. For analysis of bearing capacity we used a footing width of 5.9 ft.

## **GEOTECHNICAL EVALUATION**

In October 2000 as part of a pre-design investigation for a conceptual design<sup>2</sup>, Golder conducted a geotechnical boring program for Vanasse Hangen Brustlin, Inc. (VHB) to collect general subsurface geologic and geotechnical information for the project. The program included drilling four borings to a depth varying from approximately 62 ft to 77 ft. The locations of the borings are shown on Figure 2 and the boring logs are included in Appendix B. The VHB investigation did not include evaluation of the abutments or their foundations. (Please note that the geotechnical study for VHB was terminated before being completed, and the study was never finalized by Golder.)

Golder understands that PB intends to use the existing abutments to support the proposed replacement bridge. Using boring logs from the 2000 geotechnical study and the results of the GPR and probe drilling studies described above, Golder completed geotechnical analyses to estimate allowable bearing pressures of the existing abutment on native soils and earth pressure acting on the abutment. The following sections present the results of our analyses.

### **Bearing Capacity of the Soils for the Existing Stone Abutments**

For this evaluation, we reviewed the standard penetration test (SPT) blow counts from the four test borings drilled during the October 2000 investigation, and estimated the internal friction angle of the foundation soil from the correlation between the SPT blow counts and friction angle. The SPT blow counts in the soil below the road grade varied from 18 to 42 with an average value of 32. Based on the average blow count, we estimate an internal friction angle of 36 degrees for the bearing capacity calculations. According to the boring logs, the water table at the site is approximately 20 ft below the Bridge Street road grade. Therefore it is reasonable to assume that the water table will not have significant effect on the bearing capacity.

The information required to evaluate bearing capacity of the foundation soils includes the depth and the width of the abutment footing, the load eccentricity and the geotechnical conditions. Because the footing geometry is unknown, Golder performed the bearing capacity evaluation using reasonable depth and width based on the probing program, the GPR studies, and the 1929 bridge abutment construction drawings provided by PB.

The probing results show that the depth from ground surface to top of the footings (refusal) varies with location. However, the top of the footing is at least one foot below the Bridge Street road grade. Based on the assumption that the bottom of the footing was founded at least 3 ft below grade, we evaluated bearing capacity for a footing depth of 3 ft and a footing width of 5.9 ft as found from the probing program. Assuming a load eccentricity (e) of one sixth of the footing width and using a factor of safety (F.S.) of 3, the allowable bearing was calculated to be 8 ksf. To limit settlement to one inch, the allowable bearing capacity should be limited to 6 ksf. Given the uncertainty in the geometry of the abutment, the structural engineer should consider limiting loads on the abutment to the loads that are currently in place, unless the abutments can be suitably modified.

---

<sup>2</sup> Vanasse Hangen Brustlin, Inc., January 4, 2008. Conceptual Design Project Information, NECR over Bridge Street Bridge Replacement, State Project: Hartford STP HTFD(1).

### **Earth Pressure on Existing Abutments**

The information required to calculate earth pressure on the existing abutment wall includes the geometry of the wall, the ground profile and the geotechnical conditions. The SPT blow count in the soil behind the abutment varied from 4 to 24 with an average of 10, which corresponds to a friction angle of about 30 degrees. Using this friction angle, we calculate the at-rest ( $K_0$ ) earth pressure coefficient to be 0.5 and the active earth pressure coefficient ( $K_a$ ) to be 0.33. Actual earth pressure will likely be between at-rest and active conditions. Therefore, for the abutment, we estimate the equivalent fluid density for the soil fill as 50 pounds per cubic foot (pcf). The earth pressure on the back of the abutment due to earth fill may be calculated using the abutment height and equivalent fluid pressure of 50 pcf. Because the water table was found to be approximately 20 ft below the existing road grade, we do not expect hydrostatic pressure due to the water table to affect the earth pressure on the abutment walls. The additional lateral pressures due to the surcharge and tractive loads imparted by trains need to be evaluated in accordance with governing railroad standards.

### **Base Friction**

For base friction between the stone and soil interface, we recommend a friction angle of 27 degrees (or a friction factor of 0.51). The frictional resistance at the base may be calculated as 0.51 times the normal load on the base of the abutment. The normal load should include the weight of the abutment and dead load of the bridge. We recommend a minimum factor of safety of 1.5 against sliding for the design.

### **Limitations**

1. The load carrying capacity of the existing abutments depends on both the structural capacity of the abutment and the geotechnical capacity of the foundation soils. Our evaluation focused only on geotechnical capacity, and the structural capacity must be evaluated by the structural engineer.
2. The bearing capacity of soils depends not only on soil properties, but also on the geometry and the rigidity of the abutments. While the probe drilling investigation determined the likely minimum widths of the footings, we recommend that if possible during construction, these minimum width and footing depth be verified by exposing the footings through test excavations.
3. For our bearing capacity evaluation we assumed that the abutment stone blocks are directly and entirely supported by native soils approximately three feet below existing grade (frost depth). The 1929 design drawings for the wingwall modifications and center pier indicate wooden piles were to be used if available bearing capacity is less than 2.5 tons per square foot (or 5 ksf). However, no record drawings are available indicating whether piles were used for the wingwall and pier foundations. Based on the analysis described earlier, our recommended bearing capacity is 6 ksf. If during the wingwall and center pier construction the bearing capacity was determined to be at least 5 ksf, piles likely would not have been used. However, wooden piles, if present, will dictate the bearing capacity of the foundation. Because wooden piles can deteriorate over time, their capacity, if present, would likely be lower than the original design capacity. Our evaluation did not confirm or refute either the presence of such piles or the capacity of the piles, if present. **We strongly recommend that the construction documents include an investigation to**

**determine whether piles were installed in the original construction. As we understand the center pier is to be removed, including the upper part of its foundation, the construction activities could include complete removal of a portion of the pier foundation to investigate if piles were used. If piles were used, the recommendations in this report do not apply and will have to be revised.**

## **CONTAMINATED SOIL REMOVAL**

Golder identified petroleum-impacted soil on the side-slope of the abutment during the geotechnical assessment performed in October 2000. Golder's laboratory detected semi-volatile organic compounds (SVOCs) above the United States Environmental Protection Agency (USEPA) Region III Risk Based Concentration levels. In addition, Golder's laboratory detected total petroleum hydrocarbons (TPH) above the laboratory reporting limit (TPH does not have a USEPA Region III Risk Based Concentration). The laboratory analytical results were only qualitative. The volume of petroleum-impacted soil and concentration levels are unknown.

During construction of the new bridge, Golder recommends that the contractor be prepared to perform the following actions:

- Identifying and segregating the petroleum-impacted soils by stockpiling the soils on poly sheeting;
- Assessing whether impacted soils are suitable for re-use on-site in accordance with Vermont Agency of Natural Resources (VTANR) guidelines;
- Identifying a suitable recycling or disposal facility for the petroleum-impacted soils;
- Collecting composite samples of the petroleum-impacted soils. The number of samples and analytical suite of parameters will be dependent on the acceptance criteria of the disposal facility;
- Collecting confirmatory soil samples from the bridge abutment excavation to assess if petroleum-impacted soils are still present; and
- Transporting the petroleum-impacted soils to the off-site disposal or recycling facility.

The petroleum-impacted soils, which may not be geotechnically suitable for reuse as backfill, will need to be treated or disposed of in accordance with VTANR guidelines<sup>3</sup>. Common impacted soil disposal methods include:

- Polyencapsulation (i.e., containment of the soil with a polyethylene liner allowing biodegradation, photochemical reactions and volatilization to reduce petroleum concentrations);
- Landfilling (as waste material or daily cover); and
- Out-of-state disposal at asphalt batch or thermal desorption plants.

---

<sup>3</sup> Vermont Agency of Natural Resources, August 1996. Agency Guidelines for Petroleum Contaminated Soil and Debris. Waste Management Division, August 1986.

We assume that due to space limitations, polyencapsulation is not a viable option to treat the soils; consequently, the soils will need to be re-used on site (if re-use meets VTANR regulations) or transported off-site for disposal or recycling.

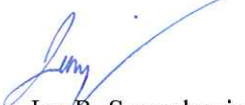
## CLOSURE

This report has been prepared for the use of PB for the proposed railroad bridge replacement in accordance with generally accepted professional engineering, geophysical 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 geophysical and/or 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 foundation recommendations are properly interpreted and implemented.

We trust this report contains the geotechnical and geophysical information that PB presently requires to proceed with the design of the proposed facilities. If there is any point which requires further clarification, or if we can be of additional assistance, please contact us.

Sincerely,

### GOLDER ASSOCIATES INC.



Jay R. Smerekanicz, P.G.  
Senior Consultant and Associate



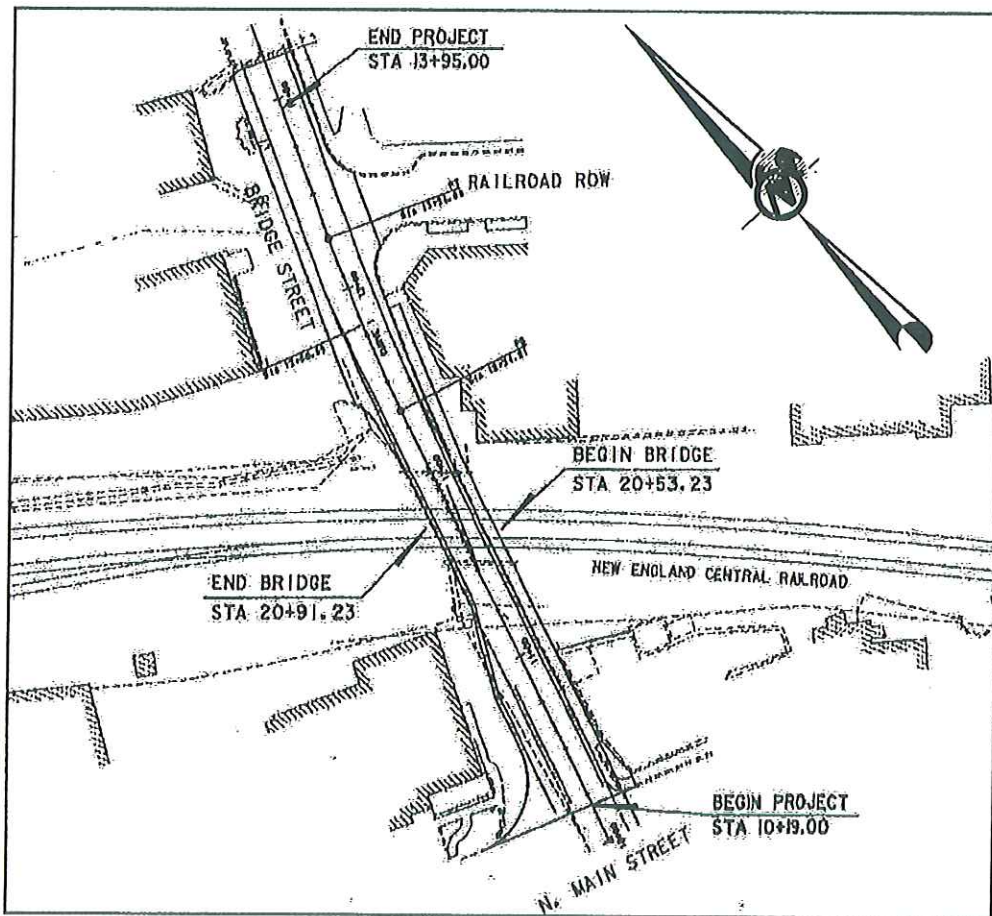
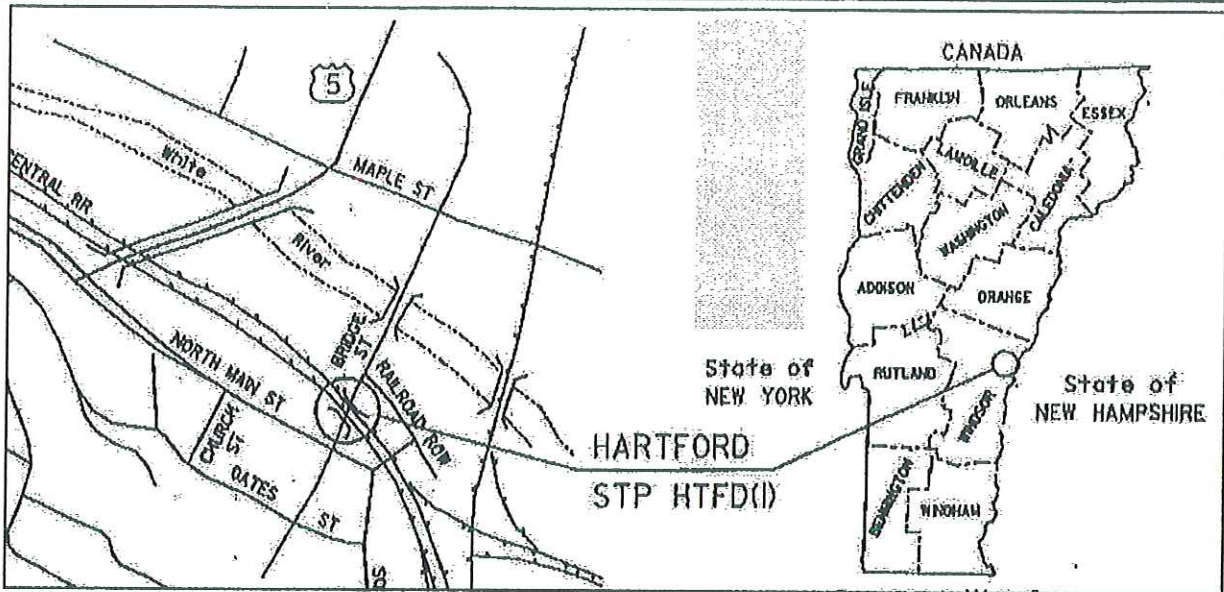
Mahendra R. Thilliyar, P.E. *for*  
Senior Engineer



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

Attachments


## FIGURES



Drawing file: 08386958A001.dwg Jul 15, 2008 - 4:38pm

**REFERENCE**

1.) BASE MAP TAKEN FROM VHB DRAWING TITLED, " TITLE SHEET", DATED JULY 2007.

 <b>Golder Associates</b> BRUNSWICK, MAINE	SCALE	AS SHOWN	TITLE	<h2>SITE LOCATION PLAN</h2>
	DATE	07/15/08		
	DESIGN	MRT		
	CADD	MPB		
FILE No.	08386939A001		CHECK	NECR BRIDGE REPLACEMENT HARTFORD, VERMONT
PROJECT No.	083-86958	REV. 0	REVIEW	
				FIGURE <b>1</b>

**LEGEND**

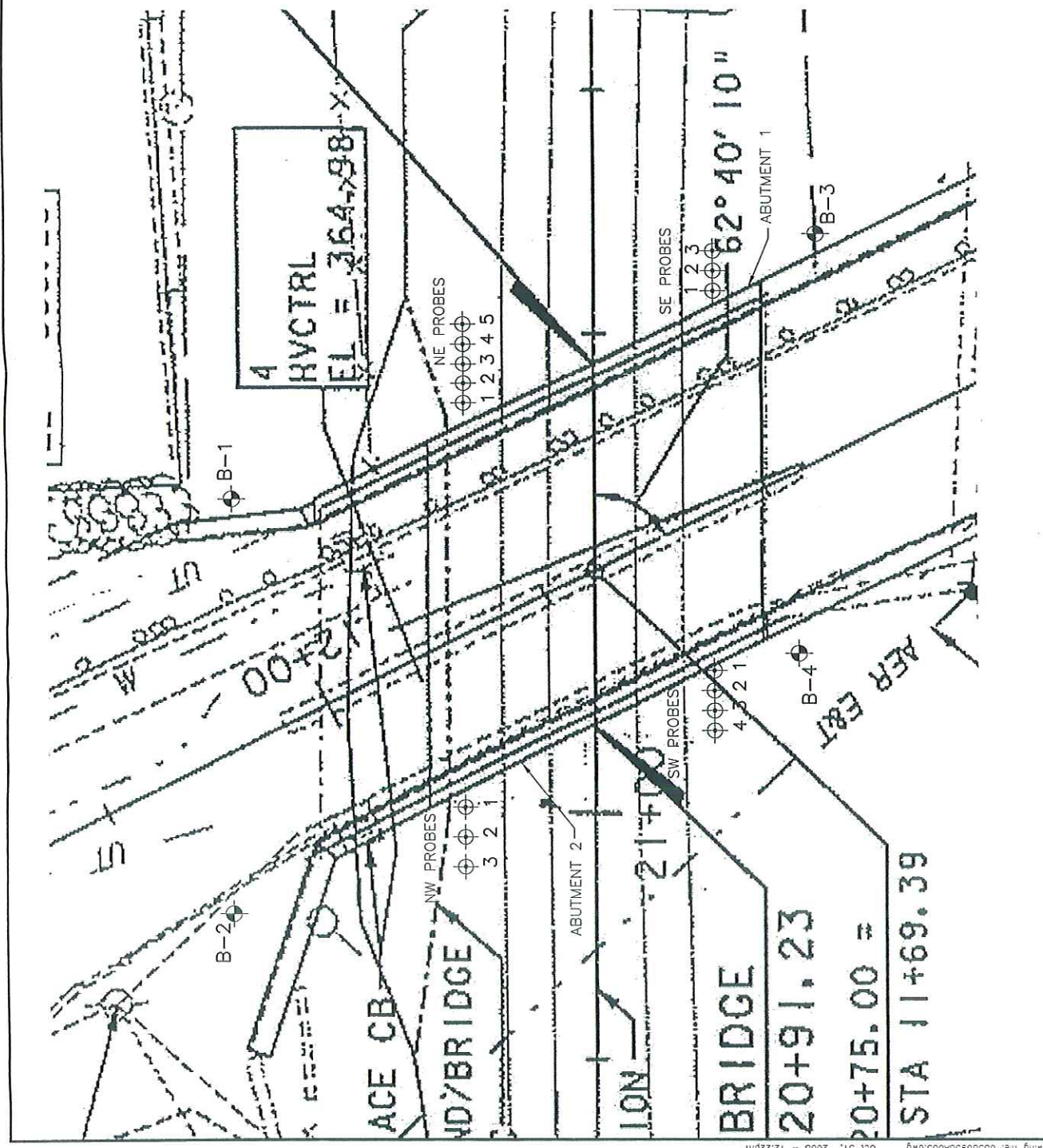
- B-1 TEST BORING LOCATION (2000)
- NE-1 PROBE HOLE LOCATION (2008)

**NOTES**

1.) BOREHOLE AND PROBE LOCATIONS ARE APPROXIMATE, AND WERE NOT OBTAINED WITH PRECISE METHODS.

**REFERENCES**

1.) BASEMAP WAS OBTAINED FROM SHEET 4 OF 10, ENTITLED N.E.C.R. BRIDGE OVER BRIDGE STREET, PREPARED BY VANASSE HANGEN BRUSTLIN, INC.



PROJECT  
 GEOPHYSICAL AND GEOTECHNICAL INVESTIGATIONS  
 NECR BRIDGE REPLACEMENT  
 TOWN OF HARTFORD, VERMONT

TITLE  
 TEST BORING LOCATION PLAN

FIGURE 2

PROJECT No.	083-86955
FILE No.	0836658A003
REV. 0	SCALE AS SHOWN
DESIGN	JRS 10/24/08
CADD	MPB 10/24/08
CHECK	JRS 10/31/08
REVIEW	JRS 10/31/08

GPR data were collected in vertically-oriented scans, each two feet apart, from the top to the bottom of the granite-block bridge existing abutments #1 (east) and #2 (west). Figure 1 depicts the approximate orientation of the GPR scans on an elevation provided by Vanasse Hangen Brustlin, Inc (2007). A total of thirty-four (34) GPR scans were collected on abutment 1 and forty-three (43) scans were collected on abutment 2. A positioning mark was placed in the electronic record of each scan where the GPR antenna crossed the block joints. Each GPR scan location along the abutment wall, file name, and time of data collection was noted in a field book as well as observations of rock quality, void locations, and concrete location along each scan.

## RESULTS

A block of granite with a known thickness (25") was identified on the ground surface immediately adjacent to the south wingwall of abutment #1 (east abutment). This block was used as a test block to calibrate the estimated GPR reflection depths of block investigated along the bridge abutments (Photo 1).

**Photo1 – 400 MHz GPR Antenna on Test Block**

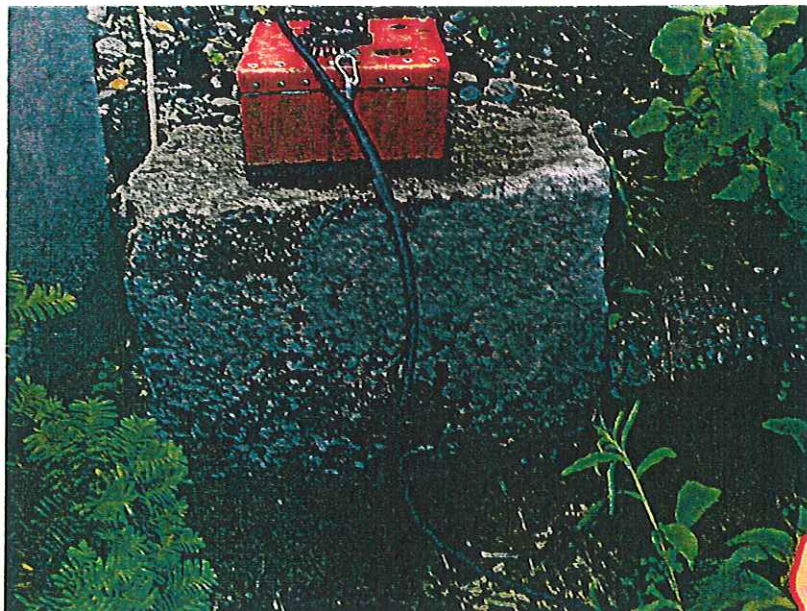


Figure 2 depicts one of the GPR scans collected on the test block. During this scan, the GPR antenna was placed on top of the test block, as shown in Photo 1. The antenna was then moved to the side of the block facing the camera in Photo 1, before being returned to the top of the block. The interpreted thickness of the block is shown in Figure 2 and shows the block to be thicker horizontally than vertically. Interpreted vertical thickness based on GPR records is approximately 25" which correlates to the measured thickness as determined in the field.

Figure 3 is an example GPR scan from abutment #1 that is representative of typical results. The GPR record was scanned from top to bottom; the top is shown on the left, and marks in the GPR record indicating joints between the rock blocks are shown on the scan. The interpreted base / thickness of the granite block closest to the surface is depicted by the dashed gray line on Figure 3. The increase in amplitude of GPR signal reflections at a depth of 1.5 to nearly 3 feet is in the interpreted interface between the surficial granite block and the material behind the block.

The decrease in block thickness below about one-third from the top does not agree with the conceptual model of increasing block thickness with depth. It is likely that a second stack of granite blocks is present behind the first, surficial blocks below the upper third of the abutment. An example



cross-section of this interpreted abutment geometry, based solely on the interpreted GPR results is shown in Figure 4. Unfortunately, the GPR records did not exhibit distinct reflections of these hidden blocks which would allow for an accurate interpretation of the geometry and/or thickness of the blocks.

Figure 5 is a second example of a GPR scan from abutment #1. This scan also exhibits increase in amplitude of GPR signal reflections at a depth of 1.5 to nearly 3 feet, interpreted as the interface between the surficial granite block and the material behind the block. A six-inch thick joint between the upper and second courses of granite was noted as visible in the field. This joint is represented by an obvious reflection in the first 5 nS of the GPR record through this area. There are additional patterns of reflections visible in the GPR record in Figure 5 and in other records. These patterns are not repeatable throughout the length of either abutment #1 or abutment #2 and are not interpreted to represent surfaces or contacts between material behind the abutments.

An attempt was made to determine the thickness of each granite block along each abutment surveyed, based on the reflection patterns in the GPR scans. The summary of this effort is shown in Tables 1 and 2. It should be emphasized that the GPR data displayed many overlapping reflectors which adds ambiguity to the interpreted thicknesses in Tables 1 and 2. These thicknesses should not be relied upon for engineering purposes.

There is no interpreted evidence of wooden piles behind the surficial granite blocks of either abutment #1 or abutment #2.

## **LIMITATION OF GEOPHYSICAL METHODS**

Golder services are conducted in a manner consistent with the level of care and skill ordinarily exercised by other members of the geophysical community currently practicing under similar conditions subject to the time limits and financial and physical constraints applicable to the services. Ground penetrating radar is a remote sensing geophysical method that may not detect all subsurface features of interest, such as block thickness. Furthermore, site-specific sources of cultural interference, such as nearby steel structures, conductive minerals in the granite, or active underground utilities, may have an adverse effect on the interpretation and maximum depth of investigation of GPR data.

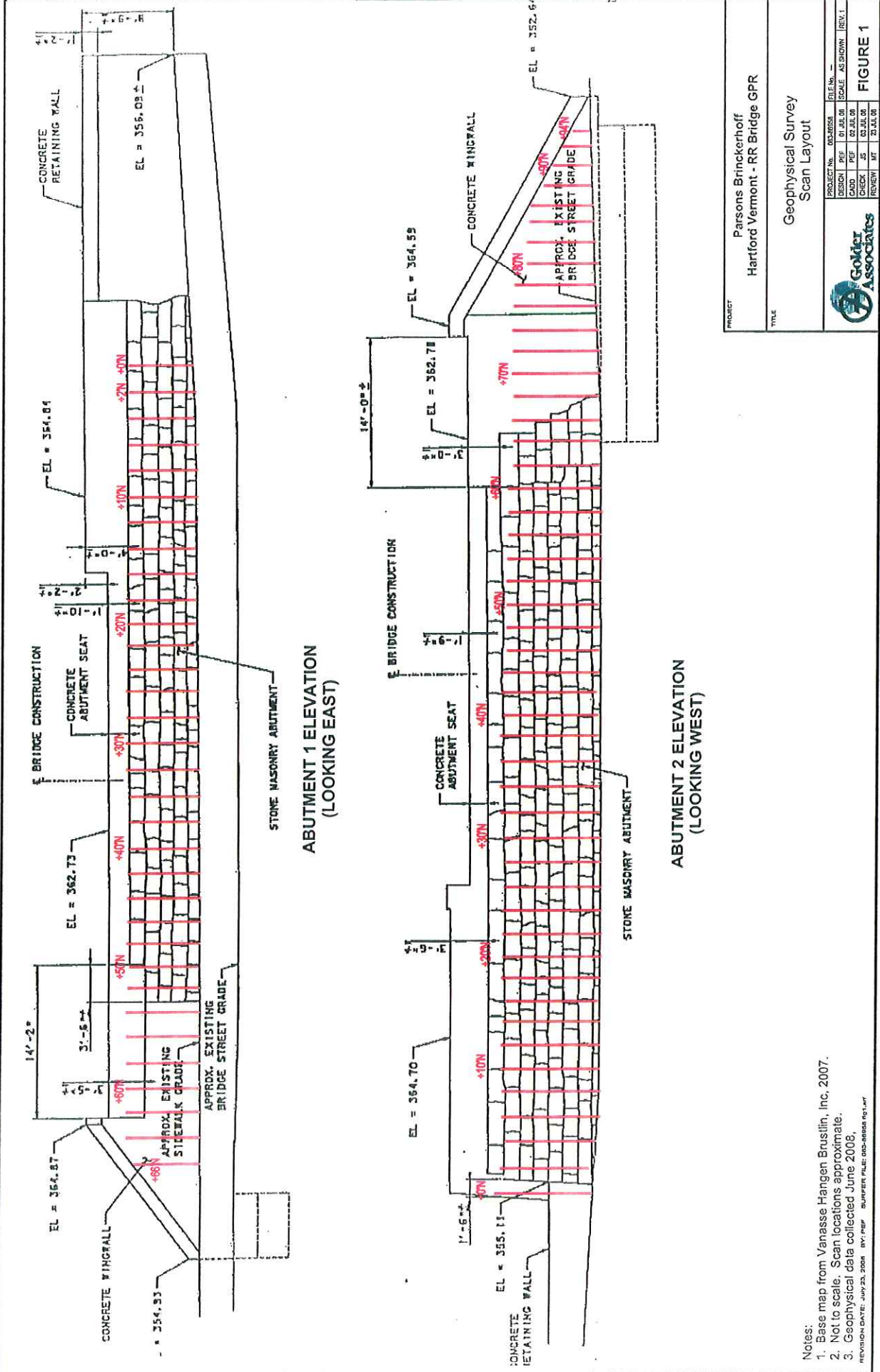
TABLE 1 – Interpreted Block Thicknesses – Abutment 1

Abutment 1 - Interpreted Block Thickness (South to North)							
			← Top Bottom →				
GPR File (.dtz)	Location	# of Blocks	Thickness Block 1 (feet)	Thickness Block 2 (feet)	Thickness Block 3 (feet)	Thickness Block 4 (feet)	Notes
140	+0' N	3	1.25	1.5	1.5	N/A	
141	+2' N	4	1.25	1.5	1.5-2	2	
142	+4' N	3	1.75	2	2.5	N/A	line in joint, 1-2
143	+6' N	4.5	2-2.5	1.75	1.75	2	
145	+8' N	4	1.5	2-2.5	2-3	2	line in joint, 1-2
146	+10' N	4	3	2-3	1.5-2.5	2	
147	+12' N	4	1.5	2	2-3	2-3	
148	+14' N	4	1	2	2-3	2	line in joint, 3-4
149	+16' N	4	1.5	2	2.5	2.5-3	45° crack in block 4
150	+18' N	4	1.5-2	2-2.5	2	2-3	
151	+20' N	4	1.5	1.5	1.5-2.5	2.5	
152	+22' N	4.5	2	2	2	3	
153	+24' N	4.5	1.5-2	2	2-4	2.5-3	60° crack in block 4
154	+26' N	4	2	2	2-3	3	
155	+28' N	4	2	2-3	3-4	3-4	
156	+30' N	4	2-3	3	2.5-3.5	?	45° crack in block 2, 80° crack in block 4,
157	+32' N	3.5	3	2.5-3	2.5-3	N/A	fill in joint, 1-2
158	+34' N	4	2	2	2-2.5	2-4	fill in joint, 1-2
159	+36' N	4	2	2-3	3-5	5-6	
160	+38' N	4	3.5	3.5-4	4	?	bottom block fractured
161	+40' N	3.5	2.5	2.5	3	N/A	bottom block fractured
162	+42' N	4	1.5-2	2-2.5	2.5-3	3	6" gap between blocks 3 & 4
163	+44' N	4.5	2.5-3	3	3-3.5	3.5	top is concrete, fill between blocks 2 & 3
164	+46' N	4.5	2	1.5-2.5	2-3	3	top is concrete, gap between blocks 1 & 2
165	+48' N	4	3-4 conc.	3	3	3-4	top is concrete
166	+50' N	4	3-4 conc.	3-4	3-4	3	top two blocks are concrete
167	+52' N	?	thick concrete, image is fuzzy to 7.5 feet				all concrete @ surface
170	+54' N	?	thick concrete, image is fuzzy to 7.5 feet				all concrete @ surface
171	+56' N	?	thick concrete?, 7 - 8 feet				all concrete @ surface
172	+58' N	?	thick concrete?, 7.5 - 8.5 feet				all concrete @ surface
173	+60' N	?	thick concrete?, ~ 7.5 feet				all concrete @ surface
175	+62' N	?	Concrete				all concrete @ surface
176	+64' N	?	Concrete				all concrete @ surface
177	+66' N	?	Concrete				all concrete @ surface

TABLE 2 – Interpreted Block Thicknesses – Abutment 2

Abutment 2 - Interpreted Block Thickness (South to North)								
			← Top		Bottom →			
GPR File (.dtz)	Location	# of Blocks	Thickness Block 1 (feet)	Thickness Block 2 (feet)	Thickness Block 3 (feet)	Thickness Block 4 (feet)	Thickness Block 5 (feet)	Notes
180	+0' N	3?	3-4 feet behind concrete surface			N/A	N/A	all concrete @ surface
181	+2' N	3	3-4 feet behind concrete surface			N/A	N/A	top 5' concrete
182	+4' N	3	3	2-3	3-4	N/A	N/A	top 4' concrete, major fracture in block 3
183	+6' N	5	1.5-2	4	4-5	3-4	4-5	
184	+8' N	4	4	4	4-2	2-3	N/A	
185	+10' N	4	2	2-3	3	3-4	N/A	
186	+12' N	4	2	2.5	2-3	2-4	N/A	
187	+14' N	5	3-4	3-4	4	4	4	
188	+16' N	4	2-3.5	3-3.5	2.5-3.5	3-4	N/A	
189	+18' N	4	2-2.5	2-2.5	2.5-3	2.5-4	N/A	
190	+20' N	4	3-4	3-4	3-4	3-4	N/A	
191	+22' N	4	2	2-3	2-3	2-3	N/A	bottom block broken
192	+24' N	4	3-4	3-4	3-4	3-4	N/A	GPR shows metal in block 3
193	+26' N	4	3-4	3-4	3-4	3-4	N/A	bottom block has void in joint
194	+28' N	5	3-4	4	2-4	4	3-5	bottom block broken
195	+30' N	4	3-4	3.5-4.5	3-4	3-4	N/A	
196	+32' N	4	2-3.5	2-3.5	2.5-3	2.5-4	N/A	
197	+34' N	4	2-2.5	2-2.5	2.5-3	2.5-4	N/A	
198	+36' N	4	3.5?	3-4?	3.5-4.5?	3-5?	N/A	Many reflectors, difficult to interpret
199	+38' N	4	3.5	3.5-4.5	4.5-5	5	N/A	
200	+40' N	4	3-3.5	3.5	4.5-5.5	5	N/A	
201	+42' N	4	3.5?	3-4?	3.5-4.5?	4.5-5?	N/A	Many reflectors, difficult to interpret
202	+44' N	4	2-3	2.5-3.5	3.5	3	N/A	
203	+46' N	4	2.5-3?	3-3.5?	3.5?	4?	N/A	Many reflectors, difficult to interpret

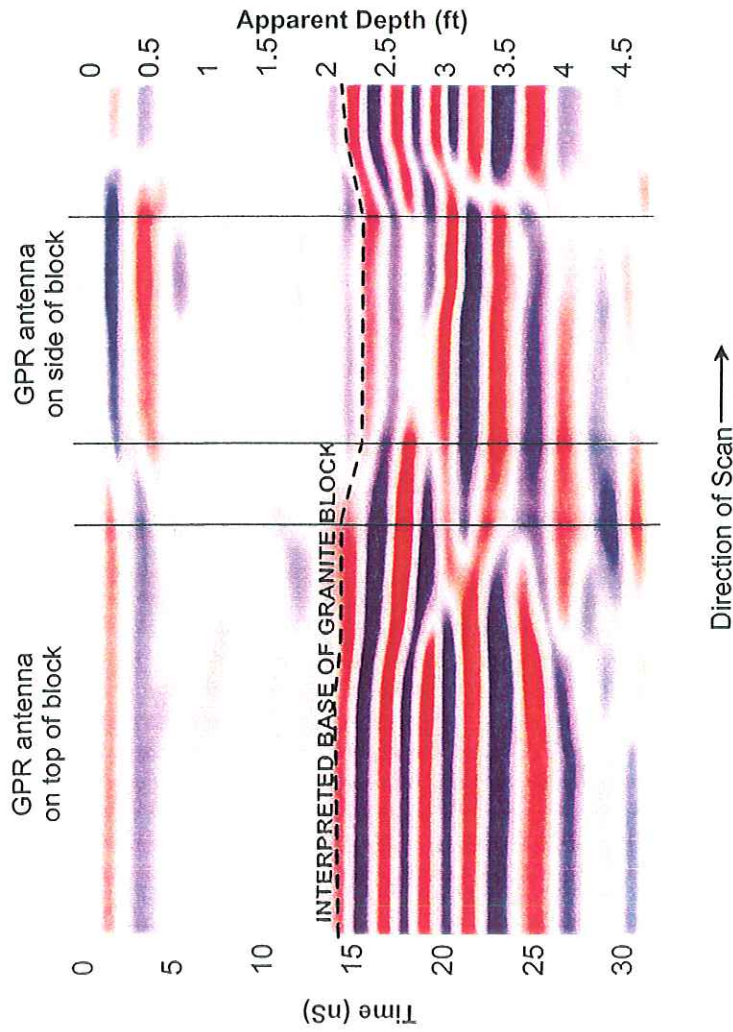
GPR File (.dtz)	Location	# of Blocks	Thickness Block 1 (feet)	Thickness Block 2 (feet)	Thickness Block 3 (feet)	Thickness Block 4 (feet)	Thickness Block 5 (feet)	Notes
204	+48' N	4	3	3.5-4	3.5-4	3.5	N/A	
205	+50' N	4	3.5	3.5-4	4-4.5	4.5-5	N/A	
206	+52' N	4	3	3.5	3.5	3-4	N/A	
207	+54' N	4	2.5-3	3-3.5	3-4	3-4	N/A	fractures in block 2
208	+56' N	4	1.5-3?	2.5-3.5?	2.5-3.5?	2.5-3.5?	N/A	Many reflectors, difficult to interpret
209	+58' N	4	1.5-2.5	2-2.5	2-2.5	2.5-3.5	N/A	
210	+60' N	4	2-2.5	2-2.5	2-2.5	?	N/A	block 4 surface very irregular
211	+62' N	4	3-3.5?	3.5?	3-4?	3?	N/A	Many reflectors, difficult to interpret
212	+64' N	4	3	3-3.5	2.5-3	2-2.5	N/A	
213	+66' N	5	2-2.5	2.5	2-2.5	2-2.5	2-2.5	top block is concrete
214	+68' N	4	2.5-3?	3-3.5?	3.5?	4?	N/A	top two blocks are concrete, void between blocks 3 & 4
215	+70' N	?	?	?	2?	2?	N/A	mostly concrete
216	+72' N	?	?	?	?	?	N/A	mostly concrete
217	+74' N	?	Concrete 5-6.5 ft thick?, thicker lower				N/A	all concrete @ surface
218	+76' N		Poor GPR image				N/A	all concrete @ surface
219	+78' N		Poor GPR image, appears as thin concrete				N/A	all concrete @ surface
220	+80' N		Concrete 2-3 feet thick?				N/A	all concrete @ surface
221	+82' N		Poor GPR image, appears as thin concrete				N/A	all concrete @ surface
222	+84' N		Poor GPR image, appears as thin concrete				N/A	all concrete @ surface
223	+86' N		Poor GPR image, Concrete 2-3 feet thick?				N/A	all concrete @ surface
224	+88' N		Poor GPR image, Concrete 2-3 feet thick?				N/A	all concrete @ surface
225	+90' N		Poor GPR image				N/A	all concrete @ surface
226	+92' N		Poor GPR image				N/A	all concrete @ surface
227	+94' N		Poor GPR image				N/A	all concrete @ surface



PROJECT		Parsons Brinckerhoff Hartford Vermont - RR Bridge GPR	
TITLE		Geophysical Survey Scan Layout	
PROJECT No.	00-000000	FILE No.	-
DESIGN	PEP	SCALE	AS SHOWN
CADD	PEP	DATE	02 JUL 08
CHECK	JS	DATE	03 JUL 08
REVIEW	BT	DATE	23 JUL 08
			REV. 1
			FIGURE 1



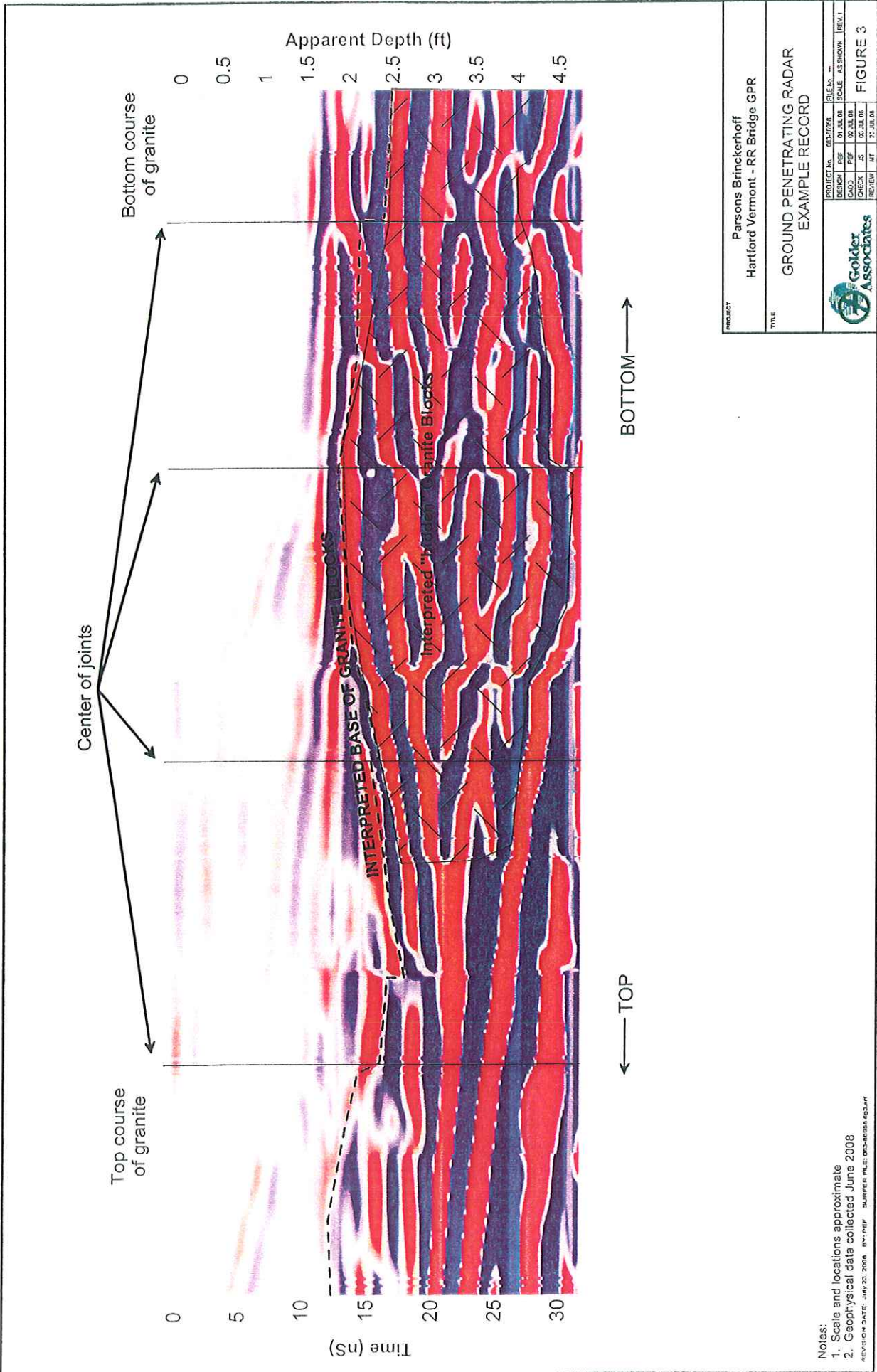
Notes:  
 1. Base map from Vanasse Hangen Brustlin, Inc. 2007.  
 2. Not to scale. Scan locations approximate.  
 3. Geophysical data collected June 2008.  
 REVISION DATE: JUL 23, 2008 BY: PEP SURFER FILE: 000-RRBRG 1.rvt



Notes:  
 1. Scale and locations approximate  
 2. Geophysical data collected June 2008  
 REVISION DATE: JUN 23, 2008 BY: PEP SURFER FILE: 08D-RR05 102-47

PROJECT		Parsons Brinckerhoff Hartford Vermont - RR Bridge GPR	
TITLE		GROUND PENETRATING RADAR TEST BLOCK RECORD	
PROJECT No.	08D-RR05	FILE No.	—
DESIGN	PEP	01 JUL 08	SCALE AS SHOWN
CHECK	JS	03 JUL 08	REV. 1
REVIEW	VT	23 JUL 08	FIGURE 2





PROJECT No.	03-10-008	FILE No.	---
DESIGN	PEF	D. J. JUL. 08	SCALE: AS SHOWN
CADD	PEF	02 JUL 08	REACT
CHECK	JS	03 JUL 08	
REVIEW	JT	22 JUN 08	



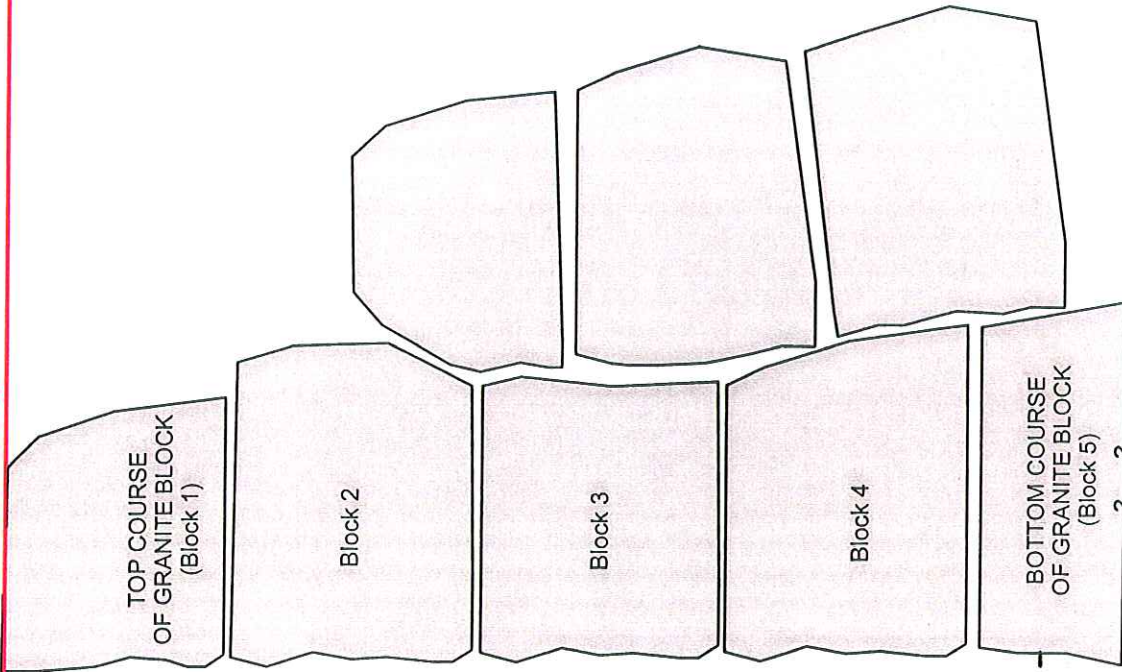
**FIGURE 3**

**PROJECT**  
Parsons Brinckerhoff  
Hartford Vermont - RR Bridge GPR

**TITLE**  
GROUND PENETRATING RADAR  
EXAMPLE RECORD

Notes:  
 1. Scale and locations approximate  
 2. Geophysical data collected June 2008  
 REVISION DATE: JUL 23, 2008 BY: NEF SURFER FILE: 03-10-008-fig3.wf

**RAILROAD BRIDGE**



**Road Surface**

Notes:  
1. Scale and locations approximate  
2. Geophysical data collected June 2008  
REVISION DATE: JUL 23, 2008 BY: PEF SURFER FILE: OR140524.rgs.rtf

**PROJECT** Parsons Brinckerhoff  
Hartford Vermont - RR Bridge GPR

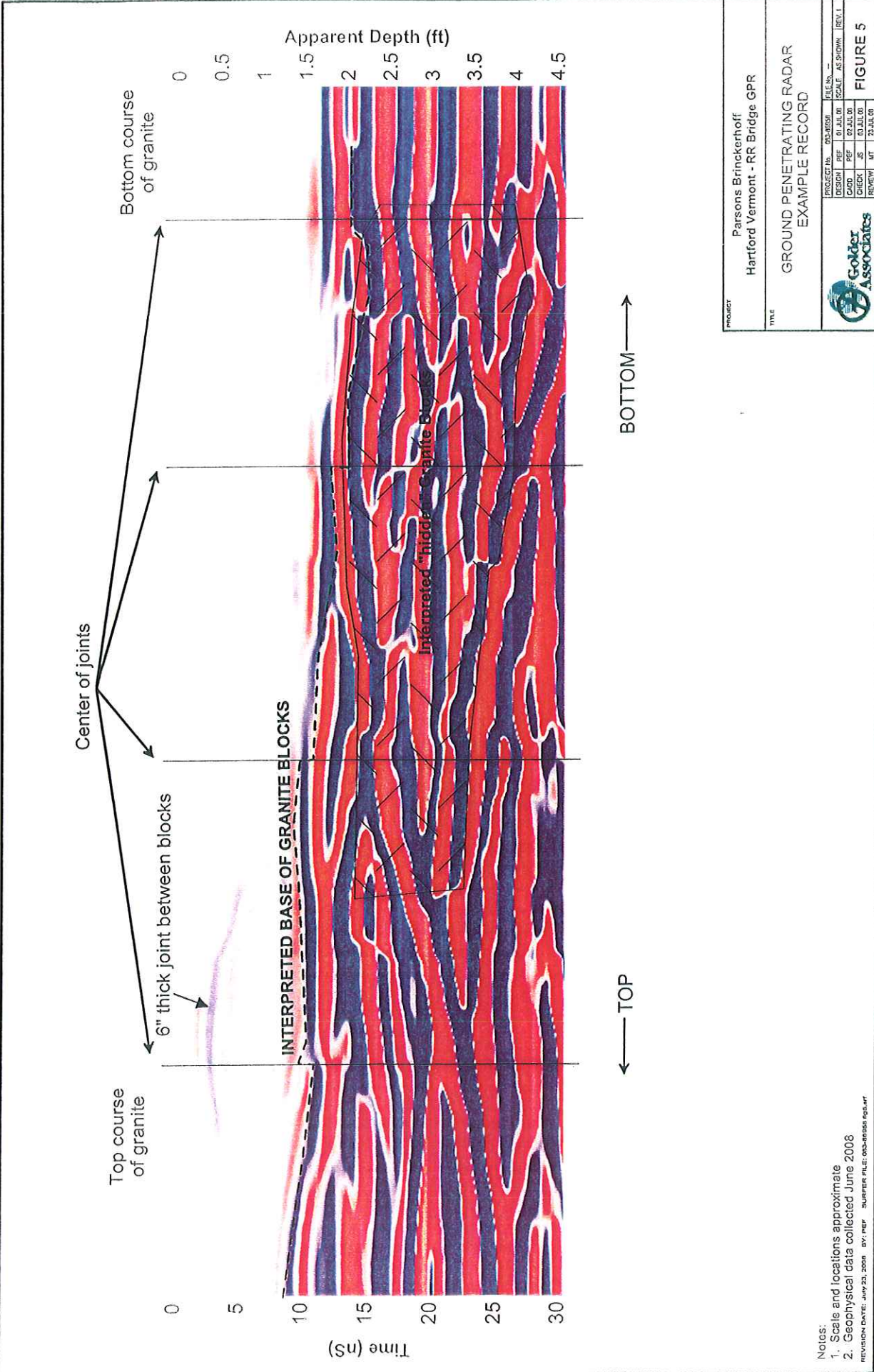
**TITLE** GROUND PENETRATING RADAR  
INTERPRETED TYPICAL GEOMETRY

PROJECT No.	0140524	FILE No.	---
DESIGN	PEF	DATE	12-JUL-07
CADD	PEF	DATE	12-JUL-07
CHECK	JS	DATE	12-JUL-07
REVIEW	MT	DATE	12-JUL-07
SCALE			AS SHOWN
REV. 1			REV. 1



**FIGURE 4**





Notes:  
 1. Scale and locations approximate  
 2. Geophysical data collected June 2008  
 REVISION DATE: JUN 23, 2008 BY: PEF SURFER FILE: 052-RRR051.FIG5.WF

PROJECT		Parsons Brinckerhoff Hartford Vermont - RR Bridge GPR	
TITLE		GROUND PENETRATING RADAR EXAMPLE RECORD	
PROJECT No.	052-RRR051	FILE No.	—
DESIGN	PEF 01 JUL 08	SCALE	AS SHOWN
DRAWN	PEF 02 JUL 08	REV. 1	
CHECK	JS 10 JUL 08		
REVIEW	MT 23 JUL 08		



FIGURE 5

**APPENDIX B**  
**BORING LOGS**

PROJECT: BRIDGE ST. RR. BRIDGE REPLACEMENT

PROJECT LOCATION: HARTFORD, VT

PROJECT NUMBER: 003-6906

BORING TIME: 0935-10/24/00 to 1115-10/25/00

# RECORD OF BOREHOLE B-1

BORING LOCATION: SEE FIGURE

DATUM: ELEV 364.5



DEPTH SCALE FEET	DEPTH SCALE METERS	BORING METHOD	SOIL PROFILE		SAMPLES				SAMPLE DESCRIPTIONS AND BORING NOTES			
			ELEV. DEPTH	NUMBER	TYPE	BLOWS / 6 INCHES	N	REC. \ ATT.				
0	0	HOLLOW-STEM AUGER & DRIVE AND WASH	0'-77' Generally compact to very dense, olive-gray and yellow-brown SANDs with varying percentages of fines and gravels.		Elev. 0.0	1	DO	1-3-2-3	5	12/24	0'-2' Loose, brown m-f SAND, trace gravel, moist. Upper 3 inches was organic.	
					2.0						Auger to 5'	
					6.5	3	DO	18-9-15-33	24	5/24	5'-5.1" Rock fragment (Granite) - No Sample Recovered Auger to 6.5'	
					8.5						6.5'-8.5' Compact, olive-gray, m-f SAND and c-f GRAVEL.	
10				10'-17' Soil samples appeared, based on visual and olfactory observations, to be contaminated. Sample S-4 was tested by con-test analytical laboratory. See Appendix B for test results.		10.0	4	DO	6-7-5-4	12	12/24	Auger to 10'
					12.0						10'-12' Compact, olive-gray, m-f SAND, some gravel, trace silt.	
					15.0	5	DO	20-15-13-10	28	1/24	Auger to 15'	
					17.0						15'-17' Compact, olive-gray, SAND, trace gravel, dry.	
					20.0	6	DO	8-11-12-11	23	14/24	Auger to 20'	
					22.0						20'-22' Compact, yellow-brown to greenish gray, f-SAND, some fines, dry.	
					25.0	7	DO	10-12-14-15	28	14/24	Auger to 25'	
					27.0						25'-27' Compact, yellow-brown to greenish gray, m-f SAND, trace gravel, dry.	
30					30.0	8	DO	15-18-18-18	38	18/24	Auger to 30'	
					32.0						30'-32' Dense, olive-gray, m-f SAND, little fines, trace gravel, dry.	
					35.0	9	DO	9-10-9-9	19	18/24	Auger to 35'	
					37.0						35'-37' Compact, olive-gray, m-SAND, trace fines. Groundwater Table at 36.5' bgs.	
40					40.0	10	DO	12-15-16-26	31	18/24	Auger to 40'	
				42.0						40'-42' Dense, olive-gray, c-f SAND, some fines, little gravel, saturated.		
				45.0	11	DO	14-14-18-18	32	12/24	Auger to 45'		
				47.0						45'-47' Dense, olive-gray, c-m SAND, trace f-gravel and fines, saturated.		
50				50.0	12	DO	6-12-17-23	29	12/24	Auger to 50'		
				52.0						50'-52' Compact, olive-gray, m-f SAND, trace f-gravel and fines, saturated.		
				55.0	13	DO	6-8-25-40	33	24/24	Auger to 55'		
				57.0						55'-57' Dense, olive-gray, m-f SAND, trace f-gravel and fines, saturated.		
60				60.0	14	DO	35-27-28-24	55	6/24	Case hole to 55' bgs.		
				62.0						60'-62' Very dense, olive-gray, c-m SAND, some c-f gravel, wet. Stopped drilling for the day at 1600.		
				65.0	15	DO	87-42-28-28	70	9/24	Resumed drilling at 0815 on 10/25/00. Advance casing to 65' bgs.		
				67.0						65'-67' Very dense, olive-gray, m-f SAND and c-f GRAVEL, trace fines, wet.		
70				70.0	16	DO	131/4"	---	0/24	Advance casing to 70'		
				72.0						70'-72' No recovery (rock) - drill ahead of casing to 75' bgs		
				75.0	17	DO	44-25-37-28	82	4/24	Advance casing to 75'		
				77.0						75'-77' Very dense, olive-gray, c-SAND, some m-f gravel, little to trace fines, saturated.		
80			End boring at 77 feet bgs.								End boring at 77' bgs.	

DRILL RIG: ACKER 82  
 DRILLING CONTRACTOR: CON-TEC  
 DRILLER: B. BOURASSA

WEIGHT OF HAMMER: 140 lbs  
 DROP: 30 inches

SHEET 1 OF 1

LOGGED: TAH  
 CHECKED: TKA  
 DATE:

PROJECT: BRIDGE ST. RR. BRIDGE REPLACEMENT

PROJECT LOCATION: HARTFORD, VT

PROJECT NUMBER: 003-6906

BORING TIME: 1410-10/25/00 to 1440-10/26/00

# RECORD OF BOREHOLE B-2

BORING LOCATION: SEE FIGURE

DATUM: ELW 3642



DEPTH SCALE FEET	DEPTH SCALE METERS	BORING METHOD	SOIL PROFILE		SAMPLES					SAMPLE DESCRIPTIONS AND BORING NOTES
			ELEV. DEPTH	NUMBER	TYPE	BLOWS / 6 INCHES	N	REC. \ ATT.		
0	0	HOLLOW-STEM AUGER & DRIVE AND WASH	0'-66' Generally compact to very dense, light gray to olive-gray, SANDs with varying percentages of fines and gravels.	Elev. 0.0	1	DO	2-3-3-2	6	1/24	0'-2' Loose, organic, m-f SAND.
				2.0						Auger to 5'
2				5.0	2	DO	4-4-4-4	8	6/24	5'-7' Loose, light gray, c-f SAND, some fines, little f-gravel, dry.
				7.0						Auger to 10'
10				10.0	3	DO	4-4-7-9	11	9/24	10'-12' Compact, light gray, m-f SAND, some c-f gravel, dry.
				12.0						Auger to 15'
				15.0	4	DO	12-19-23-26	42	9/24	15'-17' Dense, light gray, m-f SAND, some c-f gravel, dry.
				17.0						Auger to 20'
20				20.0	5	DO	15-18-17-16	35	10/24	20'-22' Dense, light gray, m-f SAND, some c-f gravel, dry.
				22.0						Auger to 25'
				25.0	6	DO	10-11-11-13	22	15/24	25'-27' Compact, olive-gray, m-f SAND, trace f-gravel, moist.
				27.0						Stopped drilling for the day at 1540. Resumed drilling at 0825 on 10/26/00. Augered to 30'
30				30.0	7	DO	19-20-16-15	36	12/24	30'-32' Dense, light gray to yellow-brown, c-f SAND and f-GRAVEL, some fines, dry.
				32.0						Auger to 35'
		35.0	8	DO	11-16-15-13	31	18/24	35'-37' Dense, light gray, m-f SAND, trace f-gravel and fines. Groundwater Table at 36.5' bgs.		
		37.0						Auger to 40'		
40		40.0	9	DO	11-15-31-68	46	24/24	40'-42' Dense, olive-gray, c-m SAND, trace fines, saturated.		
		42.0						Auger to 45'		
		45.0	10	DO	11-16-18-23	34	24/24	45'-47' Dense, olive-gray, c-f SAND, little fines, trace gravel, saturated.		
		47.0						Auger to 50'		
50		50.0	11	DO	17-14-15-45	29	24/24	50'-52' Dense, olive-gray, c-m SAND, little c-f gravel, trace fines, saturated.		
		52.0						snapped cable - switch to casing (275 blows for 5 feet)		
		54.0	12	DO	35-33-32-33	85	3/24	54'-56' Very dense, olive-gray, m-f SAND, little gravel, trace fines, saturated.		
		56.0						Advance casing to 59' (384 blows for 5 feet)		
60		59.0	13	DO	73-28-20-31	48	3/24	59'-61' Dense, olive-gray, m-f SAND and c-f GRAVEL, little to trace fines.		
		61.0						Advance casing to 64' (272 blows for 5 feet)		
		64.0	14	DO	18-48-55-34	103	---	64'-65' Very dense, c-f GRAVEL, some c-m sand.		
		66.0						End boring at 64' bgs.		
70										
80										

DRILL RIG: ACKER B2  
 DRILLING CONTRACTOR: CON-TEC  
 DRILLER: B. BOURASSA

WEIGHT OF HAMMER: 140 lbs  
 DROP: 30 inches  
 SHEET 1 OF 1

LOGGED: TAH  
 CHECKED: TKA  
 DATE:

PROJECT: BRIDGE ST. RR. BRIDGE REPLACEMENT

PROJECT LOCATION: HARTFORD, VT

PROJECT NUMBER: 003-6906

BORING TIME: 0900-10/27/00 to 1540-10/27/00

# RECORD OF BOREHOLE B-3

BORING LOCATION: SEE FIGURE

DATUM: ELFV 365±



DEPTH SCALE FEET	DEPTH SCALE METERS	BORING METHOD	SOIL PROFILE		SAMPLES					SAMPLE DESCRIPTIONS AND BORING NOTES
			ELEV.	DEPTH	NUMBER	TYPE	BLOWS / 6 INCHES	N	REC. \ ATT.	
0	0	HOLLOW-STEM AUGER & DRIVE AND WASH	0'-62' Generally compact to very dense, light gray to olive-gray to yellow-brown, SANDs with varying percentages of fines and gravels.	Elev. 0.0	1	DO	1-3-3-4	6	10/24	0'-2' Loose, dark gray, f-SAND, trace c-gravel, dry. Upper 4 inches was organic.
			2.0							Auger to 5'
2			5.0	2	DO	4-4-4-3	8	12/24	5'-7' Loose, light brown, f-SAND, little to trace c-f gravel, dry.	
			7.0							Auger to 10'
10			10.0	3	DO	2-3-2-3	5	14/24	10'-12' Loose, light gray, m-f SAND, some fines, trace gravel, dry.	
			12.0							Auger to 15'
			15.0	4	DO	18-23-22-13	45	12/24	15'-17' Dense, light gray, m-f SAND, some c-f gravel, dry. Sample had fresh fractures.	
			17.0							Auger to 20'
20			20.0	5	DO	22-20-28-22	48	12/24	20'-22' Dense, light gray, c-f SAND and c-f GRAVEL, some fines, dry.	
			22.0							Auger to 25'
			25.0	6	DO	8-11-8-12	19	18/24	25'-27' Compact, yellow-gray, c-f SAND, dry.	
			27.0							Auger to 30'
30			30.0	7	DO	25-31-20-21	51	3/24	30'-32' Very dense, light gray, m-f SAND, little to trace c-gravel, trace fines, dry.	
		32.0							Auger to 35'	
		35.0	8	DO	25-34-21-73	55	15/24	35'-37' Very dense, light gray to yellowish brown, c-m SAND, some c-f gravel, trace fines, dry. Sample had fresh fractures.		
		37.0							Auger to 40'	
40		40.0	9	DO	23-35-24-17	59	9/24	40'-42' Very dense, olive-gray, m-f SAND, little fines, trace gravel, wet.		
		42.0							Auger to 45'	
		45.0	10	DO	7-17-54-100/3"	71	24/24	45'-47' Very dense, olive-gray, c-SAND, trace f-gravel and fines, saturated.		
		47.0							Auger to 50' - Advance and set casing to 50' bgs	
50		50.0	11	DO	15-19-20-19	39	16/24	50'-52' Dense, gray, c-m SAND, trace fines, saturated.		
		52.0							Advance casing to 55'	
		55.0	12	DO	13-23-45-49	68	12/24	55'-57' Very dense, olive-gray, c-f SAND, some c-f gravel, little to trace fines, saturated.		
		57.0							Advance casing to 60' (235 blows for 5 feet)	
60		60.0	13	DO	21-17-20-33	37	---	60'-62' Dense, c-f GRAVEL, trace c-sand and fines. Sample had fresh fractures.		
		62.0							End boring at 62' bgs.	

DRILL RIG: ACKER 82  
 DRILLING CONTRACTOR: CON-TEC  
 DRILLER: B. BOURASSA

WEIGHT OF HAMMER: 140 lbs  
 DROP: 30 Inches  
 SHEET 1 OF 1

LOGGED: TAH  
 CHECKED: TKA  
 DATE:

PROJECT: BRIDGE ST. RR. BRIDGE REPLACEMENT

# RECORD OF BOREHOLE B-4



PROJECT LOCATION: HARTFORD, VT

BORING LOCATION: SEE FIGURE

PROJECT NUMBER: 003-6906

BORING TIME: 1140-10/30/00 to 1120-10/31/00

DATUM: ELEV 365±

DEPTH SCALE FEET	DEPTH SCALE METERS	BORING METHOD	SOIL PROFILE		SAMPLES					SAMPLE DESCRIPTIONS AND BORING NOTES
			ELEV.	DEPTH	NUMBER	TYPE	BLOWS / 6 INCHES	N	REC. DATE	
0	0	HOLLOW-STEM AUGER & DRIVE AND WASH	Elev.	0.0	1	DO	3-5-4-6	9	12/24	0'-2' Loose, black, m-f SAND, little to trace gravel, dry. Upper 9 inches was organic.
				2.0						Auger to 5'
				5.0	2	DO	4-2-2-3	4	9/24	5'-7' Loose, greenish gray, f-SAND, trace gravel, dry.
				7.0						Auger to 10'
10				10.0	3	DO	4-7-9-8	18	--	10'-12' Compact, light brown, m-f SAND, little to trace c-f gravel, dry.
				12.0						Auger to 15'
				15.0	4	DO	7-8-10-8	18	9/24	15'-17' Compact, yellow-brown to olive-gray, m-f SAND, some f-gravel and fines, dry.
				17.0						Auger to 20'
20				20.0	5	DO	9-9-13-26	22	12/24	20'-22' Compact, olive-gray, c-f SAND, some c-f gravel, dry.
				22.0						Auger to 25'
				25.0	6	DO	6-10-12-12	22	12/24	25'-27' Compact, yellow-brown to olive-gray, c-f SAND, some f-gravel and fines, dry.
				27.0						Auger to 30'
30				30.0	7	DO	17-23-28-28	51	18/24	30'-32' Very dense, olive-gray, m-SAND, some c-f gravel, trace fines, dry.
			32.0						Auger to 35'	
			35.0	8	DO	13-14-13-13	27	17/24	35'-37' Compact, olive-gray, m-f SAND, some fines, trace gravel. Slightly wet at 37' bgs.	
			37.0						Auger to 40'	
40			40.0	9	DO	11-9-9-11	18	14/24	40'-42' Compact, olive-gray, m-f SAND, some to little c-f gravel, trace fines, saturated.	
			42.0						Auger to 45'	
			45.0	10	DO	9-13-31-55	44	18/24	45'-47' Dense, olive-gray to yellow-brown, m-f SAND and c-f GRAVEL, trace silt, saturated.	
			47.0						Auger to 50'	
50			50.0	11	DO	11-10-14-20	24	24/24	50'-52' Compact, olive-gray to yellow-brown, c-f SAND, some c-f gravel, trace silt, saturated.	
			52.0						Stopped drilling for the day at 1515. Resumed drilling at 0930 on 10/31/00. Advanced casing to 55' bgs. (210 blows for 5 feet)	
			55.0	12	DO	51-88-50-30	138	12/24	55'-57' Very dense, olive-gray, c-f SAND and c-f GRAVEL, trace silt.	
			57.0						Advance casing to 60' (522 blows for 5 feet)	
60			60.0	13	DO	20-18-22-25	40	13/24	60'-67' Dense, olive-gray, c-f SAND and c-f GRAVEL, trace silt.	
			62.0						End boring of 62' bgs.	

DRILL RIG: ACKER 82

WEIGHT OF HAMMER: 140 lbs

LOGGED: TAH

DRILLING CONTRACTOR: CON-TEC

DROP: 30 inches

CHECKED: TKA

DRILLER: B. BOURASSA

SHEET 1 OF 1

DATE:

**APPENDIX A**  
**GEOPHYSICAL INVESTIGATION REPORT**

## APPENDIX A

### **RE: REPORT ON THE GEOPHYSICAL INVESTIGATION, HARTFORD RAILROAD BRIDGE REPLACEMENT, HARTFORD, VT**

In June, 2008 Golder Associates Inc. (Golder) conducted a geophysical investigation at the Bridge Street railroad bridge in Hartford, Vermont. The purpose of the investigation was to perform a ground penetrating radar inspection of bridge abutments #1 and #2 to support an investigation of the adequacy of the existing abutments to provide appropriate support for the replacement bridge.

The objective of the investigation was to attempt to determine the stone block configuration and evaluate the presence of wood piles behind the stone abutments. The thickness of the stone (granite) blocks was unknown, but the expected target depth was approximately 4 to 6 feet behind the abutment wall. The data generated by this investigation is expected to help determine if additional measures will be required to provide adequate bearing capacity for the new bridge configuration.

This report describes the methodology and instrumentation, field procedures, and presents the results of our investigation.

### **METHODOLOGY AND INSTRUMENTATION**

#### **Ground Penetrating Radar (GPR)**

The GPR method uses electromagnetic (radar) pulses that are directed into the ground from an antenna. Reflections of these pulses from subsurface features are produced where there is a contrast between the electrical properties of subsurface materials and the surrounding soil. Water or air filled voids can produce good reflections depending on their cross-section dimension and depth of burial.

The reflected electromagnetic pulses are received by the antenna, converted into an electric signal, and recorded by the GPR unit. The GPR unit compiles these pulses to produce a cross section or profile image of the subsurface beneath the path of the antenna.

The depth penetration of a GPR signal is a function of the antenna frequency and the conductivity of the subsurface material. As the frequency of the GPR antenna increases, the resolution (ability to detect small objects) increases, but the depth of subsurface penetration decreases. A lower frequency antenna is capable of greater subsurface penetration, but with reduced resolution. Materials that are electrically conductive, such as clay, tend to attenuate the GPR signal, resulting in a decrease in subsurface penetration.

Golder used a Geophysical Survey Systems Inc (GSSI) ground penetrating radar (GPR) system to attempt to determine the block geometry and detect evidence of wood pilings behind the rock bridge abutment. This system consisted of a SIR 2000 control unit, a 400 MHz, and a 500 MHz antenna.

#### **FIELD METHODS**

A Geophysical Survey Systems Inc. Model SIR 2000 Ground Penetrating Radar (GPR) system using a 400 and a 500-MHz antenna were used for this geophysical survey. The GPR data were displayed real-time and digitally recorded on the GSSI acquisition system. The data were reviewed in the field to identify reflected GPR signals that may represent granite block configuration.



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***APPENDIX T***

SPECIAL PROVISIONS  
SECTIONS 900.62 – 900.645

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**SECTION 900 – SPECIAL PROVISION ITEMS**

**ORNAMENTAL STREET LIGHT**

1. **DESCRIPTION:**

A. This work shall consist of furnishing and installing ornamental street light poles, fixtures, lights, foundations, wiring, and all incidentals, as shown in the Plans and as directed by the Engineer.

B. The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 679 of the Standard Specifications.

2. **MATERIALS:**

A. Materials shall meet the requirements of Section 679 and the following:

1. **Concrete:** Concrete shall meet the requirements of Section 541 for Concrete, Class B.

2. **Light Poles:** Poles shall be per the Plans.

3. **Finish:** Finishes shall be per the Plans.

4. **Light Fixtures:** Luminaires shall be per the Plans.

5. **Lamps:** Lamps shall be per the Plans.

6. **Wiring:** The Contractor shall provide and install all wiring for the proposed lighting system.

7. **Alternate Manufacturers:** Other ornamental street lights will not be considered in this contract.

3. **CONSTRUCTION REQUIREMENTS:**

A. The Contractor shall submit, as Working Drawings in accordance with Section 105.03 of the Standard Specifications and these Special Provisions, manufacturer's descriptive literature for materials specified and certification of Buy America compliance.

B. Transport, storage, and handling of products shall be in accordance with the manufacturer's instructions.

C. Ornamental light poles shall only be installed in the locations specified in the Plans and in accordance with the manufacturer’s instructions.

4. METHOD OF MEASUREMENT:

A. The quantity of Special Provision (Ornamental Street Light) to be measured for payment will be the number of each unit installed in the complete and accepted work.

5. BASIS OF PAYMENT:

A. The accepted quantity of Special Provision (Ornamental Street Light) will be paid for at the Contract unit price for each. Payment will be full compensation for furnishing, transporting, handling, assembling, and placing the materials specified, including poles, fixtures, lamps, foundations, concrete bases, anchors, grounding, receptacles, wiring, photocells, and accessories; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

B. The cost of furnishing and installing conduit and pull boxes will be paid separately under the appropriate Contract items.

C. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Ornamental Street Light)	Each

**UNDER BRIDGE LIGHT**

6. DESCRIPTION:

A. This work shall consist of furnishing and installing under bridge light fixtures, lights, wiring, and all incidentals, as shown in the Plans and as directed by the Engineer.

B. The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 679 of the Standard Specifications.

7. MATERIALS.:

A. Materials shall meet the requirements of Section 679 and the following:

1. Product Description. Solid-state LED lighting with an expected life: of 60,000 hours minimum and 5000°K color temperature (nominal)

2. Housing/Optical Unit. Unit to be no greater than 18"x18"x6 inches thick. Housing to be die-formed aluminum with a gasketed clear tempered glass lens providing a water-resistant seal. Weather-tight aluminum enclosure to contain factory prewired driver to ensure no water entry and provides a "knock-out" entry for primary wiring.
  3. Mounting. Mounting is to be direct surface mount to a 4" (102mm) octagonal box as shown on drawings.
  4. Electrical. Universal voltage power supply 120-277 VAC, (50/60 Hz) input.
  5. Operating Temperature. -40°C to +50°C (-40°F to +122°F).
  6. Driver. Driver to operate with input of 120V thru 277V (50/60 Hz). Components to be fully encased in potting material for moisture resistance. Driver will comply with IEC and FCC standards.
  7. Finish. Each fixture to be finished with polyester powder coat finishing process. The finish shall withstand extreme weather changes without cracking or peeling, and be guaranteed for five full years. Color to be black.
  8. Light Fixtures. 3530 Lumens with an input power of 60 watts.
  9. Warranty. LED fixtures shall carry a minimum limited 5-year warranty.
  10. Distribution. Suitable for parking garages and other applications needing a wider throw.
  11. Listing. Listed to U.S. safety standards and suitable for wet locations.
  12. Wiring. The Contractor shall provide and install all wiring for the proposed lighting system.
8. CONSTRUCTION REQUIREMENTS:
- A. The Contractor shall submit, as Working Drawings in accordance with Section 105.03 of the Standard Specifications and these Special Provisions, manufacturer's descriptive literature for materials specified.
  - B. Transport, storage, and handling of products shall be in accordance with the manufacturer's instructions.
  - C. Under bridge lights shall only be installed in the locations specified in the Plans

and in accordance with the manufacturer’s instructions.

9. METHOD OF MEASUREMENT:

A. The quantity of Special Provision (Under Bridge Light) to be measured for payment will be the number of each unit installed in the complete and accepted work.

10. BASIS OF PAYMENT:

A. The accepted quantity of Special Provision (Under Bridge Light) will be paid for at the Contract unit price for each. Payment will be full compensation for furnishing, transporting, handling, assembling, and placing the materials specified, including fixtures, lamps, anchors, grounding, receptacles, conduit, junction boxes, wiring, photocells, and accessories; and for furnishing all labor, tools, equipment and incidentals necessary to complete the work.

B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Under Bridge Light)	Each

**CONCRETE STAINING AND SEALING**

11. DESCRIPTION:

A. This work shall consist of applying a tinted or pigmented acrylic stain and sealant system for the sealing and protection of concrete surfaces to achieve a dark gray appearance as indicated in the Plans and as directed by the Engineer.

12. MATERIALS:

A. Materials and coating(s) systems furnished under this Section shall conform to the manufacturer’s specifications. The following coating systems, or an approved equivalent, are acceptable for use:

Coating: Thoro® Pigmented Sealer

Manufacturer: BASF Building Systems  
889 Valley Park Drive  
Shakopee, MN 55379  
Tel.: 1-800-433-9517  
Internet: [www.BASFbuildingsystems.com](http://www.BASFbuildingsystems.com)

Coating: TK-290 Tri-Siloxane  
TK-5272 Pigmented Stain

Manufacturer: TK Products  
Division of Sierra Corporation  
11400 West 47th Street  
Minnetonka, MN 55343  
Tel.: 1-952-938-7223  
Fax: 1-952-938-8084  
Internet: [www.tkproduct.com](http://www.tkproduct.com)

Coating: H&C® Shield Plus™ Ultra Concrete Stain  
H&C® Commercial Grade Super V™ Water-Based Water  
Repellent

Manufacturer: H&C® Concrete Care Products  
101 Prospect Avenue  
6 Guild Hall  
Cleveland, OH 44115  
Tel.: 1-800-867-8246  
Internet: [www.hc-concrete.com](http://www.hc-concrete.com)

or equal

13. SUBMITTALS:

- A. Four weeks prior to beginning the work, the Contractor shall submit between four and six color samples to the Engineer for approval. The Engineer, in consultation with the municipality, will determine which, if any, of the samples are acceptable. If none of the samples are acceptable, then the Contractor shall repeat the process with four to six additional color samples.

14. APPLICATION:

- A. All surfaces that are to be stained and sealed shall be at least 30 days old and as required by the coating manufacturer. These surfaces shall also be cleaned as required by the manufacturer to remove any latency, dirt, grease, oil, efflorescence, paint, or other foreign materials and contaminants. Any solvent cleaning necessary shall meet the recommendations of the coating manufacturer.
- B. Coatings shall be applied in accordance with the manufacturer's recommendations.



15. SURFACE PROTECTION:

- A. After application(s) of the sealer and/or stain, the concrete surfaces shall be protected as necessary in accordance with the manufacturer’s recommendations.

16. ENVIRONMENTAL PROTECTION:

- A. During cleaning, surface preparation, and coating operations, the Contractor shall provide appropriate measures (such as suitable protective coverings) to protect the public, the bridge superstructure, work area, river, etc. from cleaning and coating contamination due to drippings, spatter, wind-blown particles, falling objects, etc. The Contractor shall be fully responsible for property damage or personal injury which may result from operations incidental to sealing and staining concrete surfaces.

17. METHOD OF MEASUREMENT:

- A. The quantity of Special Provision (Concrete Staining and Sealing) to be measured for payment will be the number of gallons of stain applied in the complete and accepted work, measured to the nearest gallon.
- B. Water repellent sealant (as required) will not be measured separately, but shall be considered incidental to the work.

18. BASIS OF PAYMENT:

- A. The accepted quantity of Special Provision (Concrete Staining and Sealing) will be paid for at the Contract unit price per gallon. Payment will be full compensation for furnishing, transporting, handling, and placing the material(s) specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.
- B. Any apparatus, material, and labor not specifically mentioned herein which may be found necessary to complete or perform any portion of the work in a satisfactory manner and in compliance with the requirements implied or intended in these specifications shall be furnished by the Contractor at no additional cost to the Agency.
- C. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.625 Special Provision (Concrete Staining and Sealing)	Gallon

**PEDESTRIAN HAND RAILING**

19. DESCRIPTION:

- A. This work shall consist of furnishing and erecting pedestrian hand railing at the locations indicated in the Plans and as directed by the Engineer.
- B. The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 525 of the Standard Specifications.

20. MATERIALS:

- A. General: Materials for pedestrian hand railing shall meet the requirements specified in the Contract Documents and as recommended by the manufacturer.
- B. Railing: Pedestrian hand railing shall be made of aluminum and have a baked enamel black finish. The railing shall stand approximately 4 feet high. No portion of the pickets shall extend above the top rail.

Acceptable pedestrian hand railing systems are available from the following manufacturers:

The Wagner Companies  
10600 West Brown Deer Road  
Milwaukee, WI 53224  
Tel. 1-888-243-6914  
Product: Series 550 Non-Welded Aluminum Pipe Railing is the basis of design.  
Website: <http://www.wagnercompanies.com>

Superior Aluminum Products  
555 East Main Street  
Russia, OH 45363-0430  
Tel. 1-800-548-8656  
Website: <http://www.superioraluminum.com>

Carfaro  
2075 East State Street  
Hamilton Township, NJ 08619  
Tel. 1-800-467-8432  
Website: <http://carfaro.com>

AVCON  
1915 Swarthmore Avenue

Lakewood, NJ 08701  
Tel. 1-800-724-5464  
Website: <http://www.avconrail.com>

or equal

C. Concrete: Concrete shall meet the requirements of Section 501of the Standard Specifications for Concrete, High Performance Class B.

21. CONSTRUCTION REQUIREMENTS:

A. Pedestrian hand railing shall be installed to the configuration shown in the Plans, as recommended by the manufacturer and as directed by the Engineer.

22. METHOD OF MEASUREMENT:

A. The quantity of Special Provision (Pedestrian Hand Railing) to be measured for payment will be the number of meters (linear feet) of railing placed in the complete and accepted work, measured within the pay limits designated in the Plans.

23. BASIS OF PAYMENT:

A. The accepted quantity of Special Provision (Pedestrian Hand Railing) will be paid for at the Contract unit price per linear foot. Payment will be full compensation for detailing, furnishing, handling, and placing the materials specified, including posts and concrete for post bases; for performing augering necessary for post placement; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Pedestrian Hand Railing)	Linear Foot

**MICROPILES**

24. DESCRIPTION:

A. This work shall consist of constructing micropiles as shown on the contract plans and approved working drawings and as specified herein. The Contractor is responsible for furnishing of all materials, products, accessories, tools, equipment, services, transportation, labor and supervision, and manufacturing

techniques required for installation and testing of micropiles and micropile top attachments for this project.

B. The micropile load capacity shall be verified by load testing.

25. MATERIALS:

A. General: Furnish materials new and without defects. Materials for micropiles shall consist of the following:

B. Admixtures: Admixtures for grout shall conform to VAOT Standard Specifications. Accelerators will not be permitted. Admixtures containing chlorides will not be permitted.

C. Cement: All cement shall be Portland cement conforming to ASTM C 150\AASHTO M85, Types II, III or V.

D. Centralizers and Spacers: Centralizers and spacers shall be fabricated from Schedule 40 PVC pipe or tube, steel, or material non-detrimental to the reinforcing steel. Wood shall not be used. Centralizers and spacers shall be securely attached to the reinforcement; sized to position the reinforcement within 1/2" of plan location from center of micropile; sized to allow grout tremie pipe insertion to the bottom of the drill hole; and sized to allow grout to freely flow up the drill hole and casing and between adjacent reinforcing bars.

E. Grout: Neat cement or sand/cement mixture with a minimum 3-day compressive strength of 2500 psi and a 28-day compressive strength of 5000 psi per AASHTO T106/ASTM C109. The grout shall conform to VAOT Standard Specifications.

F. Permanent Casing Pipe: Permanent steel casing/pipe shall have the diameter and at least minimum wall thickness shown on the plans. The permanent steel casing/pipe:

1. Shall conform to one of the following ASTM designations: A53, A500, A501, or A618 and have minimum yield strength  $f_y = 60$  ksi.
2. May be new "Structural Grade" (a.k.a. "Mill Secondary") steel pipe meeting above but without Mill Certification, free from defects (dents, cracks, tears) and with two coupon tests per truckload delivered to the fabricator.

For permanent casing/pipe that will be welded, the following material conditions apply:

1. The carbon equivalency (CE) as defined in AWS D1.1, Section X15.1, shall not exceed 0.45, as demonstrated by mill certifications
2. The sulfur content shall not exceed 0.05%, as demonstrated by mill certifications

For permanent casing/pipe that will be shop or field welded, the following fabrication or construction conditions apply:

1. The steel pipe shall not be joined by welded lap splicing
2. Welded seams and splices shall be complete penetration welds
3. Partial penetration welds may be restored in conformance with AWS D1.1
4. The proposed welding procedure certified by a welding specialist shall be submitted for approval.

G. Reinforcing: Reinforcing steel shall be deformed bars in accordance with ASTM A615/AASHTO M31, Grade 60. Continuous spiral deformations (i.e. continuous threadbars) shall be used. Bar tendon couplers, if required, shall develop the ultimate tensile strength of the bars without evidence of any failure.

## 26. CONSTRUCTION REQUIREMENTS:

- A. Contractor's Experience Requirements and Submittals: The micropile Contractor shall be experienced in the construction and load testing of micropiles and have successfully constructed at least 5 projects in the last 5 years involving construction totaling at least 100 micropiles of similar capacity to those required in these plans and specifications.
- B. The Contractor shall have previous micropile drilling and grouting experience in soil/rock similar to project conditions. The Contractor shall submit construction details, structural details and load test results for at least three previous successful micropile load tests from different projects of similar scope to this project.
- C. At least 45 calendar days before the planned start of micropile construction, the Contractor shall submit 5 copies of the completed project reference list and a personnel list. The project reference list shall include a brief project description with the owner's name and current phone number and load test reports. The personnel list shall identify the supervising project engineer, drill rig operators, and on-site foremen to be assigned to the project. The personnel list shall contain a summary of each individual's experience and be complete enough for

the Engineer to determine whether each individual satisfies the required qualifications.

D. The Contractor shall prepare and submit to the Engineer working drawings. Working drawings shall be submitted in accordance with Section 105.03 of the Standard Specifications. The working drawings shall include all information required for the construction and quality control of the micropiles. This information should include the following:

1. Detailed step-by-step description of the proposed micropile construction procedure, including personnel, testing and equipment to assure quality control. This step-by-step procedure shall be shown on the working drawings
2. If welding of casing is proposed, all welding shall be done in accordance with the current AWS Structural Welding Code.
3. Information on space requirements for installation equipment that verify the proposed equipment can perform at the site.
4. Plan describing how surface water, drill flush, and excess waste grout will be controlled and disposed.
5. Certified mill test reports for the reinforcing steel and permanent casing. The ultimate strength, yield strength, elongation and material properties composition shall be included. For API N-80 pipe casing, coupon test results may be submitted in lieu of mill certification.
6. Grouting Plan. The grouting plan shall include complete descriptions, and details for the following:
  - a. Grout mix design and type of materials to be used in the grout including certified test data and trial batch reports.
  - b. Methods and equipment for accurately monitoring and recording the grout depth and grout volume as the grout is being placed.
  - c. Estimated curing time for grout to achieve specified strength. Previous test results for the proposed grout mix completed within one year of the start of grouting may be submitted for initial verification and acceptance and start of production work. During production, grout shall be tested in accordance with the American Petroleum Institute (API) Recommended Practice (RP) 13B-1 by the Bariod Mud Balance Test and AASHTO T106/ASTM C019 Standard Test Method for Compressive Strength of

## Hydraulic Cement Mortars Using 2 inch (50 mm) Cube Specimens.

- d. Procedure and equipment for Contractor monitoring of grout quality.
  7. Detailed plans for the proposed micropile load testing. This shall include all drawings, details, and structural design calculations necessary to clearly describe the proposed test, reaction load, system capacity and equipment setup, types and accuracy of apparatus to be used for applying and measuring the test loads and micropile top movements in accordance with this specification.
  8. Calibration reports and data for each test jack, pressure gauge and master pressure gauge and electronic load cell to be used. The calibration tests shall have been performed by an independent testing laboratory, and tests shall have been performed within 90 calendar days of the date submitted. Testing shall not commence until the Engineer has reviewed and accepted the jack, pressure gauge, master pressure gauge and electronic load cell calibration data.
  9. Work shall not begin until the construction submittals have been received, reviewed, and accepted in writing by the Engineer.
- E. Site Drainage Control: The Contractor shall control and properly dispose of drill flush and construction related waste, including excess grout, in accord with all applicable local codes and regulations. Provide positive control and discharge of all surface water that will affect construction of the micropile installation. Maintain all pipes or conduits used to control surface water during construction. Repair damage caused by surface water at no additional cost. Upon substantial completion of the work, remove surface water control pipes or conduits from the site. Alternatively, with the approval of the Engineer, pipes or conduits that are left in place may be fully grouted and abandoned or left in a way that protects the structure and all adjacent facilities from migration of fines through the pipe or conduit and potential ground loss.
- F. Immediately contact the Engineer if unanticipated existing subsurface drainage structures are discovered during excavation or drilling. Suspend work in these areas until remedial measures meeting the Engineer's approval are implemented.
- G. Micropile Allowable Construction Tolerances:
1. Centerline of micropiles shall not be more than 3 inches from indicated plan location.
  2. Micropile shall be plumb within 2 percent of total-length plan alignment.

3. Top elevation of micropile shall be plus 1 inch or minus 1 inch maximum from vertical elevation indicated.
  4. Centerline of reinforcing steel shall not be more than ½ inch from indicated location.
- H. Micropile Installation: The micropile Contractor shall select the drilling method. The micropile Contractor is also responsible for estimating the grout take.
1. The drilling equipment and methods shall be suitable for drilling through the conditions to be encountered, without causing damage to any overlying or adjacent structures or services. The Contractor shall furnish a shell of the type and thickness, which can be installed without distortion. Casings that fail, fracture, or otherwise distort during drilling or after drilling shall, unless otherwise directed, be withdrawn or replaced at the Contractor's expense. The drill hole shall be open along its full length to at least the design minimum drill hole diameter prior to placing grout and reinforcement.
  2. During construction, the Contractor shall observe the conditions vicinity of the micropile construction site on a daily basis for signs of ground heave or subsidence. Immediately notify the Engineer if signs of movements are observed. Contractor shall immediately suspend or modify drilling or grouting operations if ground heave or subsidence is observed, if the micropile structure is adversely affected, or if adjacent structures are damaged from the drilling or grouting. If the Engineer determines that the movements require corrective action, the Contractor shall take corrective actions necessary to stop the movement or perform repairs.
  3. Reinforcement may be placed prior to grouting the drill hole. Reinforcement surface shall be free of deleterious substances such as soil, mud, grease or oil that might contaminate the grout or coat the reinforcement and impair bond.
  4. The Contractor shall check micropile top elevations and adjust all installed micropiles to the planned elevations.
  5. Centralizers and spacers shall be provided at 10 foot centers maximum spacing. The upper and lower most centralizer shall be located a maximum of 3 feet from the top and bottom of the micropile. Centralizers and spacers shall permit the free flow of grout without misalignment of the reinforcing bar(s) and permanent casing. The central reinforcement bars with centralizers shall be lowered into the stabilized drill hole and set. The reinforcing steel shall be inserted into the drill hole to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or



forced into the hole. Contractor shall redrill and reinsert reinforcing steel when necessary to facilitate insertion.

6. Lengths of casing and reinforcing bars to be spliced shall be secured in proper alignment and in a manner to avoid eccentricity or angle between the axis of the two lengths to be spliced. Splices and threaded joints shall meet the requirements of the rebar material. Threaded pipe casing joints shall be located at least two casing diameters (OD) from a splice in any reinforcing bar. When multiple bars are used, bar splices shall be staggered at least 12 inches.
  7. Micropiles shall be grouted the same day the embedment length is drilled. The grouting equipment used shall produce a grout free of lumps and undispersed cement. The Contractor shall have means and methods of measuring the grout quantity during the grouting operations. The grout shall be kept in agitation prior to mixing. Grout shall be placed within one hour of mixing. The grouting equipment shall be sized to enable each pile to be grouted in one continuous operation. The grout shall be injected from the lowest point of the drill hole and injection shall continue until uncontaminated grout flows from the top of the micropile. The grout takes shall be controlled to prevent excessive heave or fracturing of rock or soil formations. Upon completion of grouting, the grout tube may remain in the hole, but must be filled with grout.
  8. Grout within the load test micropiles shall attain the minimum required 3-day compressive strength prior to load testing. During production, micropile grout shall be tested by the Contractor for compressive strength in accordance with AASHTO T106/ASTM C109 at a frequency of no less than one set of three 6 inch diameter cylinders from each grout plant each day of operation or per every 10 micropiles, whichever occurs more frequently. The compressive strength shall be the average of the three cylinders tested.
  9. Grout consistency as measured by grout density shall be determined by the Contractor per ASTM C 188/AASHTO T 133 or API RP-13B-1 at a frequency of at least one test per micropile, conducted just prior to start of micropile grouting. The Baroid Mud Balance used in accordance with API RP-13B-1 is an approved device for determining the grout density of neat cement grout. The measured grout density shall be between 130 pcf and 135 pcf.
  10. Provide grout cube compressive strength and grout density test results to the Engineer within 24 hours of testing.
- I. Micropile Installation Records: Contractor shall prepare and submit to the

Engineer full-length installation records for each micropile installed. The records shall be submitted within one work shift after that micropile installation is completed. The data shall be recorded on an approved micropile installation log provided by the Contractor. A separate log shall be provided for each micropile.

- J. Load Tests: Perform load testing of micropiles at the locations specified on the plans in accordance with ASTM D1143.
1. Perform a load test on a micropile to verify the design of the micropile system and the construction methods proposed prior to installing any other production micropiles. The load test micropile shall be constructed in conformance with the approved Working Drawings.
  2. Load tests shall be performed to verify that the micropile embedment length is adequate. The micropile load test results must verify the design and installation methods, and be reviewed and accepted by the Engineer prior to beginning installation of other production micropiles.
  3. The maximum test loads applied to the micropile shall not exceed 80 percent of the structural capacity of the micropile structural elements, to include steel yield or buckling in compression or grout crushing in compression. Any required increase in strength of the load test micropile elements above the strength required for the production micropiles shall be provided for in the Contractor's bid price.
  4. Testing equipment shall include dial gauges, dial gauge support, jack and pressure gauge, electronic load cell, and a reaction frame. The Contractor shall provide a description of test setup and jack, pressure gauge and load cell calibration curves in accordance with the Submittals Section.
  5. Design the testing reaction frame to be sufficiently rigid and of adequate dimensions such that excessive deformation of the testing equipment does not occur. Align the jack, bearing plates, and stressing anchorage such that unloading and repositioning of the equipment will not be required during the test.
  6. The jack shall be positioned at the beginning of the test such that unloading and repositioning during the test will not be required. Apply and measure the test load with a hydraulic jack and pressure gauge. The pressure gauge shall be graduated in 50 psi increments or less. The jack and pressure gauge shall have a pressure range not exceeding twice the anticipated maximum test pressure. Jack ram travel shall be sufficient to allow the test to be done without resetting the equipment. Monitor the creep test load hold during load

tests with both the pressure gauge and the electronic load cell. Use the load cell to accurately maintain a constant load hold during the creep test load hold increment of the load test.

7. Measure the micropile top movement with a dial gauge capable of measuring to 0.001 inch. The dial gauge shall have a travel sufficient to allow the test to be done without having to reset the gauge. Visually align the gauge to be parallel with the axis of the micropile and support the gauge independently from the jack, micropile or reaction frame. Use a minimum of two dial gauges when the test setup requires reaction against the ground or single reaction micropiles on each side of the test micropile.
8. The required load test data shall be recorded by the Contractor.
9. Test micropiles to a maximum test load of 2.0 times the micropile Design Load shown on the Plans.
10. The Engineer will provide the Contractor written confirmation of the micropile design upon completion of the load test. This written confirmation will either confirm the estimated capacities and embedment lengths specified in the plans for micropiles, or revise the embedment length accordingly.
11. The Engineer will utilize the Davisson Offset Limit Load Method to verify that the micropiles are capable of carrying the design loading.

27. METHOD OF MEASUREMENT:

- A. Measurement will be made as follows for the quantity, as specified or directed by the Engineer. Micropiles will be the number of feet of micropile actually installed and accepted in place in the completed structure. Load test for micropiles will be measured as each.

28. BASIS OF PAYMENT:

- A. The quantities accepted for payment will be paid for at the contract unit price for the for the items listed below, complete in place and accepted, which price shall include all materials, equipment, tools, proper disposal of drilling spoil, and labor incidental thereto.
- B. Payment will be made under:

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

900.620 Special Provision (Load Test for Micropiles) Each

**SAWED PAVEMENT**

29. DESCRIPTION:

- A. This work shall consist of sawing concrete pavement, bituminous pavement, or both, as shown on the plans or as ordered.

30. CONSTRUCTION REQUIREMENTS:

- A. Concrete pavement or bituminous pavement to be sawed shall be accurately marked before sawing.
- B. The equipment used to saw concrete or bituminous pavement shall be capable of sawing the pavement as shown on the plans or as ordered and shall produce a substantially vertical and sound face without deformation of the adjacent pavement. The use of methods other than sawing (i.e. cutting wheels, pavement breakers), which deform the pavement or leave an unsound face, will not be permitted.
- C. Concrete pavement or bituminous pavement to be sawed in connection with laying pipes, roadway excavation, constructing curb, and the like shall be sawed to a sufficient depth to permit breaking the pavement at the cut.

31. METHOD OF MEASUREMENT:

- A. Sawed pavement of the type specified will be measured by the linear foot.

32. BASIS OF PAYMENT:

- A. The quantities accepted for payment will be paid for at the contract unit price per linear foot complete and accepted, which price shall include all equipment, tools and labor incidental thereto. No separate payment will be made for filler.
- B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Sawed Pavement)	Linear Foot

**GENERAL TRACK CONSTRUCTION REQUIREMENTS**

33. DESCRIPTION:

A. This section includes specifications for general information concerning track construction as indicated on the contract drawings, and specified herein.

B. The types of track construction specified herein include:

1. Direct Fixation Track Construction
2. Ballasted Track Construction.

#### 34. REFERENCE STANDARDS:

A. Primary pertinent provisions of the following listed standards and publications shall apply to the work, except as they may be modified herein, and are hereby made part of these specifications to the extent required.

1. American Railway Engineering and Maintenance-of-Way Association, Manual for Railway Engineering, herein referred to as the AREMA Manual.
2. American Railway Engineering and Maintenance-of-Way Association, Portfolio of Trackwork Plans, herein referred to as the AREMA Portfolio.
3. American Society for Testing and Materials (ASTM)
  - a. ASTM E10 Standard Method of Brinell Hardness for Metallic Materials

#### 35. SUBMITTALS:

Submittals shall be in accordance with Section 105.03 of the Standard Specifications.

- A. All submittals are subject to review by the Engineer and New England Central Railroad (NECR).
- B. After checking and verifying all field measurements and after complying with applicable procedures specified in the contract documents, Contractor shall submit to Engineer all information required by the contract documents at the timing and level of detailed specified.
- C. All submittals will be referenced to applicable specification section(s).
- D. Shop drawings showing the layout and match marking of precurved running rails and restraining rails shall be furnished by the Contractor.

- E. Submittals shall include certificates of compliance, codes and regulations of the jurisdictional authorities including other submittals as stipulated in these specifications.
- F. Continuous welded rail laying records as specified in this section.
- G. Submittals shall be furnished to Engineer at least 30 days before scheduled start of applicable work.
- H. Engineer will evaluate the submittal for conformance to the contract documents. The first review will be completed within 21 days of the Engineer's receipt of the submittal.
- I. Contractor shall make corrections required by NECR and Engineer, and shall resubmit the information as directed. Contractor shall direct specific attention in writing to revisions other than the corrections called for by NECR or Engineer on previous submittals.
- J. No work may commence on any task until the required submitted information has been approved by NECR and Engineer.
- K. NECR's or Engineer's approval of the submitted information in no way shall relieve Contractor of:
  - 1. Responsibility for constructability, erectability, fabrication or fit in the field.
  - 2. Satisfactory performance in the field.
- L. If multiple resubmittals are required, the Contractor may be charged NECR's actual cost for their Engineer's time in reviewing subsequent resubmittals.

36. MATERIALS:

- A. Furnish all trackwork materials and incidental materials required for the construction of track.

37. CONSTRUCTION EQUIPMENT:

- A. Contractor's on-track construction equipment shall be in a state of good repair and is subject to inspection by the New England Central Railroad and the approval of the Engineer.

38. TRACK GEOMETRY:

- A. Construct track to conform to the alignment and profile data as specified herein, and as indicated on the contract drawings.
- B. For tangent track the alignment is based on each centerline of track, equidistant between the gauge sides of the running rails.
- C. For curved track, the alignment is based on the centerline of track with the outside rail located 2 feet 4-1/4 inches radial from the centerline measured at the gauge line of the rails.
- D. Measure track gauge as specified herein:
  - 1. Tangent and curved track gauge shall be 4 feet 8-1/2 inches.
  - 2. Gauge variations: Where existing track gauge beyond the limits of work is different than the specified track gauge, make the change in track gauge at the rate of 1/8 inch in a transition length of not less than 15 feet.
- E. Rail cant (inclination): Construct tracks with rail cant at 40 to 1 inward inclination of the rails.
- F. Superelevation:
  - 1. Superelevate track curves as indicated on the contract drawings.
  - 2. Track superelevation shall be accomplished by maintaining the inside rail of the curve at top of rail profile and raising the outside rail.
  - 3. The superelevation at the tangent-to-spiral point shall be zero and shall increase uniformly through the length of the spiral to full elevation of the outer rail at the spiral-to-curve point unless otherwise shown on the contract drawings. Provide this spiral and superelevation at the ends of simple curves and segments of compound curves as indicated.
  - 4. Turnouts and crossovers shall not be superelevated.

39. TRACK CONSTRUCTION TOLERANCES:

- A. The track construction tolerances shall be as specified in Table 1 below.

**TABLE 1**

**TRACK CONSTRUCTION TOLERANCES**

Type of track	Track gauge	Cross level	Horizontal alignment deviation	Vertical alignment deviation	
Ballasted main track	+/- 1/8"	+/- 1/8"	+/- 1/4"	+/- 1/4"	
Ballasted yard track	+1/4 /-1/8"	+/- 1/4"	+/- 3/8"	+/- 3/8"	
Direct fixation track	+/- 1/8"	+/- 1/8"	+/- 1/8"	+/- 1/8"	

NOTES:

- (1) Designed alignment and the actual constructed track position.
- (2) Rate of change variations in gauge, horizontal alignment, vertical alignment, cross level and track surface shall be limited to 1/8 inch per 15 feet of track.

**45. TYPES OF RAIL.**

- A. Rail for use as running rail shall be as specified in Special Provision (Rail).
- B. Rail in main track shall be 115RE section.
- C. Rail in yard tracks shall be 115RE section.

**46. RUNNING RAIL REQUIREMENTS.**

- A. Running rail in main track shall be welded in accordance with Special Provision (Rail Welding).
- B. Locate field welds so that they do not occur at the following locations:
  - 1. Within 12 feet of another field weld in the opposite rail.
  - 2. Within 18 feet of a field weld in the same rail
  - 3. Within 200 feet from the center of bolted joint
  - 4. Within 9 feet of an electric flash butt weld in same rail.
  - 5. Within 6 feet of an electric flash butt weld in opposite rail.



- C. In butting CWR strings, where cutting is required to fit and where the option of cutting standard carbon or premium CWR exists, cut the standard carbon CWR string.

47. LAYING CONTINUOUS WELDED RAIL (BALLASTED AND DIRECT FIXATION TRACK CONSTRUCTION).

- A. Laying, clamping, and fastening CWR shall be according to the following procedure.

- B. Place the CWR on tie plates or direct fixation fastener rail seat in accordance with the approved working drawings submitted in accordance with Special Provision (Rail Welding). Remove rail anchors or high restraint rail clips from existing rail for a distance of 200 feet beyond the connections between existing undisturbed track and newly constructed track by this contract.

- C. Rail temperature

1. A record of the rail temperature and the information specified hereinafter shall be recorded by the Contractor at the time of rail anchoring and furnished to the Engineer.
  - a. Location by station, track designation, and rail.
  - b. Date and time.
  - c. Rail weight and section, mill brand, year and month rolled, and heat number of the end rails in each CWR string.
  - d. Length of CWR string in feet.
  - e. Air temperature, rail temperature, and approximate weather conditions.
  - f. Rail end gap to nearest 1/16 inch.
  - g. Adjustments applied to obtain zero thermal stress.
2. Determine rail temperature by means of AREMA standard rail thermometers as specified in chapter 5, part 6, of the AREMA manual.
  - a. Place two rail thermometers on the shaded side of the rail base next to the web and leave in place until no changes in the readings are detected, but no less than ten minutes.

- b. Take the average of the two temperature readings at the time of adjusting the gap between rail ends.
  - c. If the rail temperature deviates from the specified zero thermal stress range, fastening or anchoring of rail shall cease until the rail temperature returns to within the specified range and the rail has been vibrated to relax localized stress build-up.
- D. Gap: During rail laying, determine the gap between CWR strings and between CWR and bolted rail by using the equation:

$$G = (t-T)LK+Q$$

Where:

- G = Rail gap in inches;  
t = Zero thermal stress temperature in degrees f;  
T = Average actual rail temperature at time of laying in degrees f.;  
L = One-half the sum of lengths of CWR string being laid and the preceding CWR string;  
K = Coefficient of thermal expansion for rail steel (0.000078 inch per foot per degree f.); and;  
Q = Rail gap as required by manufacturers of field weld kit in inches. For bonded insulated joints q equals the end post thickness.

- E. Dutchman: Insert a dutchman at the time the rail is being laid to prevent damage to the rail ends during rail laying, ballasting, and other operations requiring passage of on-track equipment over the rail joints.
1. The dutchman, equal in length to g minus 1/2 inch where g is determined by the formula in the preceding paragraph, shall be inserted after the rail has been laid, except that no dutchman shall be inserted if the computed rail gap g is less than 1-1/2 inches.
  2. Remove the dutchman prior to anchoring and when the rail temperature results in a calculated closure of the rail gap.
- F. Install the rail and clamp to produce zero thermal stress in the rail at a temperature to be specified by the New England Central Railroad, with a tolerance of +10 degrees f, -5 degrees f.
1. Submit the details of these procedures for anchoring CWR to the Engineer as part of the working drawings specified in Article 35 of this section.

2. Zero thermal stress in CWR may be achieved by heating, cooling, vibrating or pulling the rails, or a combination thereof.
  3. When zero thermal stress is obtained, begin anchoring immediately.
  4. The stress within the rail shall remain within the specified zero thermal stress range during installation of joints.
  5. Methods for artificially obtaining zero thermal stress shall be subject to the Engineer's review prior to use.
  6. Once zero thermal stress has been obtained, maintain the correct rail gap until the rail is fully anchored.
  7. Vibrators used for relieving internal rail stresses shall be of a type not to damage the CWR.
  8. CWR shall not be struck with objects that might damage the rail.
- G. The installation of rail anchoring as described on AREMA Part 4 Track Construction, is not required, anchoring is provided by the longitudinal restraint characteristics of the rail fastening spring clip supplied with the rail fixation anchor plates or fasteners.
1. The fastening temperature of each rail in a track shall be within the allowable range specified herein and shall be within 5 degrees f of the opposite rail anchoring temperature.
  2. Prior to placing on-track equipment on newly laid rail, secure the rail in a manner that will prevent damage to the rail and track material.
  3. Move equipment over partially secured track in such a manner as to prevent damage to structures and trackwork materials.
  4. Temporarily fasten newly laid rail at the specified gauge at every ten feet on tangents and on curves having a radius greater than 500 feet.
  5. Remove rail anchors or rail fastening spring clips at the time of CWR temperature adjustment.
- H. When a joint is made between clamped CWR strings, the rail gap shall be as specified. If the gap is not within the recommended tolerances for the joint, unclamp the CWR strings for 300 feet each side of the rail gap, and readjust each CWR string for 300 feet within the specified zero thermal stress

temperature range. Reclamp the CWR before the joint is made. If the recommended rail gap cannot be obtained in this manner, unclamp one of the strings entirely, move, length adjust and reclamp so that the specified rail gap is obtained. If the Contractor elects to use a mechanical means of adjusting the rail for clamping, the method and equipment proposed shall be subject to review by the Engineer.

- I. After the lengths of CWR strings of all types of track are adjusted for the zero thermal stress temperature vibrate them to relieve internal rail stresses, and fully anchor by complete spring clip application. Perform rail vibration with a mechanical device producing a frequency of 900 to 1,000 Hz and a force of 160 pounds per cycle acting on the head of the rail. The method the Contractor uses to adjust the rail for fastening-anchoring shall be subject to review by the Engineer. The use of hydraulic machines or other "rail stretchers" in such a manner that may concentrate stresses in the end section of the rails will not be allowed.
- J. Final rail fastening with zero thermal rail stress in direct fixation track shall not proceed until the track installation meets all the requirements specified in Special Provision (Ballasted Track Construction) or Special Provision (Direct Fixation Track Construction).

48. JOINTS – WELDED, STANDARD BOLTED, BONDED, INSULATED:

- A. In main track, use portable electric flash butt weld or thermite weld joints to connect CWR strings together and to join rails in special trackwork in accordance with special Provision (Rail Welding).
- B. In yard track use conventional bolted joints and/or bolted compromise joints to joint rails in accordance with Special Provision (Track Appurtenances). Joints, including insulated joints, shall not be located opposite each other. Bolted joints shall be staggered at least 5 feet 0 inches from a rail joint on the opposite rail, unless otherwise noted on the contract drawings or approved by the Engineer.

49. MEASUREMENT AND PAYMENT:

- A. General track construction requirements will not be measured for payment.
- B. All costs in connection herewith will not be paid for directly, but will be considered incidental to the item of work to which they pertain.

**BALLASTED TRACK CONSTRUCTION**

50. DESCRIPTION:

- A. This Section includes specifications for the construction of ballasted track.
- B. The construction of ballasted track shall include:
  - 1. Hauling of construction materials.
  - 2. Welding of rail for continuous welded rail (CWR) construction.
  - 3. Construction of ballasted track.
- C. The above construction is encompassing and includes all pertinent trackwork related items associated with track construction such as the welds, rail cutting and stress adjustment; subballast, ballast, tamping, surfacing, lining and gauging, testing and other operations necessary to construct an acceptable completed track structure.

51. REFERENCE STANDARDS:

- A. American Railway Engineering and Maintenance-of-Way Association, AREMA, Manual for Railway Engineering
- B. American Railway Engineering and Maintenance-of-Way Association, AREMA, Portfolio of Trackwork Plans.

52. SUBMITTALS:

- A. The following submittals shall be made by the Contractor.
  - 1. Detailed descriptions of construction method Work Plan 90 days prior to commencing trackwork required for the work specified in this Section.
  - 2. Information about the type of ballast tamping and shoulder compaction equipment proposed.
  - 3. Survey of the track for acceptance.

53. QUALITY ASSURANCE:

- A. To determine the acceptability of the installation, the Contractor shall make a survey of the track and provide the Engineer with a copy for review. Deviations from the Drawings that exceed tolerances specified in Special Provision (General Track Construction Requirements), shall be corrected by the Contractor at his sole expense.

54. MATERIALS:

- A. The following track materials shall be furnished by the Contractor and additional items necessary to construct an acceptable completed track structure.
  - 1. Earthwork: Section 200 of the Standard Specifications.
  - 2. Special Provision (Subballast)
  - 3. Special Provision (Ballast)
  - 4. Special Provision (Rail)
  - 5. Special Provision (Timber Cross Ties)

55. EXECUTION

A. GENERAL:

- 1. Construct ballasted track in accordance with applicable requirements of Special Provision (General Track Construction Requirements), as supplemented herein, and as indicated on the Contract Drawings.

B. SUBGRADE PREPARATION:

- 1. Refer to the requirements of Special Provision (Subballast), for subgrade preparation.

C. PLACEMENT OF SUBBALLAST:

- 1. Subballast shall be distributed, placed, and compacted in accordance with Special Provision (Subballast).

D. PLACEMENT OF BALLAST:

- 1. Prior to placement of ballast, rutting and other damage to the subballast shall be corrected.
- 2. Uniformly distribute a base layer of ballast over the subballast and compact before tie distribution.

- a. Compact initial layer of ballast over the entire ballast section as indicated on the Contract Drawings.
- b. Limit the base layer of ballast to 6 to 8 inches deep ready to compact without further shaping. The top surface of the compacted base layer shall be at an elevation such that a minimum of two surfacing passes, are required to bring the track profile to final elevation in conformance with Article 55.G of this Section.
- c. The ballast shall be compacted with not less than three passes of a vibratory roller of gross weight not less than 5,000 pounds, a drum not less than 58 inches wide and not less than 42 inches in diameter. The vibration frequency shall be between 1,100 and 2,000 vibrations per minute and shall impart a dynamic impact of not less than nine tons. A preliminary ballast layer shall not be spread for yard and secondary tracks. Avoid damage to existing facilities including sub-drains, stub-ups, conduits, and other structures.
- d. Ballast finish: The top of the base ballast layer shall be a level, flat plane, uniformly compacted prior to cross tie distribution.

E. PLACEMENT OF TIMBER CROSS TIES:

1. Except as modified herein; handle transport and store timber cross ties in accordance with the current AREMA recommended practices.
  - a. Use only approved lifting devices that will not damage the tie.
  - b. Transport cross ties and switch ties in a horizontal position and brace to prevent movement that could cause damage.
2. Transport the timber cross ties from the storage area to the job site, where the ties shall be distributed and properly spaced on the compacted base layer of ballast. Space cross ties in accordance with the following criteria as indicated on the Contract Drawings.

F. RAIL INSTALLATION:

1. Lay, join, and anchor rail in accordance with Special Provision (General Track Construction Requirements) and the AREMA Specifications for Track Construction.
2. Bolted rail shall be laid with joint gaps in accordance with AREMA and standard practice.

### 3. Spiking Patterns:

- a. Pandrol plates shall be fastened to the crossties with two screw spikes on the gauge end of the plate and one screw spike on the field end.
  - b. Conventional tie plates shall be spiked with two rail holding spikes on the gauge side, one rail holding spike on the field side and one plate holding spike on the field side.
4. Rail Anchoring: Ties with conventional tie plates and cut spikes shall be full box anchored within the limits of the total track reconstruction shown on the Contract Drawings with the exception of any ties which have a rail joint on either end shall not be anchored.

### G. SURFACING AND ALIGNING:

1. After the skeleton track has been installed, place ballast in the tie cribs and shoulders of the track structure to restrain movement of the ties due to temperature changes in the CWR. Unload ballast in sufficient quantities that will form a high shoulder and will fill the tie cribs and provide an adequate amount of ballast for the initial track lift, plus a surplus as required to continue to hold the track in line after the initial track lift.
2. Track surfacing shall be by methods that will prevent undue bending of the rail, straining of the joints, and damaging or loosening the spring clip fastenings. The amount of track lift shall neither exceed 4 inches nor endanger the horizontal and vertical stability of the track. The track shall be raised so that a final lift shall not be less than 1 inch or more than 3 inches when bringing the track to the final surface. Complete final surfacing and aligning of the track after the track has been initially surfaced and aligned, fastened, and joined together by specified method.
3. Track lining and surfacing operations shall extend beyond the limits of track reconstruction a minimum of 100 feet into the existing main track at each end of the bridge. In yard track, the lining and surfacing operation shall extend a minimum of 50 feet beyond the reconstruction limit.
4. After the track has been raised, lined and surfaced to final alignment, the closure welds shall be made in CWR and the rails shall be refastened within the specified zero thermal stress temperature range. Clips, insulators, and rail pads shall be thoroughly cleaned of dust, dirt, and grindings prior to refastening of rail. Ties and fastening devices damaged during the surfacing



operation shall be replaced with new ties and fastening devices at the Contractor's expense.

5. The final raising and aligning operations shall fill cribs and shoulders with ballast to within 1 inch below the base of rail. Provide a minimum of 1-inch clearance between metallic portions of the track structure and ballast.
6. Discontinue surfacing when the ambient temperature is higher than 95 degrees F or the rail temperature exceeds 100 degrees F.
7. Perform tamping with a squeeze-vibratory type 16-tool production power tamper. Control of the power tamper's tamping cycle shall ensure the maximum uniform compaction of ballast around the track. Uniformly tamp ballast under both sides of each tie, directly under each running rail for a distance of 18 inches on both sides of the rail. Tamping will not be permitted at the center of the tie, but fill the cribs with ballast. For each tie, proceed with tamping simultaneously inside and outside both running rails on both sides of the tie. Mechanically tamp the total track length including transition slab area track zones. Tamper blades shall not penetrate to a depth that would damage the surface of the ballast mats and the transition slab.
8. Compact ballast shoulders with a vibratory shoulder compactor. Continue compacting until the ballast is firmly interlocked and the surface is true and unyielding, displaying no deformation or movement under the compaction equipment. Protect catenary foundations, drainage lines, inlets, and electrical conduit from damage during tamping and compacting.
9. After the final surfacing and lining of track has been completed, dress the ballast to conform to the ballast sections indicated on the Contract Drawings. Reslope subballast outside the toe of slope of ballast that has been fouled or disturbed by the Contractor's operations to the indicated cross sections on the Contract Drawings.
10. The final surface and alignment of track shall be within the ballasted track installation tolerances specified in Special Provision (General Track Construction Requirements).

#### H. RAIL BONDING:

1. General: Upon completion of ballasting and surfacing operations any bolted joints that lie within the approach circuits to the Joe Reed Drive grade crossing shall be electrically bonded by the Cadweld process.

56. MEASUREMENT AND PAYMENT

- A. Payment for the work of this Section will paid as a Lump Sum for ballasted track complete in place and approved.
- B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Ballasted Track Construction)	Lump Sum

**DIRECT FIXATON TRACK CONSTRUCTION**

57. DESCRIPTION: This section includes:

- A. Requirements for furnishing all labor, materials, tools, and equipment, and performing all operations necessary for the installation of direct fixation (DF) track components and the following:
  - 1. Preparing existing concrete inverts for second pour concrete.
  - 2. Placing concrete reinforcement and rail anchorage inserts for direct fixation rail fasteners.
  - 3. Placing second pour concrete for direct fixation track.
  - 4. Installing direct fixation rail fasteners.
  - 5. Correcting deficiencies, including electrical faults revealed by electrical testing.
  - 6. Incidental construction as indicated on the Contract Drawings.
- B. The construction procedures described herein are the Engineer’s suggestions but are not mandatory. The Contractor shall submit his own detailed construction procedures in both written and graphical format. The Contractors procedures, even if identical to the Engineer’s, may be used only if the submittal is returned stamped “ACCEPTED” or “PROCEED AS NOTED” with no exceptions taken. Regardless of methods used, acceptable results remain the Contractor’s responsibility.
- C. Related Work
  - 1. Reinforcing Steel: Section 507 of the Standard Specifications

2. HPC Structural Concrete: Section 501 of the Standard Specifications
3. Structural Concrete: Section 541 of the Standard Specifications
4. Special Provision (General Track Construction Requirements)
5. Special Provision (Ballasted Track Construction)
6. Special Provision (Rail Welding)
7. Special Provision (Direct Fixation Rail Fasteners)
8. Special Provision (Rail)

58. CITED STANDARDS:

A. American Railway Engineering and Maintenance-of-Way Association, (AREMA):

1. Manual of Railway Engineering
2. Portfolio of Trackwork Plans (AREMA Portfolio)

B. ASTM International (ASTM)

1. A 385 – Providing High Quality Zinc Coatings
2. A 611 – Steel Sheet, Carbon, Cold Rolled, Structural Quality
3. C 33 – Concrete Aggregates
4. C 39 – Compressive Strength of Cylindrical Concrete Specimens
5. C 109 - Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)
6. C 191 - Time of Setting of Hydraulic Cement by Vicat Needle.
7. C 579 – Standard Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concrete.
8. C 827 - Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures

9. C 881 - Epoxy-Resin-Base Bonding Systems for Concrete
10. D 257 - D-C Resistance or Conductance of Insulating Materials
11. D1056 - Flexible Cellular Materials – Sponge or Expanded Rubber
12. D 1248 - Polyethylene Plastics Extrusion Materials for Wire and Cable
13. D 2240 - Rubber Property - Durometer Hardness

59. QUALITY CONTROL:

- A. In order to determine the acceptability of the installation, make surveys in accordance with Article 63.A of this section and provide the Engineer with a copy of the report.
- B. Develop and maintain a quality control program for trackwork installation that regulates methods, procedures, and processes to ensure compliance with standards of quality required by the Contract Documents and the following.
  1. Conform to AREMA “Portfolio of Trackwork Plans” and “Manual for Railway Engineering,” except as modified herein.
  2. Engage qualified suppliers to furnish products required for this work. Verify that the quality programs of suppliers meet the requirements of this contract. Include copies of supplier quality programs in submittals to the Engineer.
  3. Employ personnel qualified by experience in direct fixation track installation as foreperson or lead person for trackwork installation. Employ workers experienced in track construction and repair including rail welding.
  4. Use proper tools and techniques.
  5. Use a Land Surveyor licensed in the State of Vermont to establish and maintain alignment and elevation.
- C. Tolerances: Deviations from the Contract Documents that exceed tolerances specified shall be corrected by Contractor at no additional cost.
  1. Total deviation in vertical and horizontal track alignments are measured between theoretical and actual alignment at any point in track.

2. Variations in gauge, cross level, and superelevation: Comply with Special Provision (General Track Construction Requirements)
3. Verify final location in accordance with Article 63.A of this Section.
4. Allowable deviations for second pour concrete:
  - a. Plinth Location - Horizontal: Plus or minus 1/2-inch.
  - b. Plinth Elevation: Plus or minus 1/4-inch
  - c. Slope of concrete surface transverse to longitudinal axis of the rail – within 1:100 of dead level along tangent track and parallel to plane of superelevation for curved track. (Approximately 1/4 inch in the nominal 26-inch width of each rail plinth.)
  - d. Planarity of top plinth surface: Maximum 1/16 gap between 16-inch straight-edge and concrete surface in all directions.
5. Fastener spacing: 24-inches plus 1–inch or minus 2-inches. In curved track, these measurements are along the high rail of each track. The fastener spacing along the low rail of the track shall be proportionally smaller, but with the same tolerances.
6. Minimum concrete cover over all rebar: 1-1/2-inches.
7. Maximum concrete cover between top rebar layer and top surface of plinth: 3-inches.
8. Rail Anchorage Insert Placement: Perpendicularity of insert to top surface of concrete: maximum deviation 3-degrees.
9. Concrete voids under direct fixation fastener base plate
  - a. Voids shall not exceed 10-percent of concrete surface area under fastener.
  - b. Maximum size of any single void: 1/2-inch diameter by 3/8 inch deep.

#### D. Demonstration Section

1. In order to confirm the Contractor's proposed procedure for the construction of direct fixation track, construct a demonstration section not less than 10 track feet in length. Demonstration section shall be a continuous segment of

track which incorporates segments of tangent, spiraled and circular curve track including superelevation, and vertical curvature.

2. If the demonstration section (or portion thereof) is unsatisfactory, it shall be demolished, a revised construction procedure proposed, and a new demonstration section constructed.
3. Production construction of direct fixation track will not be permitted until the designated demonstration section has been accepted by the Engineer.

60. SUBMITTALS:

- A. Plinth concrete mix design.
- B. Catalog cuts describing the following products:
  1. Cementitious mortar
  2. Epoxy for installing inserts, if required to install out-of-tolerance inserts.
  3. Elastomeric pads for use beneath sliding rail expansion joints and rail anchors.
  4. Anchorage assemblies for sliding rail expansion joints and rail anchors, highlighting and differences between those products and similar items used with the direct fixation rail fasteners furnished under Special Provision (Direct Fixation Rail Fasteners)
- C. Construction work plan for installation of direct fixation trackwork. Describe type of fixtures used to hold rails at final line and grade, type of equipment used to deliver concrete, protection of existing drainage and other invert features, and measuring steps before and after placement of concrete to verify rail alignment.
- D. Outline drawings of track plinths for second pour concrete, showing coordination of plinth outlines with other bridge deck features. Design plinth layouts so that no plinths extend across expansion or contraction joints in the bridge structure.

61. DELIVERY, STORAGE, AND HANDLING:

- A. Handle trackwork materials in a manner that will prevent damage during loading, unloading, storing, transporting, and installing.

62. MATERIALS:

A. GENERAL

1. All products for the construction of Direct Fixation Track shall be furnished by the Contractor.

B. CONCRETE

1. In accordance with the plans and Section 541 and Section 501 of the Standard Specifications.

C. REINFORCING STEEL

1. In accordance with the plans and Section 507 of the Standard Specifications.

D. RAIL ANCHORAGE INSERTS

1. Ductile iron cast or fabricated inserts, at least 5-1/4" long, epoxy coated, diameter and threads to match the anchor bolts for the direct fixation rail fasteners. Insert shall have a history of successful application in railroad direct fixation track systems and be approved by the manufacturer of the direct fixation rail fastener for use with their product.

E. DIRECT FIXATION RAIL FASTENERS

1. In accordance with Special Provision (Direct Fixation Rail Fasteners).

F. SHIMS

1. In accordance with Special Provision (Direct Fixation Rail Fasteners).
  - a. Material: Galvanized Steel
  - b. Size and Configuration:
    - 1.) Shims shall bear fully under fasteners and extend a minimum of 1/4" beyond edges of fasteners in all positions of fastener lateral adjustment. Slots in the shims for rapid insertion/removal are not acceptable; they shall be punched with circular holes to match the anchor bolt template.
    - 2.) Provide shims in graduated thicknesses so that no more than two shims will be required for all increments of 1/16" thickness from 1/16" to 1/2".

#### G. CEMENTITIOUS MORTAR

1. As specified in Section 541 of the Standard Specifications and the following:
  - a. Premeasured, prepackaged, fast-setting polymer-modified, cementitious mortar.
  - b. Compressive strength of 7,000-psi at 28 days, as determined by ASTM C109.
  - c. Acceptable products: Sikatop 123 Plus or approved equal.

#### H. EPOXY GROUT

1. Product shall be pourable, 100-percent solids, pre-measured mix, prepackaged, component epoxy system complying with ASTM C881, Type IV.
2. Meet the following requirements:
  - a. Maximum shrink when tested in accordance with ASTM C827: 1-percent.
  - b. Resistivity after cure: Minimum  $10^6$  ohm-cm.
3. Accepted Manufacturers: Adhesives Technology Corporation, Sika Corporation, Fosroc Inc., ITW Ramset/Red Head, Schul International, Hilti, or approved equal.

#### 63. EXECUTION:

##### A. PRECONSTRUCTION INSPECTION AND SURVEY

1. Before commencing direct fixation track construction, inspect existing installations for damage, defects or installation variances that may affect the subsequent work.
2. Examine alignment and elevation of existing work for interface with Work specified herein. Use benchmarks and horizontal control points accepted by the Engineer. Check elevations of existing invert and assess implications of any suspect conditions before installation of second pour concrete for track plinths. Advise the Engineer of all first pour concrete work that requires corrective action, including but not limited to damaged or mislocated stirrups, and coordinate with any remedial work.



3. Prepare a preconstruction report detailing discrepancies in existing installations. Discuss preconstruction report findings at site meeting with Engineer and installer of slab to resolve conflicts.
4. Prepare working drawings depicting layout of all direct fixation track features including plinths, rails, rail fasteners, etc.

#### B. PREPARATION

1. Establish track alignment and elevation points. Establish a method for verifying the final location of DF tracks after erection of forms but before concreting. Demonstrate to the satisfaction of the Engineer that track fixation is properly located prior to placing plinth concrete. Perform a final as-built survey of rail locations, after completion of concrete finishing and final track adjustment, to verify compliance with alignment tolerances.
2. Sweep clean the existing concrete surface and wash with pressurized water blaster so as to remove laitance and expose aggregate and provide an optimal surface for bonding of second pour concrete. Do not use epoxy bonding agents.
3. Straighten any bent dowels or stirrups embedded in the concrete to provide a proper connection for reinforcing bars and the second pour concrete.
4. Drill and grout additional steel reinforcing stirrups where indicated or directed. Locate rebars in slab using a pacometer prior to drilling, and locate new holes for stirrups so as to avoid cutting the existing rebar.

#### C. DIRECT FIXATION TRACK INSTALLATION

1. Second Pour Concrete:
  - a. Establish benchmarks for formwork by referencing to control points.
  - b. Set tops of forms for direct fixation track to indicated line and grade of finished edges for second pour concrete, in accordance with the accepted working drawings. Ensure that formwork will result in finished concrete that clears all wayside train control system appurtenances. Do not obstruct drainage.
  - c. Install reinforcing steel in accordance with Section 507 of the Standard Specifications.

- d. Place blockouts for drainage chases, and sleeves for signal cables as indicated on approved shop drawings.
  - e. Place second pour concrete, and finish concrete surfaces in accordance with Section 541 of the Standard Specifications and tolerances given in this Section. Ensure that excess concrete does not obstruct drainage.
  - f. Insert pull-away plug into rail anchorage inserts immediately after removing the insert positioning template, and before repairing voids.
  - g. Repair voids in top surface of plinth by troweling in cementitious mortar to smooth the surface. Prepare surface in compliance with manufacturer's recommendations. An unacceptable number or volume of voids shall be cause for rejection of the pour.
  - h. Do not use cementitious mortar to correct second pour concrete that is not within the required vertical tolerances. Grinding of second pour concrete surfaces to bring concrete flush with rail anchorage inserts, or to achieve proper elevation or flatness tolerances, is allowable only with the approval of the Engineer. Low concrete may be corrected by using shims beneath the fasteners, subject to the limitations on shimming which are stated elsewhere in this Section.
  - i. Do not remove forms until concrete has been in place for at least 24 hours and has attained a compressive strength of not less than 1000-psi.
  - j. Remove and replace concrete that is not within the required tolerances and cannot be corrected without disturbing the rail anchorage inserts.
2. Rail Anchorage Inserts:
- a. Cast direct fixation fastener anchorage inserts into the concrete as shown on the Contract Drawings.
  - b. Ensure that all inserts are free from grease or other foreign matter.
  - c. Use templates to accurately locate inserts, and secure inserts against displacement during concrete placement. Install inserts flush with the top of concrete to plus zero , minus 1/16-inch tolerance.
  - d. Install anchor bolt inserts to a tolerance of 3-degrees from perpendicular to plinth surface. Test by inserting an 18-inch length of threaded rod into insert. Place the 1-foot leg of a carpenter's square against the threaded rod with the other leg sitting flat on the concrete surface that will be the

fastener seat. Measure the maximum distance between threaded rod and vertical edge of square. With either top or bottom of square touching any side of the rod, the opposite end of that side of the square shall deviate no more than 5/8-inch from vertical side of the threaded rod.

- e. Remove misaligned inserts by core drilling or other method that prevents spalling or structural damage to the surrounding concrete. Use kerfing tool, or other device as accepted by the Engineer, to roughen sides of cored hole. Wire brush inside of hole to loosen dust and loose material from hole, then blow out hole with compressed air. Provide filter on compressed air system to ensure that air jet is free of any oil residue. Set anchor bolt insert with epoxy grout as per manufacturer's instructions. Do not use previously-installed anchor inserts that have been damaged during coring operations.

### 3. Anchor Bolt Insert Tests:

- a. Test installed rail anchorage inserts: Engineer will randomly select inserts to be tested.
  - 1.) Cast-in-Place Inserts: Conduct the unrestrained pull-out test and torsion tests on one insert out of every 100 inserts (or fraction thereof) installed in a single day.
  - 2.) Epoxied-in-Place Inserts: Conduct the restrained pull-out test on five inserts out of every 100 (or fraction thereof) installed in a single day, and the unrestrained pullout and torsion tests on one insert out of every 100 inserts (or fraction thereof) in a contiguous installation of epoxied inserts.
- b. Restrained Pull-Out Test: Place a 6-inch by 6-inch by 1/2-inch steel plate, with a hole in the center 1/4-inch larger in diameter than the top collar of the anchor bolt insert, over the insert. Install an anchor bolt and apply an upward force of 14,000-pounds to the bolt, bearing downward against the steel plate. Hold the load for 3 minutes. During this time, examine the installation for insert slippage, concrete cracking, or failure of bond between the insert, grout, and concrete. Visual evidence of these conditions indicates failure of this test.
- c. Unrestrained Pull-Out Test: Install an anchor bolt and apply an upward force of 10,000-pounds to the bolt in such a manner that no vertical bearing load is provided within a 6-inch radius of the centerline of the insert. Examine the installation for insert slippage, concrete cracking, or

failure of bond between the insert, grout, and concrete. Visual evidence of these conditions indicates failure of this test.

- d. Torsion Test: Subject the anchor bolt inserts to 600-foot-pounds of torque. Visual evidence of bond failure between the insert, grout, and surrounding concrete indicates failure of this test.
  - e. If any insert fails the above tests, retest four adjacent inserts in each direction from the failed sample. If any of the eight additional inserts fail, continue testing inserts in each direction from the failure area until ten consecutive inserts pass this test.
4. Installation of Direct Fixation Rail Fasteners and Running Rails:
- a. Install fasteners after the second pour concrete has attained at least 75-percent of the specified 28-day compressive strength.
  - b. Install fasteners in accordance with manufacturer's installation instructions.
  - c. Install rail and anchor to direct fixation rail fasteners as specified in Special Provision (General Track Construction Requirements), Special Provision (Ballasted Track Construction) and in accordance with the fastener manufacturer's installation instructions. When the rail has been brought into proper horizontal alignment and gauge there shall be not less than 1/4-inch of lateral adjustment (in each direction) remaining in the direct fixation rail fastener anchorage assemblies. If less than 3/8 inch adjustment remains, the anchor inserts shall be core drilled out and a new insert installed in the correct location.
  - d. After rail has been installed and anchored to the direct fixation rail fasteners, adjust each rail to final vertical alignment, if necessary, with galvanized steel shims placed between the rail fastener and the second pour concrete. Do not use more than two shims under each direct fixation fastener. Total thickness of shims shall not exceed 1/2 -inch.
  - e. Fully anchor rail fasteners to second pour concrete with anchor bolts tensioned to torque as specified by the rail fastener manufacturer. Provide Engineer with certification of calibration of the torque wrench as well as impact wrench used, before tightening anchor bolts. Check torque setting of impact wrench daily by checking torque of installed bolts using the torque wrench.

- f. After installation of fastener, test bearing of fastener on plinth by attempting to insert a 1/16-inch-thick feeler gauge between underside of fastener bottom plate and top of plinth surface. If gauge can be inserted more than 2” under edge of fastener, then insert a shim under the fastener to improve the bearing. If plinth surface is uneven, bring it to a level planar condition by grinding the plinth.

64. MEASUREMENT AND PAYMENT:

- A. Payment for the work of this Section will paid as a Lump Sum for Direct Fixation Track complete in place and approved.
- B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Direct Fixation Track Construction)	Lump Sum

**SUBBALLAST**

65. DESCRIPTION:

- A. This Section specifies the furnishing, placing and compacting sub-ballast on previously constructed subballast or subgrade.
- B. Related work specified elsewhere:
  - 1. Earthwork: Section 200 of the Standard Specifications.
  - 2. Special Provision (Ballast)
  - 3. Special Provision (General Track Construction Requirements)
  - 4. Special Provision (Ballasted Track Construction)

66. QUALITY ASSURANCE:

- A. The following codes, regulations, reference standards and specifications apply to the work included in this section:
  - 1. Codes and regulations of the jurisdictional authorities.
  - 2. Applicable Standards

- a. AREMA: Chapter 1, Section 2.11.
- b. ASTM: C88, C117, C127, C131, C142, D422, D423, D424, D1556, D1557, D2434, D2922, D3107.
- c. AASHTO: T180.

B. Source of Materials:

1. Obtain acceptance of sub-ballast prior to commencing installation.
2. Do not change material or source of supply without acceptance from the Engineer.

C. Inspection:

1. The Engineer may stop delivery of material to the job site based on visual inspection pending sampling and testing.
2. If material loaded, being loaded or installed does not conform to specified requirements, the material will be rejected and no further delivery will be accepted until the deficiency is corrected.

67. SUBMITTALS:

A. Submit the following in accordance with Section 105.03 of the Standard Specifications and these Special Provisions:

1. Certification.
2. Documentation:
  - a. Qualifications: Submit source of supply sufficiently in advance to obtain acceptance not less than 30 days prior to anticipated date of commencing installation.

68. MATERIALS:

A. SUBBALLAST

1. Furnish crushed stone meeting the following requirements:

- a. Gradation: Comply with ASTM D422 and C117 and with the following additional requirements:

<u>SIEVE SIZE</u>	<u>% PASSING BY WEIGHT</u>
1-3/4"	100
7/8"	90 - 100
3/8"	50 - 70
No. 4	42 - 55
No. 40	5 - 20
No. 200	0 - 5

1. Maximum liquid limit: 35 complying with ASTM D423.
  2. Maximum PI: 10 complying with ASTM D424.
- b. Clay lumps and friable particles: ASTM C142, 0.5 percent maximum.
- c. Wear: ASTM C131, 40 percent maximum.
- d. Absorption: ASTM C127, 1.0 to 1.5 percent maximum.
- e. Soundness: ASTM C88, weighted average loss 15 percent maximum after five cycles of sodium sulfate tests.
- f. Permeability: ASTM D2434.

## 69. EXECUTION:

### A. PLACING MATERIAL

1. Do not place material on subgrade that is muddy, rutted or frozen or contains standing water.
2. Prior to placing materials, prepare subgrade in accordance with Section 200 of the Standard Specifications.
3. Place material to provide uniformity of grading throughout work.
4. If subgrade is dusty, dampen it with water prior to placing subballast.
5. Install, shape and compact subballast to the depth shown on the Contract Drawings.

- a. Where compacted thickness is 4 inches or less, place subballast in one layer.
- b. Where compacted thickness is greater than 4 inches, place subballast in layers not to exceed 6 inches.
- c. Under precast concrete track slabs, place subballast in layers not to exceed 4 inches.

## B. COMPACTION

1. During placing and compacting, maintain moisture content within specified tolerance.
2. Compact material for its full depth to 95 percent of maximum dry density. Under precast concrete track slabs, compact material for its full depth to 97 percent of maximum dry density.

## C. FIELD QUALITY CONTROL

1. Allowable Tolerances:
  - a. Construct sub-ballast to the following tolerances:
    - 1) Vertical: Within +/- 1 inch of elevation shown. Deviation not to exceed 1/4 inch in 16 feet.
    - 2) Horizontal: Within plus 3 inches minus 1 inch of the limits shown.
  - b. During compaction maintain moisture content within two percent of optimum moisture content.
2. Test Methods:
  - a. Determine optimum moisture content and maximum dry density in accordance with AASHTO T 180.
3. In place field tests and frequency:
  - a. Perform field testing for compliance of dry density and moisture content of subballast in place in accordance with ASTM D2922, D3017 or D1556.
  - b. Perform a minimum of one test every 200 linear feet.



70. MEASUREMENT AND PAYMENT:

- A. Subballast will not be measured for payment.
- B. Payment for Subballast will be included in the Contract unit price for the item 900.645 Special Provision (Ballasted Track Construction).

**BALLAST**

71. DESCRIPTION:

- A. This section specifies the furnishing and installation of mineral aggregate for railroad track ballast.

72. QUALITY ASSURANCE:

- A. The following codes, regulations, reference standards and specifications apply to work included in this section:
  - 1. Code and regulations of the jurisdictional authorities.
  - 2. Applicable Standards
    - a. ASTM: C 88, C 117, C 127, , C 142, , D 75, D 4791 ASTM C535, and ASTM E11.
    - b. AREMA: AREMA, Chapter 1, Part 2.
- B. Source of Materials
  - 1. Obtain approval of ballast prior to commencing installation.
  - 2. Do not change material or source of supply without acceptance from the Engineer.
  - 3. Take samples at the locations designated by the Engineer.
- C. Source Quality Control: Test each stratum or portion of the quarry containing a variation in quality of stone separately. Do not average any tests of a single stratum or portion with any other stratum or portion of the quarry. Take two samples from each ledge or different quality of stone used in the preparation of the ballast.

73. INSPECTION AND TESTING:

- A. Ballast shall be subject to inspection by the Engineer at any time between quarry production and consolidation in track.
  - 1. The Engineer will have free entry to the producing plants at all times while the work of this Contract is being executed.
  - 2. Provide the Engineer all reasonable facilities to ensure that the ballast is being prepared and loaded in accordance with the Specifications.
  - 3. Determinations of deleterious substances, resistance to abrasion and soundness are to be made a State certified laboratory, but visual inspection and gradation tests may be required at the place of production prior to shipment as often as considered necessary by the Engineer.
    - a. Ballast that does not conform to this Specification shall not be used.
    - b. The Contractor shall stop further ballast operations until the fault has been corrected and defective material has been disposed of.
- B. If the Engineer determines that ballast does not meet specified requirements, Engineer will notify Contractor promptly, and Contractor shall discontinue ballast operations and take appropriate corrective measures.
- C. Upon determination that ballast does not meet specified requirements, ballast operations shall not be resumed until passing test results are obtained.
- D. Qualification Testing - Ballast at the quarry shall be qualified prior to production.
  - 1. Contractor shall have representative samples taken under the direction of the Engineer tested for quality and gradation and certified by a qualified independent testing laboratory.
  - 2. Certificates shall be submitted not less than five working days prior to start of production of ballast.
  - 3. Additional sampling and testing shall be performed if, in the Engineer's opinion, there are significant changes in the quarry operation.
- E. Quality Control Testing
  - 1. Take a 150-pound ballast sample prior placement and perform the following tests:

- a. Test will be for uniformity and gradation.
  - b. Test will conform to ASTM and AREMA requirements.
2. Samples will be taken in accordance with ASTM D75.

74. SUBMITTALS:

- A. Submit the following in accordance with Section 105.03 of the Standard Specifications and these Special Provisions:
  1. Quarry Qualification Test Report.
  2. Provide additional Qualification Test results if, during ballast installation, the supplier changes the source of ballast.
  3. Plan for handling and placing ballast.
  4. Quality Control Test Results.

75. MATERIALS:

A. BALLAST

1. Ballast shall be crushed stone derived from rock such as granite or traprock composed of hard, strong, angular and durable particles conforming to the requirements of these Specifications and the following paragraphs.
2. Ballast source shall be subject to acceptance pursuant to quality requirements specified hereinafter.
3. Quality Requirements:
  - a. Limestone, dolomite, other carbonates, crushed slag ballast or any material containing metallic ore, metallic residues, or crushed river gravel will not be acceptable.
  - b. Sampling shall be undertaken in accordance with above listed codes.
  - c. Deleterious material in the ballast shall not exceed the following amounts, as determined by the testing method specified:

- 1) Maximum amount of material passing the No. 200 standard sieve, tested in accordance with ASTM C 117: 0.5 %.
  - 2) Maximum clay lumps friable particles tested in accordance with ASTM C 142: 0.5 %.
  - 3) Maximum Water Absorption, in accordance with ASTM C 127: 1.0 percent.
  - 4) Maximum, thin, elongated particles, in accordance with ASTM D 4791: 5.0 percent. The dimension ratio used in this test method shall be 1:3.
- d. Wear of the material, as tested in a L.A. abrasion machine, shall not exceed 25 percent when tested in accordance with ASTM C 535.
  - e. The soundness (sodium sulphate) shall be such that loss shall not exceed seven percent after five cycles when tested in accordance with ASTM C 88.
  - f. Ballast gradation shall conform to AREMA. Gradation shall be determined by sieve analysis using sieves with square openings in conformance with ASTM E11.
    - 1) Ballast shall be AREMA No. 3 gradation with the exception of walking areas as described in the paragraph below.
    - 2) Along the yard track, including the dummy gauge between the yard track and the main track, at least the top 3 inches, but not more than the top 5 inches, shall be AREMA No. 5 gradation. Below that the remaining ballast shall be AREMA No. 3 gradation.

## 76. EXECUTION:

### A. HANDLING

1. Ballast shall be kept clean and free from segregation during transporting, handling, and placing operations. Rock shall be washed at the quarry or crusher plant.
  - a. Handle and transport during all stages of manufacture and supply in a manner that ensures a uniform product.

- b. Handle and transport aggregates at all times in a manner and with equipment that prevents segregation and continuation by mud or any other deleterious material.
- c. Do not allow aggregates to fall from a height in a manner that the larger particles are thrown beyond the smaller particles. When placing aggregates in a bin, drop the aggregate vertically over the center of the bin.
- d. Washing of aggregate shall be done at the quarry or crusher facility and not on-site.

#### B. STOCKPILING

1. Stockpile materials on level, well-drained sites free of all foreign materials and of adequate bearing capacity to support the weight of the materials to be placed thereon.
2. Except where stockpiled on Portland cement or asphalt foundations or on otherwise acceptably stabilized areas, provide a compacted sand stockpile base of not less than one (1) foot in depth.
3. Build stockpiles in layers not to exceed 3 feet in depth, completing each layer over the entire area of the stockpile before beginning the next layer. Uniformly spot-dump aggregates delivered to the stockpile in trucks. Coning of the piles or spilling of materials over the edges of the pile is prohibited.

#### C. INSTALLATION

- A. Submit plan for handling and placing ballast as follows.
  1. This plan shall include source, type of equipment to be used, location of stockpiles, and method of distribution.
  2. Ballast shall be placed and spread evenly.
  3. Spreading ballast by plowing will not be permitted.

#### D. DEFECTIVE MATERIALS

1. Unless otherwise permitted by the Engineer, remove rejected materials from the site within 48 hours of rejection.

#### E. FIELD QUALITY CONTROL

1. Inspection:

- a. The Engineer has the right to stop delivery of material to the job site based upon visual inspection pending sampling and testing.
- b. The Engineer will reject any ballast that arrives at the site for unloading that does not conform to the specified requirements.
- c. Take one sample of the delivered ballast product for visual inspection and gradation testing, unless otherwise directed by the Engineer. The sample shall be representative and to weigh not less than 150 pounds.
- d. If material delivered does not conform to specified requirements, the material will be rejected and no further delivery will be accepted until the deficiency is corrected.

77. MEASUREMENT AND PAYMENT

A. BALLAST

1. Ballast will not be measured for payment.
2. Payment for Ballast will be included in the Contract unit price for the item 900.645 Special Provision (Ballasted Track Construction).

**TIMBER CROSS TIES**

78. DESCRIPTION:

A. This Section consists of requirements for manufacturing, treating, testing, inspecting, handling and shipping timber cross ties.

B. Related Sections of Work:

Special Provision (Ballasted Track Construction)

79. REFERENCED STANDARDS:

A. Timber ties shall be manufactured and treated in accordance with the following as applicable:

1. "Specifications for Crossties of the Railway Tie Association".

2. "Specifications for Switch ties of the Railway Tie Association".
3. Chapter 30 of the AREMA "Manual for Railway Engineering" except as those documents may be amended by this specification.
4. "Book of Standards" of the American Wood Protection Association (AWPA, formerly the American Wood Preservers Association) <http://www.awpa.com/> .
  - a. C2 – Lumber, Timber, Bridge Ties and Mine Ties, Preservative Treatment by Pressure Processes.
  - b. C6 – Crossties and Switch Ties – Preservative Treatment by Pressure Processes.
  - c. M2 - Standard for inspection of wood products treated with preservatives
  - d. P3 – Organic & Organometallic Preservative Systems

80. SUBMITTALS:

- A. The following information shall be submitted in accordance with Section 105.03 of the Standard Specifications and these Special Provisions.
- B. Product Data
  1. Name(s) and location(s) of the tie manufacturer, timber supplier, the area of timber acquisition, the sawmill, the seasoning yard and the treatment plant.
  2. Certification of the manufacturer's Railway Tie Association membership.
  3. Description of manufacturer's equipment - The type, age and present condition. Particular attention shall be made concerning equipment used to artificially season ties, if proposed. Gauges and thermometers on seasoning and treatment equipment shall have been calibrated within six months of the date of seasoning and treatment. Include information on equipment and methods to be used for machining, including incising, stamping, boring, dapping, and end-plating.
  4. Wood species proposed and the quantities of each.
  5. Product data for ties to be furnished.
  6. Tie seasoning and handling methods.

7. Complete seasoning and treatment records for timber ties.

C. Quality Assurance / Control Submittals

1. Test Reports - Subsequent to treatment and a minimum of seven days prior to any ties being installed in track provide notarized records concerning the seasoning and treatment of ties. Reports shall contain the information required by Part 7 of AWPA Standard M-2 "Standard for Inspection of Treated Timber Product".
2. Certificates - Provide certified test results or Certificates of Compliance for the requirements specified herein

D. Material Safety Data Sheets.

81. QUALITY ASSURANCE / QUALITY CONTROL:

- A. Qualifications - Ties shall be produced by a member of the Railway Tie Association.
- B. The requirements, terminology, and standards for machining, seasoning, handling, and inspecting timber are those specified and recommended by the American Railway Engineering and Maintenance of Way Association (AREMA), except as modified herein.
- C. Inspect crossties, switch ties and bridge ties at the source location.
- D. Make close examination of the top, bottom, sides, and ends of each tie. Each tie shall be judged independently without regard to the decisions made on other ties in the same batch.

82. DELIVERY, STORAGE, & HANDLING:

- A. Conform to AREMA Manual, Chapter 30, Part 5.
- B. Segregate the ties by lengths and type.
- C. Use dunnage to protect ties edges from metal bands.
- D. Transportation and handling shall be performed in such a manner as to present contamination of soil, water, container, etc. with timber preservatives.



- E. Acceptance at Site - Obtain conditional inspection and acceptance by the Engineer before installing ties in the track.

82. MATERIALS:

A. GENERAL

- 1. All ties shall be new and free from defects which may impair their strength or durability as ties, including but not limited to decay, large splits, large shakes, slanting grain, and large or numerous knots or holes.

B. SIZE

- 1. Timber crossties shall be "Seven Inch Grade" ties as defined by the American Railway Engineering and Maintenance-of-way Association and shall be 8'-6" in length. The rail bearing area is defined as that area of the tie 23" to 43" distant from the track centerline.
- 2. Dimensional Tolerances:
  - a. Thickness and width:
    - 1) Crossties and Switch ties: Plus 1/2 inch, minus 1/4"
    - 2) Bridge Ties and Packing Blocks: Plus or minus 1/4".
  - b. Length: Plus or minus 1 inch.
  - c. Dimensions with respect to measurement for size acceptance shall not be averaged; each tie shall be judged individually.

C. ACCEPTABLE WOOD SPECIES

- 1. Timber crossties and switch ties shall be manufactured from sound live timber and only from those wood species listed below. Submittals shall indicate the type of woods proposed for this Contract.
- 2. Crossties may be manufactured from the following:
  - a. Ashes
  - b. Beeches
  - c. Hickory

d. Gum

e. Oaks

D. SOURCE CONTROL, TIES

1. The following requirements apply to timber ties prior to final acceptance:
2. Ties shall be backsawn and free from any defects that may impair their strength or durability such as decay, large splits, large shakes, slanting grain, or large or numerous holes or knots, extensive checking or twisting of the member
3. Sawing and Machining, as per AREMA and the following:
  - a. Except as specified, provide ties with straight sawed top, bottom and sides, cut square at the ends, bottom and top parallel, and bark entirely removed.
  - b. Requirements relating to the rail seat area (critical area) shall be considered as applying to the zone between 20 and 40 inches on each side of the centerline of tie and in all areas that support rails, switches, frogs or switch machines.
4. Defects shall meet the following requirements. No defects are acceptable in the critical areas described above, except where specifically noted.
  - a. Decay: Disintegration of the wood substance due to the action of wood destroying fungi. "Blue stain" is not decay and is permissible in any wood. Tropical hardwood bridge ties shall be free of "white rot", and brown-to-red and white-to-yellow mold stains are not allowed.
  - b. Holes: A large hole is one more than ½ inch in diameter and 3 inches deep within, or a hole of any depth which is wider than 25% the width of the surface on which it appears. Numerous holes are any number equaling a large hole in damaging effect. Such holes are not permitted.
  - c. Knots: Within the rail bearing areas, a large knot is one having an average diameter more than 0.33 times the width of the surface on which it appears; but such a knot shall be allowed if it is located outside the rail bearing area. Numerous knots are any number equaling a large knot in damaging effect. Such knots are not permitted.

- d. Checks over 1 ½ inches deep or ½ inch wide (or wider) on any face and longer, in aggregate, than 1/3<sup>rd</sup> of the length of the switch tie, crosstie or tie block shall be cause for rejection.
- e. Shake: A separation along the grain, most of which occurs between the rings of annual growth. The length of a shake shall not be greater than 0.33 times the width of the tie. Shakes shall not be located within 25 mm of any edge.
- f. Split: A separation of the wood extending from one surface to an opposite or adjacent surface. In unseasoned cross ties, a split not more than 1/8 inch wide and/or 4 inches long is acceptable. End splits and shrinkage cracks that do not impair the fastening or strength of the material will be permitted.
- g. Any wood separation greater than 18 inches in length (and more than 1/16 inch wide and 1/8 inch deep) shall be cause for rejection.
- h. Cross Grain: Ties with excessive cross grain are not permitted.
- i. Straightness:
  - 1) A tie manufactured from will be considered straight when all of the following conditions are met:
    - a) Horizontal Sweep: A straight line along the top of the tie from middle of one end to the middle of the other end is not closer than 3 inches from either side of the tie.
    - b) Vertical Bow:
      - (1) Ties up to 11 feet in length: A straight line along a side from the middle of one end to the middle of the other end is everywhere more than 3 inches from the top and bottom surfaces of the tie.
      - (2) Ties 12 feet and longer: A straight line along a side from the middle of one end to the middle of the other end is everywhere more than 2 inches from the top and bottom surfaces of the tie.
  - 2) Top and bottom of ties will be considered parallel if any difference in the thickness at the sides or ends does not exceed ¼ inch.

#### E. SEASONING

1. North American Hardwoods - Timber crossties and switchties manufactured from red or white oak shall be dried to an oven dry moisture content of 50% or less prior to preservative treatment. Timber crossties manufactured from other allowable wood species shall be dried to an oven dry content of 45% or less prior to preservative treatment. The wood may be air dried, vapor dried, or bouldenized. Submittals shall indicate the type of seasoning to be utilized.
  - a. Ties which are to be dried by artificial means shall be seasoned and treated as soon as possible after sawing but in no case more than 30 days later.
  - b. The temperature used for bouldenizing shall be as high as possible but in no case less than 200°F.
  - c. Vapor dried ties shall be transferred from drying cylinders to treatment cylinders as quickly as possible to avoid loss of heat from the seasoned ties.
  - d. Borate treatment – Prior to seasoning, hardwood timber crossties and switchties shall be treated with a borate compound to kill fungi and enhance the preservative quality of the subsequent treatment with coal tar creosote.

#### F. MACHINING & INCISING

1. Timber crossties shall be incised on all four sides in the pattern specified in the AREMA Manual for Railway Engineering, Chapter 3, Part 6 “Wood Preserving”.

#### G. PRETREATMENT STERIZATION

1. Sterilization – So as to kill fungi spores throughout the entire tie, timber crossties, switch ties, and those bridge ties manufactured from Longleaf Yellow Pine shall, prior to preservative treatment, be heat sterilized at a temperature and for a time period sufficient to ensure that the wood fibers are at a uniform temperature throughout the cross section of the wood.

#### H. PRESERVATIVE TREATMENT

1. Tropical hardwoods and Alaska Yellow Cedar require no preservative treatment.

2. North American Hardwoods and Longleaf Yellow Pine
  - a. Preservative treat and condition ties in accordance with American Wood Preservers Association (AWPA) C6 - *Cross Ties and Switch Ties - Preservative Treatment by Pressure Process*. Timber crossties and switch ties shall be pressure treated by the empty cell process with either a 60/40 creosote/coal tar solution (Grade C) or creosote-petroleum solutions conforming to AWPA P3. Record treatment as specified in Article 80.C.
  - b. Minimum retention: Eight pounds per cubic foot of wood or refusal, whichever is less.
3. Field Treatment of cut surfaces in treated ties: Coat all bare untreated surfaces resulting from drilling, cutting, dapping or damage with three applications of a hot mixture of 60 percent creosote and 40 percent roofing pitch, or three applications of creosote followed by a coat of hot roofing pitch.

#### I. ANTI-SPLITTING DEVICES

1. Timber crossties and switch ties shall be equipped with anti-splitting devices of the type indicated below regardless of whether or not the wood has shown any tendency to split. Products used shall conform to the AREMA "Specifications for Devices to Control the Splitting of Wood Ties" and be applied per the AREMA "Application of Anti-Splitting Devices".
2. Timber crossties shall be equipped on each end with an approved gang-nail plate. Gang nail plates shall be at least 6 inches by 8 inches.
3. Timber switch ties and bridge ties shall be equipped with either steel dowels or approved gang nail plates.
  - a. Dowels shall be of the four-fluted type and be a minimum of 6 inches in length. Each switch tie shall be equipped with four dowels – two at each end of the tie. Each dowel shall be located 150 mm from the end of the tie and 50 mm from the top or bottom surface of the tie.
  - b. Gang nail plates shall be as specified for timber crossties.
4. If the anti-splitting device selected conceals the wood grain pattern on the end of the tie (e.g., most gang nail plates) mark the top surface (sapwood

side) of the tie in one of the following manners prior to application of the device.

- a. A kerf not less than 1/8 inch in both depth and width shall be sawn in to the top surface of the tie.
- b. A broadhead nail shall be driven into the top surface of the tie.
- c. Other method as accepted by the Engineer.

#### J. MARKING

A. Crossties, switch ties, and bridge ties shall be marked after seasoning in accordance with the AREMA Manual, Chapter 30, Specifications for Timber Crossties, Marking Ties to Indicate Size Acceptance, except as specified below:

1. Marking shall indicate the manufacturer's name or trademark, the month and year of production and the manufacturer's plant identification in figures at least ½ inch high. If dating nails are used, only the last two digits of the year of manufacture shall be shown.
2. Marking shall be by either dating nails, hot-iron branding or tagging on the middle of the tie and/or timber top surface. When anti-splitting devices are applied, brands or tags shall appear in the middle of the top surface of the tie or timber. Tags, if used, shall be of stainless steel conforming to ASTM Designation A176. Dating nails, if used, shall conform to the requirements of the former AREA Manual for Railway Engineering chapter 3 Ties and Wood Preservation, section 1.8, Specifications for Dating Nails, dated 1975 or later.

#### 83. EXECUTION:

##### A. HANDLING

1. Timber crossties and switch ties shall be carefully handled to avoid damage in accordance with the AREMA specification "*The Handling of Ties From the Tree Into the Track*" and AWPA Standard M4, "*Standard for the Care of Preservative-Treated Wood Products. General Requirements, Storage*".

##### B. SEASONING AND TREATMENT

1. Shall be in accordance with the AREMA Manual, Chapter 3, Part 6 “Wood Preserving”. Provide the Engineer with 14 days written notice of the date(s) scheduled for artificial seasoning and treatment of ties.

#### C. SOURCE QUALITY CONTROL

1. Contractor’s Inspection - Obtain the services of an independent tie inspection service (Service) to perform inspections that will assure compliance with the contract.
  - a. Require tie supplier to provide suitable facilities, equipment, and assistance necessary for the Service’s inspector to work efficiently.
  - b. Perform an initial inspection of each tie prior to seasoning.
  - c. Ties shall be judged independently without regard to decisions made on other ties in the same lot. Ties too muddied for ready examination shall be rejected. Ties which have stood on their ends on the ground shall be rejected.
  - d. Examine top, bottom, sides and ends of each tie in accordance with AREMA Specification for Timber Crossties Article 1.1.5 - Inspection. Ties handled by hoist shall be turned over for inspection.
  - e. Ties accepted for seasoning shall be subject to additional inspections by the Service at any time and at any stage of preparation for treatment.
  - f. Test the preservative used in treatment of the ties. Service shall have the right to take samples from any container in which the preservative is stored or used.
  - g. The Service shall examine and pass judgment on the adequacy of each piece of equipment used during any step of the manufacture and treatment of the ties.
  - h. The Service shall examine records of preservatives used and treatment of the ties and shall not approve ties for shipment until such records indicate that the ties are in compliance with the requirements of this Section.
  - i. One crosstie or switch tie out of every 100,000 board-feet shall be bored and checked for specified retention and penetration of the preservative. The Engineer will select which ties are to be bored. Boring shall be done with both the Engineer and the Contractor’s Quality Officer present.

Unacceptable ties shall be replaced. For each tie that is determined to be unacceptable, two additional ties shall be bored and checked. If more than ten percent of the ties are determined to be unacceptable, the entire lot will be rejected.

- j. The Service shall brand each acceptable tie, indicating their determination of compliance with these specifications.

## 2. Engineer's Inspection

- a. The Engineer may elect to perform additional inspections of the ties at any time. Provide labor and equipment as required so that the Engineer can make a thorough inspection of the material. Notify the Engineer at least 15 days prior to when ties will be ready for shipment so as to provide the Engineer the opportunity to inspect the materials before shipment. Plant inspection of ties by the Engineer is optional and unacceptable materials, whether inspected by the Engineer at the plant or not, are subject to rejection at any time up until the date of Final Acceptance of the completed track.
- b. Crossties and switch ties shall have been inspected by the Engineer prior to their installation in track. The Contractor is responsible for arranging delivery schedules in such a manner that the Engineer has adequate time to schedule pre-installation inspections.
- c. When inspections of on-site materials result in product rejection, promptly segregate and remove rejected material from the premises. In the event that re-inspections or retesting is required, the Engineer's costs of such additional work may be charged against the Contractor and deducted from money due or to become due the Contractor.

## D. DELIVERY

1. Timber ties shall be delivered either to the Contractor's own storage areas or to the point of shop fabrication of the special trackwork units in which they will be used.

## 84. MEASUREMENT AND PAYMENT:

- A. Timber Cross Ties will not be measured separately for payment.
- B. All costs in connection herewith will not be paid for directly, but will be considered incidental to the item of Work to which they pertain.



**TRACK APPURTENANCES**

85. DESCRIPTION:

A. The Work of this Section includes providing miscellaneous trackwork components and other related materials and Work as specified in the Contract Documents and as otherwise required for the proper and timely completion of the Work. Items to be provided under this Section include:

1. Bolted rail joints
2. Compromise rail joints
3. Bolts, nuts and spring washers for rail joints.
4. Track Spikes
5. Rail Anchors
6. Tie Plates
7. Elastic clip type rail fastenings for timber tie ballasted track.
8. Rail bonding materials.

86. REFERENCE STANDARDS:

A. American Railway Engineering & Maintenance-of-way Association (AREMA)

1. *Manual for Railway Engineering* (MRE)
2. *Portfolio of Trackwork Plans* (PTWP)

87. SUBMITTALS:

A. General Requirements for all products

1. Assembly and installation instructions: Furnish manufacturer's printed recommendations.
2. Method of unloading and stacking materials.
3. Certificates of compliance.

B. Compromise Rail Joints

1. Shop drawings.

C. Elastic Rail Clip Fasteners for Timber Tie Ballasted Track

1. Shop drawings and/or catalog cuts for products proposed.

D. Rail Bonding Materials

1. Catalog cuts for products proposed.

88. MATERIALS:

A. TIMBER TIE RAIL FASTENINGS (Main Track)

1. General: Timber tie rail fasteners for use under rail sections 115RE and heavier shall be based on elastic spring clips.
2. Elastic Spring Clips - Forged from alloy steel bars and quenched to achieve the spring action holding power specified. Conform to the following criteria.
  - a. Rail clips shall be of a boltless, threadless, one-piece elastic design which shall permit removal of the rail, switch or frog without the removal of plate holding screw spikes from the timber ties. Two clips shall be provided per each complete rail fastener. Elastic spring clips shall be right hand mounting.
  - b. Elastic rail clips shall be forged from alloy steel bars, fabricated from spring steel bar stock and quenched to achieve the spring action holding power as specified herein.
  - c. Field assembly and disassembly shall be possible by both one worker using standard hand track tools and by commercially available equipment.
3. Rolled Steel Tie Plates
  - a. Standard design for 115RE rail, providing a 1:40 cant to the rail and with round holes to accept screw spikes. Comply with applicable AREMA specifications.
4. Screw Spikes
  - a. General: Drive spikes, aka "coach screws" or "screw spikes".

“Lockspikes” are not acceptable.

#### B. TIMBER TIE RAIL FASTENINGS (Yard Track)

1. General: Timber tie rail fasteners for use under rail sections weighing less than 115 pounds per yard shall be conventional tie plate, cut spikes and rail anchors complying with AREMA recommended designs and specifications.
2. Tie Plates: Either new or fit condition relay tie plates conforming to the following.
  - a. Tie plates for rails with 5 ½ inch base shall be double shoulder tie plates. Tie plates for rails with bases narrower than 5 ½ inches may be either single or double shoulder.
  - b. Tie plates shall be punched so as allow at least two gauge side rail holding spikes, one field side rail holding spike and an anchor spike on both the gauge side and field side of the rail.
3. Spikes: AREMA design soft steel track spikes, 6” x 5/8” size.
4. Rail Anchors: Either new or fit reformed to match the rail sections used. Either drive on or snap on conforming to AREMA specifications; all anchors for each rail section shall be the same design.

#### C. PLAIN BOLTED RAIL JOINTS

1. JOINT BARS: New or fit condition relay joint bars of standard design and drilling and complying with AREMA as applicable.
2. Track Bolt Assemblies; New material, matching the punching of the joint bars with which they will be used and complying with the following.
  - a. Track bolts and nuts: Conform to the AREMA "*Design for Track Bolts and Nuts*", "*Rail Drillings, Bar Punchings and Track Bolts*", and "*Specifications for Heat Treated Carbon Steel Track Bolts and Carbon Steel Nuts*". Bolts shall be the proper length for the joint bar to allow at least four full bolt threads and 1/2 inch of bolt length to extend past the outside of the nut.
  - b. Spring Washers: Conform to the AREMA "*Specifications for Spring Washers*" of AREMA MRE and Section M12., "*Spring Washers*" of the AREMA "*Specifications for Special Trackwork*" of AREMA PTWP.

D. COMPROMISE JOINTS

A. Compromise joint bars shall be new and conform to the requirements of "*Specifications For Quenched Carbon-Steel Joint Bars and Forged Compromise Joint Bars*" found in Chapter 4, Part 2 of AREMA MRE. Compromise joint bars shall be of the size, shape, and punching pattern to fit the rail sizes and sections being joined. Only factory designed and constructed (forged or cast) compromise joint bars shall be used to join rails of different sizes.

B. Bolt Assemblies: Comply with Paragraph 2.03 B

E. RAIL BONDING PRODUCTS

A. Exothermically welded copper rail bonds applied to the rail head. 2/0 copper cable. Comply with AREMA Signal Manual as applicable. Cadweld or accepted equivalent.

89. EXECUTION:

A. FABRICATION - In accordance with accepted shop drawings and the manufacturer's own quality procedures.

B. DELIVERY - Materials shall be delivered in the manufacturer's original never-opened containers.

C. INSTALLATION - Per manufacturer's instructions, as required by other specification Sections of this contract.

90. MEASUREMENT AND PAYMENT:

A. All costs in connection herewith will not be paid for directly, but will be considered incidental to the item of Work to which they pertain.

**RAIL**

91. DESCRIPTION:

A. This Section includes specifications for the manufacturing, testing, fabricating, and shipping of undrilled, high strength steel rail as specified herein.

92. REFERENCE STANDARDS:

A. The following Codes, Regulations, Reference Standards, and Specifications apply to the work.

1. The American Railway Engineering and Maintenance-of-Way Association Manual for Railway Engineering (AREMA Manual), Chapter 4.
2. American Society for Testing and Materials (ASTM):
  - a. ASTM A578: Standard Specification for Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Application
  - b. ASTM E10: Standard Test Method for Brinell Hardness for Metallic Materials

93. SUBMITTALS:

A. Submit the following for approval in compliance with Section 105.03 of the Standard Specifications, these Special Provisions and with the additional requirements as specified for each:

1. Quality Control program description as outlined in Article 94.
2. Provide rail processing reports and a rail list for the heat of steel from which the rails are rolled showing the heat, ingot and letter for every rail including identification of the short rail, test rail, scrap rail, etc.
3. Provide rail test records, including mechanical properties tests, hardness measurements, ultrasonic test records and all other required test documentation.
4. Submit the method of handling, shipping, unloading, and stacking rail for review and approval at least four weeks before shipping of the rail.

94. QUALITY CONTROL:

A. Develop and maintain a quality control program regulating methods, procedures, and processes to ensure compliance with standards of quality as required in this Section.

B. Records of inspection work by the Contractor shall be kept complete and available to the Engineer during the performance of the Contract; and to such other agencies and for longer periods as may be specified elsewhere in the Contract.

## C. Inspection and Testing:

1. The products and material incorporated into the work will be subject to inspection by the Engineer, at the Contractor's and SubContractor's facilities, place of manufacture, the shipping point, and at the shipping destination. Inspection and tests by the Engineer will be performed in such a manner as not to unduly delay the work.
2. Whether or not the Engineer inspects or tests any materials, the Contractor will not be relieved from any responsibility regarding defects or other failures to meet the Contract requirements, nor will such inspection or testing be considered as a guarantee of acceptance of any material which may be delivered later.
3. Perform tests and analyses specified in Chapter 4, Part 2, of the AREMA Manual and submit the results in accordance with this Section.
4. Ultrasonically test rail for internal defects in accordance with ASTM A578, as modified herein:
  - a. References to "plate thickness" in ASTM A578 mean rail depth from head to base for measurements from the top of the rail head, or rail web width for measurements laterally through the rail web.
  - b. Replace "Acceptance Standards" in ASTM A578 by a defect in the occurrence of one of the following readings:
    - 1) Complete loss of back reflection.
    - 2) A reflection from a defect (i.e. not attributable to a reflecting surface of the rail exterior) greater than 5 percent of the back reflection.
  - c. Conduct ultrasonic testing for the full length of each rail with a 1 inch diameter, 45-degree probe from the top of the rail head, directed along the length of the rail, positioned such that the rail base generates the back reflection.
  - d. Conduct ultrasonic testing within 12 inches of each rail end with the 1-inch diameter 45-degree probe and also with a 1-inch diameter, 0-degree probe from the top of the rail head, vertically, and through the rail web, laterally. The back reflection for the lateral measurement through the rail web is the web surface opposite the probe side.

- e. Conduct ultrasonic testing by a qualified technician. Provide qualification certification of each individual conducting ultrasonic inspection of the material.
  - f. Permanently mark indications on the rail head directly over the defect location with the percentage amplitude relative to the back reflection.
  - g. Have the manufacturer furnish the Mill Certificate of rail production inspection certifying that all rails to be supplied have passed the ultrasonic testing as required in this specification.
5. As an alternative to the requirements of paragraph 4 above, ultrasonically test rails 100 percent in-line with the rail manufacturer's fully computerized testing unit. Testing for 115RE rail shall conform to the requirements of Chapter 4, Part 2, Section 2.1.8 of the AREMA specification. A calibration test rail of the same section as being tested will be utilized with the following calibration reference standard:
- a. Head 3/32-inch wide by 1/2-inch long slot
  - b. Web 1/16-inch wide by 1/2-inch long slot
  - c. Base 1/16-inch wide by 1/2-inch long slot.
6. Make rail tests and inspections at the mill before shipment. Assume full responsibility for testing indicated. Give the Engineer sufficient notice when testing is proposed so the tests may be witnessed. Provide the Engineer free entry at all times to the manufacturer's mill to inspect the processing and testing of rail while work on this Contract is being performed. Perform tests specified herein at no additional cost. Testing shall be witnessed and certified by a qualified independent testing firm or individual.

95. DELIVERY, HANDLING AND STORAGE:

- A. Handle rails carefully using approved methods and tools so as to avoid damage. Rails longer than 39 feet shall only be handled using a spreader beam for a two-point pick. Load them head up with the branding on rails facing in the same direction.
- B. Load rails with adequate wood strips between the tiers of rail to prevent damage in transit.
- C. Rail shall not be stockpiled and stored within the street right-of-ways.

96. MATERIALS:

A. RAIL:

1. New Rail for Main Line and Yard Track on Bridge:

- a. Steel rail for installation in mainline track plus the yard track on and immediately adjacent to the bridge shall be 115RE high strength head hardened rail conforming to the requirements of the following sections of the American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering, Volume 1, Chapter 4 "Rail". Part 1 - Design (and Part 2 - Specifications (Specifications for Steel Rails) except as modified by this Section.
- b. Rails shall be new rails manufactured from continuous cast bloom process.
- c. Classifications, markings, brandings, and stampings of rail shall be in accordance with AREMA specifications for rail manufactured from continuous cast blooms process.
- d. All rails furnished on this contract shall be full lengths not shorter than 80 feet.
- e. Rails to be fabricated into continuous welded rail shall not be end-drilled for joint bars or any other purpose.

2. Relay Rail:

- a. Rail for reconstruction of those portions of the Yard Track within the zone specified for complete track reconstruction but beyond the limits specified for new 115RE rail shall be new or No. 1 relay grade 115RE rail.

97. EXECUTION

A. GENERAL:

1. A mill certificate shall be furnished to the Engineer containing the following data:
  - a. The identity of each rail in a charge by heat, ingot, and letter.
  - b. The identity of each equivalent sample by heat.



- c. The dates of all phases of head hardening for each charge.
- d. Ultrasonic Testing Certification
- e. A listing of the accepted and rejected rail in each charge.

98. MEASUREMENT AND PAYMENT

- A. Rail will not be measured for payment.
- B. All costs in connection herewith will not be paid for directly, but will be considered incidental to the item of work to which they pertain.

**RAIL WELDING**

99. DESCRIPTION:

- A. This Section includes specifications for fabricating continuous welded rail (CWR) strings and other welding of running rail, including testing, inspecting, transporting of rail and CWR, and qualifying of welding and welders. Rail welds shall be either of two types:
  - 1. Pressure Welds: Electric flash-butt pressure welding process using a mobile welder.
  - 2. Thermite Welds: Thermite welds shall be used only when mobilization of a portable flash butt pressure welding machine is impractical.
- B. The Contractor shall make its own assessment as to the number of rails to be welded under this Contract, and the number of welds that can be made by any one welding process, based on the information contained in these Specifications and the Contract Drawings.

100. REFERENCE STANDARDS:

- A. AREMA Manual for Railway Engineering, Vol. I, Chapter 4, Specification for Fabrication of Continuous Welded Rail and Specifications for Thermite Welding - Rail Joints.
- B. American Society for Testing and Materials (ASTM)
  - 1. ASTM E 164: Ultrasonic Contact Examination of Weldments.

2. ASTM E 709: Standard Guide for Magnetic Particle Examination.

C. American Welding Society

1. AWS D1.1: Structural Welding Code - Steel

D. American Society for Nondestructive Testing

1. ASNT SNT-TC-1A: Recommended Guidelines for Qualification and Certification of Non-Destructive Testing Personnel.

101. SUBMITTALS:

A. General

1. Refer to Section 105.03 of the Standard Specifications and these Special Provisions for submittal procedures. , Submit the following:
2. Rail handling methods and procedures including equipment to be used in handling rail, with data on equipment performance characteristics.
3. Testing Laboratory: Employ an independent testing laboratory which shall perform indicated weld testing. Submit name and qualification of laboratory and procedure to be utilized in testing.
4. Certification of ultrasonic and magnetic particle testing personnel.
5. Ultrasonic inspection procedure, equipment description, and calibration methods.
6. Procedure for dry powder magnetic particle inspection.
7. Magnetic particle and ultrasonic inspection records for each weld.
8. Inspection records of each weld for straightness according to AREMA requirements.
9. Daily calibration of ultrasonic inspection equipment.
10. Quality Control procedures to be followed.

B. Pressure (Electric Flash-Butt) Welds. Submit the following:

1. A written description of the welding procedure, including facilities, personnel and list of similar completed projects.
2. A list of equipment and calibration methods, method of rail end alignment, method of rail straightening, and a schedule of lengths of rail strings to be fabricated.
3. Welding Machines Performance: Submit pressure welding machine performance standards as provided by the manufacturer. During welding production, a recorder shall be attached to each welding machine to record platen movement and current impulses on the form "Record Of Field Welds", a copy of which is attached to the end of this Specification. A record of machine performance for each weld shall be submitted to the Engineer. If the record indicates performance that is not in conformance with the approved standards, the weld will be considered defective and shall be rejected.
4. Working Drawings: Submit Working Drawings for the pressure welding machine and Working Drawings of the proposed method and equipment for handling and laying CWR. This submittal shall include reference data relating to where the proposed equipment and laying method were previously successfully used.
5. Details of the equipment and procedure proposed for straightening welds if required. The submittal shall include reference data relating to where the proposed straightening equipment and method were previously successfully used.
6. The manufacturers recommended procedure for welding high strength rail if different from requirements for standard rail.
7. Pressure Weld Samples: Before beginning of production welding, six test welds shall be made in accordance to 1.04B using the welding machine and the procedures proposed in the manufacturer's instructions.

C. Thermite Welds. Submit the following:

1. Prior to thermite welding, submit a detailed specification of the proposed method and exact procedure to the Engineer. The method and selected procedure specified shall comply with that of the weld kit manufacturer and shall include the name of the weld kit manufacturer.

102. QUALITY ASSURANCE:

- A. Rail Straightness: The Contractor shall check rail for end straightness before welding. Examine both ends and tops of rails using a 3 foot metal straightedge. Deviations from straight shall be measured with a metal taper gage. Rails which are at or exceed the tolerances in AREMA Chapter 4, Part 2, "Specifications for Steel Rails", Sections 13.3 through 13.5, shall not be welded.
- B. Fabrication of Qualification Sample Pressure Welds and Thermite Welds. Provide sample welds that were produced specifically for this contract or sample welds produced with the previous 12 months that were fabricated with the same equipment and under the direct supervision of the same welding crew field supervisor.
1. Produce three sample thermite welds of each combination of metallurgy; standard to standard, standard to high strength, high strength to high strength for testing.
  2. Prepare samples by the welding crews in accordance with the Contractor's submitted, reviewed, and accepted methods and procedures for rail welding. The supervisor of each welding crew shall be trained and certified by the manufacturer supplying the weld kits and/or pressure welder to perform rail welding. Each welding crew shall perform at least one of each type of the sample welds. Prior to performing welds in the specified work, the welds and each welding crew shall be qualified as specified below.
  3. When the pressure weld machine is returned to production after a period of malfunctioning or major repair, or when the welding crew is replaced, six additional test welds will be required. Acceptance of the welding machine or the new crew shall be after six acceptable welds as above have been produced.
  4. Sample pressure and thermite welds shall be tested by an independent laboratory and the certified test results shall be submitted to the Engineer. Approval of the pressure welder, weld kit, weld specification, and welding crews will be dependent upon the sample welds satisfying the test requirements in this specification. Qualification testing of sample welds shall be as stated herein.
- C. Laboratory Testing of Qualification Sample Welds - The sample welds shall be tested as follows:
1. Visually examine the test welds for cracks. Welds with surface cracks shall be rejected.

2. Radiographic Test: The test samples for pressure weld and thermite welds shall be radiographically tested in accordance with ASTM E 142, "Controlling Quality of Radiographic Testing."
  - a. The radiographic tests shall detect flaws in welds with sufficient detail to establish the ability of the weld to meet the requirements specified herein. If a defective weld is detected, the welding procedure shall be modified and the tests repeated.
  - b. At least four areas of each weld shall be radiographed: the head, the web, and each side of the base. The presence of any cracks or voids shall be cause for rejection.
  - c. Each radiographic film shall be identified, through the use of numbers and letters, to show the Contract Number, the Rail identity, the Date, Inspection Agency, and the View. A letter of certification shall be submitted with each film to the Engineer. The letter shall state the information given on the film and whether the weld meets or fails to meet the requirements specified herein.
  - d. Each weld shall have complete fusion with no evidence of surface or internal cracks or fissures. In thermite welds, porosity or slag inclusion will be tolerated provided that the largest defect does not exceed 1/8 inch in any dimension and the total area of all defects does not exceed 0.06 square inches.
  - e. Nondestructive inspection of metal welds by radiographic use of nuclear by-product materials shall be in accordance with United States Nuclear Regulatory Commission Rules and Regulations, Title 10, Atomic Energy, Part 20, "Standards for Protection Against Radiation." Transportation, handling, and storage of hazardous materials used in nondestructive inspection of welds shall be performed only by or under the supervision of a person of proven experience and ability operating under a proper license.
  - f. The laboratory and procedure to be utilized and radiographic testing shall be submitted to the Engineer for approval.
3. Ultrasonic Test and Magnetic Particle Test: The test samples for pressure and thermite welds shall be ultrasonically tested and tested using the magnetic particle method. Certified test reports shall be forwarded to the Engineer for review. Acceptance criteria shall be in accordance with Article 102.E.

4. Dynamic Test for Sample Rail Welds: One of each type sample weld that has passed the radiographic and ultrasonic testing shall be subjected to the following dynamic testing. The test sample rail weld shall be supported on 36-inch centers with the weld located between supports as shown in Figure 1. Repeated loads shall be applied with two hydraulic rams. Apply loads to the rail alternatively at Points A and B. Each load shall vary from zero to 44,400 pounds in the approximate shape of a sine curve. Loads shall be applied for two million cycles. Application of load at Point A and then at Point B shall constitute one cycle. Rail deflection shall be measured every 500,000 load cycles at Point A and recorded to the nearest 0.001 inch. Loads shall be monitored with load cells placed between each ram and the rail head. These load cells shall be calibrated prior to commencement of the test program.
  - a. Acceptance Criteria: After 2,000,000 cycles, the rail weld joint shall show no evidence of failure by bending. The deflection of the rail shall not exceed 0.065 inch during the test. Deflection shall be measured after every 500,000 load cycles.
  
5. Slow Bend Test for Sample Rail Welds. One of each type sample weld which has passed the radiographic and ultrasonic testing shall be subjected to the Slow Bend Tests described in the AREMA Manual Chapter 4, Part 2, "Specification for the Quality Assurance of Electric Flash-Butt Welding of Rail".
  - a. Acceptance criteria for this test shall be a minimum of 1/2-inch deflection and 125,000 pounds (minimum) per square inch modulus of rupture for thermite welds and a minimum of 3/4-inch deflection and 125,000 pounds (minimum) per square inch modulus of rupture for flash-butt welds.
  
6. Hardness Test for Sample Rail Welds. One of each type sample weld that has passed the radiographic test and ultrasonic test shall be longitudinally cross sectioned for a distance of 6 inches each side of the weld, macroetched, and Rockwell-hardness tested with a 150-kgf diamond sphero-conical penetrator. The sample rail weld shall be tested for hardness vertically and horizontally on the longitudinal section in 1/2-inch increments for 3 inches each side of the centerline of the weld.
  - a. Acceptance shall be the decrease in hardness shall be uniform and coincide with parent rail within a maximum of 2 inches from center of weld. The finished weld throughout shall have Rockwell hardness numbers between 31.2C and 42C on the 45N scale.

7. Should any sample rail welds fail to satisfy the specified requirements, either the welding process or the welding crew, or both, will not be permitted on the project. Should any supervisor of the welding crew be replaced during the work, the welding crew shall be requalified under the new supervisor.

D. Qualification of Testing Technician:

1. Testing shall be performed by a technician certified to have met ASNT procedure SNT-TC-1A, Level II or III qualifications.
  - a. Ultrasonic inspection of welds shall be performed in accordance with ASTM E164. Prior to testing of welds, the technician certified in accordance with ASNT procedure SNT-TC-1A, Level II or III shall be tested to ensure his ability to calibrate the equipment and detect defects in rail.

E. Field Testing of Production Welds: All production flash butt welds and thermite welds shall be tested in the field for defects by visual, magnetic particle and ultrasonic methods as follows:

1. Visual testing by the Contractor shall be in accordance with AREMA standards.
  - a. Acceptance Criteria: Rail weld showing surface cracks shall be rejected.
2. Not used in this project.
3. Magnetic Particle Testing shall be performed on flash butt pressure welds in accordance with ASTM E709. Testing shall be conducted with the rail temperature below 800 degrees F.
  - a. Acceptance Criteria: Particles shall form a regular longitudinal pattern indicating homogeneity of the weld and freedom from defects, surface irregularities and internal discontinuities.
4. Ultrasonic Testing shall be performed on both flash butt pressure welds and thermite welds in accordance with ASTM E164 and the specified procedure and equipment in Articles 101.F and 101.G respectively.
  - a. Acceptance Criteria: Welds shall be free from defect or flaw giving a reflected display of greater than 20 percent of distance-amplitude correction curve at calibration level, or will be as listed in Table 1.

**TABLE 1**  
**MINIMUM ACCEPTANCE LEVELS (DECIBELS)**  
**WELD THICKNESS (in.) AND TRANSDUCER ANGLE**

REFLECTOR SEVERITY	5/16 to 3/4	3/4 to 1-1/2	1-1/2 to 2-1/2		2-1/2 to 4		4 to 6	
	70°	70°	70°	45°	70°	45°	70°	45°
Large Reflectors	+8	+3	-1	+4	-4	+1	-7	-2
	+9	+4	+1	+6	-2	+3	-5	0
Small Reflectors	+10	+5	+3	+8	0	+5	-3	+2
Minor Reflectors								

F. Incorporate the following in the test procedure:

1. Scanning level shall be +20 db minimum.
2. Scan the rail in a zig-zag pattern twisting probe, on one side of the weld only at a rate not exceeding 6 inches per second, so that the full weld is scanned. Each pass shall overlap a minimum 10 percent and the scanning is carried out longitudinally to the rail.
3. Calibrate the equipment at the start and end of each day's work, and at least every four hours during examination, and hourly checks with DSC blocks. If any point on the distance-amplitude curve has been changed by more than 20 percent, all results since last calibration check shall be void and all welds re-examined. If the curve has moved on the sweep line by more than five percent, all non-complying welds since last calibration check shall be re-examined.
4. When a reflection of greater amplitude than the acceptance criteria is found, scan around the full perimeter of the weld from both sides, to ensure full weld coverage and determination of size, type, and location of discontinuity.
5. Make permanent trace recording of discontinuity indications.
6. Paint the rail web at non-conforming welds on both sides across the weld.

G. The following equipment shall be used for ultrasonic testing and documented on a Test Report Form:



1. Ultrasonic, pulsed echo, instrument normally used for inspection of rails with calibrated decibel gain control of minimum 2db increments, operating in the range 1-5 MHz, with CRT screen and scale. Equipment shall be capable of detecting a 3/64-inch discontinuity 6-1/2 inches below top of rail.
  2. Calibrated paper tape recording attachments to record accurately the CRT screen indications when a non-complying weld is located.
  3. 2.25 MHz angle beam transducers 1/2 inch by 1 inch at 70 degrees and 45 degrees.
  4. Suitable high viscosity couplets of good wetting characteristics.
  5. Standard IIW calibration blocks of rail steel for primary reference response and to construct distance-amplitude correction curve, and DSC Blocks of rail steel for calibration checks.
  6. A "calibration rail", a piece 115RE rail, 18 inches long with a 3/64-inch diameter round bottom hole 6-1/2 inches below top of rail and in which other 1/8-inch diameter flat bottom hole patterns have been drilled as shown in Figure 2.
  7. Use an ultrasonic Test Report Form that records 20 inspected welds per sheet. The form shall include the location of the weld in track, the results of the ultrasonic inspection including size of defects found in the head, web or base of rail, shape identity and location of all reflections, trace record, the results of the visual inspection, name of inspector, and other information noted on Record of Field Weld.
- H. Welds found defective by radiographic, ultrasonic, magnetic particle, or visual inspection and rejected by the Engineer shall be cut out and replaced.
- I. Approval of all production flash butt and thermite welds visual, radiographic, magnetic particle and ultrasonic testing results shall be by the Contractor. All testing records shall be submitted and filed as part of Contractor's construction quality control documentations.

### 103. MATERIALS:

#### A. RAIL FOR CONTINUOUS WELDED RAIL:

1. Rail for the Work shall be furnished by the Contractor in accordance with Special Provision (Rail).

B. THERMITE WELDING MATERIALS:

1. Thermite type rail welds shall be formed utilizing one of the following brands of rail welding kits or an approved equal.

a. Thermit Self PreHeat  
As manufactured by:

1) Orgothermite Inc., Rail Services Group  
3500 Colonial Drive  
Lakehurst, New Jersey, 08733  
telephone: 732-657-5781  
fax: 732-657-5899  
web site: <http://www.orgothermit.com/>  
e-mail: [info@orgothermit.com](mailto:info@orgothermit.com) .

b. Delachaux / Boutet  
web site: <http://www.delachaux.fr/anglais/index.htm> ]  
As distributed by:

1) Railtech Boutet, Inc.  
25 Interstate Drive  
Post Office Box 69  
Napoleon, OH 43545  
telephone: 419 592 5050  
e-mail: [rtboutet@aol.com](mailto:rtboutet@aol.com)

2) Matweld, Inc.  
632 South 3rd Street  
Post Office Box 2816  
Paducah, KY 42002  
telephone: (502) 444 0085  
fax : (502) 443 6180  
web site: <http://www.matweld.com/>  
e-mail : [customerservice@matweld.com](mailto:customerservice@matweld.com)

c. Railwel Calorite Welding Procedure

1) As distributed by:  
Les Industries Railwel, Inc.  
175 J. F. Kennedy Boulevard  
St. Jerome, Quebec, J7Y 4B5, Canada  
telephone: 450-565-9100 or 800-667-4709

fax: 450-432-6985 or 800-442-9817

web site: <http://www.railwel.com/>

e-mail: [jprecourt@railwel.com](mailto:jprecourt@railwel.com)

- 2) Represented in the USA by:  
Morrison Metalweld, Inc.  
3685 Stutz Drive  
P.O. Box 519  
Canfield, OH 44406  
telephone: 330.702.5188 or 330.702.5193  
fax: 330.702.5199  
web site: <http://www.morrisonmetalweld.com/>  
e-mail: [morweld@aol.com](mailto:morweld@aol.com) .

2. The rail welding kits used when welding head hardened rail shall conform to the process manufacturer's recommended standard for such work.
3. Prior to selecting the Thermit Weld Kit brand, the weld kit manufacturer shall confirm in writing that the weld finish after grinding as described in Article 103.H is obtainable and guaranteed.

#### 104. EXECUTION:

##### A. REPARATORY WORK FOR ALL WELDS:

1. Rail, which must be cut for any reason, shall be cut square and clean by means of rail saws or abrasive cutting wheels in accordance with AREMA "Specifications for Steel Rails". Torch cutting of rails is prohibited. Rail ends not within 1/32 inch of square shall be cut square.
2. Rails shall conform to the AREMA "Specifications for Steel Rails", for straightness. Rail ends shall show no steel defects, dents, or porosity before welding.
3. Rails shall be straightened cold in a hydraulic press or roller machine to remove twists, waves, and kinks until they meet the surface and line requirements specified herein before. The method of permanent straightening shall be submitted to the Engineer for approval.
4. Rail that cannot be straightened permanently shall be cut back a sufficient distance to achieve the required alignment. Burrs shall be removed. The method of end finishing rails shall be such that the rail end shall not be metallurgically or mechanically damaged.

5. Continuous welded rail strings shall be oriented so that the rail brands are on the field side when placed in final track position.

**B. FABRICATION OF CONTINUOUS WELDED RAIL (CWR) STRINGS:**

1. Welded rail strings shall be of the longest lengths practical to fabricate and handle. String length shall be as required by the track alignment, bolted joint location, and worksite access.
2. A schedule of the placement of rail by its location in track shall be developed. This rail schedule shall consist of a schedule of lengths and designations of welded rail strings to be fabricated and their proposed location in track.
3. The schedule shall indicate which strings or which portions of strings will be high strength rail.
4. The schedule shall indicate the locations of the proposed field cuts, if any. The rail schedule shall minimize thermite welds between standard rails and high strength rails.
5. Designation of the location of rail strings:
  - a. Shall clearly identify location in track by line, survey stationing, track, and rail.
  - b. Shall be marked on the web of both end rails of each string with a paint suitable for application to steel in exterior service.
  - c. The marking shall provide a unique identification for each rail string coordinated with the welding schedule indicating the location of each rail string by rail and track.

**C. PRESSURE WELDING:**

1. Pressure welding shall be in accordance with the AREMA Specification for, "Fabrication of Continuous Welded Rail" except as modified hereinafter.
2. Mismatched or jagged rail ends shall be either sawed or cut with an abrasive rail cutter. Mating mismatched or jagged rail ends by flashing will not be accepted.
3. Rails shall have the scale removed down to bright metal in areas where the welding current-carrying electrodes contact the rail. Grind down raised rail

brands in electrode areas. The weld and adjacent rail for a distance clearing the electrodes shall be rejected if in the areas of electrode contact there is not more than 95 percent of the mill scale removed. Electrode contact areas shall be examined for evidence of electrode burn. Where metal is displaced or where the oxidized areas exhibit checks or small cracks the weld shall be rejected and the rail cut back clear of the electrode burn.

4. Welds shall be forged to point of refusal to further plastic deformation and shall have a minimum upset of 1/2-inch, with 5/8 inch as standard.
5. If flashing on electric pressure (flash butt) welds is interrupted, because of malfunction or external reason, with less than 1/2 inch of flashing distance remaining before upsetting, rails shall be re-clamped in the machine and flashing initiated again.
6. Whenever possible, grinding shall be accomplished immediately following welding at an elevated temperature. When grinding must be done at ambient temperature, care shall be taken to avoid grinding burns and metallurgical damage.
7. Alignment of rail in the welding machine shall be at the head of the rail.
  - a. Vertical alignment shall provide for a flat running surface. Any difference of height of the rail shall be in the base.
  - b. Horizontal alignment shall be accomplished in such a manner that any difference in the width of heads of rails shall be divided equally on both sides of the head. Where the difference, when divided, exceeds 0.040 inch, 0.020 inch of the difference shall be placed on the gage side and the remaining differences in the width of heads shall be on the field side.
  - c. Horizontal offsets shall not exceed 0.040 inch at the head and/or 0.125 inch at the base.
8. Surface and Gage Misalignment Tolerances: Shall meet the alignment tolerances given in the AREMA Manual, Chapter 4, Part 2, "Tolerances for Inspection of Welded Rail New and Mainline Relay Rail".
9. If, at any time, 7 or more of a series of 12 consecutive welds made on one machine exceed 75 percent of the stated surface misalignment tolerances that machine shall be shut down and adjusted before work continues.
10. Re-welds shall be cut out beyond the heat-affected zone of the previous weld. Minimum crop distance from the center of the weld shall be 18 inches.

#### 11. Weld Finishing:

- a. A finishing deviation of the parent section of the rail head top surface shall not exceed plus 0.010 inch of the lowest rail.
- b. The sides of the rail head weld shall be finished to plus 0.010 inch minus 0.000 inch of the parent section. The top and bottom of the rail base shall be finished to within 0.010 inch of the lowest rail.
- c. The web zone including the underside of the head, the web, and both fillets on each side, shall be finished to within plus 0.090 inch to plus 0.010 inch of the parent section. Finishing grinding shall eliminate all cracks.
- d. Notches created by minor offset conditions, twisted or misshaped rails shall be eliminated by minimum grinding to blend the variations.
- e. Fins on the weld due to grinding or shear drag shall be removed prior to final inspection.

#### D. PRODUCTION, INSPECTION, AND TESTING OF PRESSURE WELDS:

1. A chart recorder shall be used to monitor significant welding parameters. The recorder shall identify each weld in each string. In addition, the rail schedule designation for each string shall be included on the recording with a notation to indicate the beginning and ending of each CWR string. Each recorder employed shall be calibrated daily. Recordings shall be filed as part of Contractor's quality control documentation and be submitted to the Engineer.
2. Contractor shall inspect all pressure welds by the dry powder magnetic particle method in accordance with ASTM E 709. Subsequently, inspect pressure welds radiographically and ultrasonically in accordance with Article 102.E of this Section.
3. Contractor shall inspect pressure welds in accordance with the AREMA Specifications.
4. Defective pressure welds shall be repaired immediately during production. Other defective weld findings shall be repaired as specified in Article 104G, Repair of Defective Welds.

5. Hardness - The hardness of the weld measured on the head of the rail in the center of the weld and the heat affected zone shall be equal to the Brinell hardness of the parent metal with a tolerance of plus or minus 30 Brinell Hardness Numbers. The Brinell hardness of the parent metal shall be from the rail test records provided by the mill/rail manufacturer. One weld out of each 10 will be selected at random by the Engineer for Brinell Hardness testing by the Contractor's approved Testing Technician.
6. Weld testing shall be carried out by an independent testing laboratory at the expense of the Contractor. The testing service and their testing program and procedures are subject to approval as specified in Article 102 of this Section.
7. The testing service shall certify whether or not each weld meets the quality acceptance criteria detailed and the Contractor shall submit reports directly to the Engineer. At the time of testing, the testing service shall mark their findings as to acceptability or rejection on the weld itself. Welds inspection and testing reports will be submitted and filed as part of construction quality control documentation.
8. Identifying Pressure Welds and Rail Strings: At the completion of welding each string of CWR, a record shall be submitted to the Engineer documenting production of the string. Included shall be the heat numbers of the first and last pieces of rail in the string, the number of welds in the string, the heat numbers of rail on each side of welds which have been cut out and re-welded, a record of machine performance for each weld, and reports for magnaflux and ultrasonic testing. Reports shall be bound in pad or notebook form for ease of handling and retention as permanent record.

#### E. THERMITE WELDING:

1. All Contractor's welding personnel performing thermite welding shall be certified by the weld kit manufacturer.
2. Except at Special Trackwork locations, thermite welds shall not be located at the locations specified in Special Provision (General Track Construction Requirements) Article 46.C.
3. Bolt holes and handling holes shall not be permitted to remain in the ends of the rail to be welded. Rail ends containing such holes shall be cut off during track construction.
4. Preparation of Rail Ends: Rail ends shall be either saw-cut or ground at right angles to the rail to provide a smooth and clean surface. The surface of the rails for a length of approximately 6 inches from the end of the rails shall be

cleaned by grinding to remove all grease, dirt, loose oxide, oxidized metal, scale, and moisture. Burrs and lipped metal, which would interfere with the fit of the mold, shall be removed.

5. **Weld Gap:** At the time of thermite welding, the rails shall have the rail gap recommended by the manufacturer of the weld kit and shall be aligned to produce a weld which, with respect to alignment, shall comply with the AREMA specifications. If the rail gap is larger than the manufacturer's recommended gap after the rails have been adjusted for zero thermal stress, then sufficient rail shall be removed from one or both rails to permit insertion of a rail not less than 19 feet long which shall provide the recommended gaps at each end for field welding. At a location where the rail gap is smaller than the manufacturer's recommended gap, the recommended gap shall be obtained by sawing a piece from one rail.
6. **Thermite Weld Preheating** - The rail ends shall be pre-heated prior to welding to a sufficient temperature and for sufficient length of time as indicated in the approved welding procedure to ensure full fusion of the weld metal to the rail ends without cracking of the rail or weld.
7. **Thermite Weld Postheating** - The molds shall be left in place after tapping for sufficient time to permit complete solidification of the molten metal and proper cooling to prevent cracking and provide a complete weld with proper specified hardness and ductility.
8. **Weld Finish:** Rail shears shall be used to trim upset weld metal from the rail after removal from the mold. Trimming and grinding of the weld shall result in the weld being within the following tolerances:
  - a. The top, field and gage side of the rail head shall be finished to within plus 0.010 inch minus 0.000 inch of the parent section. The top and bottom of the rail base shall be finished to within 0.010 inch of the lowest rail.
  - b. The remainder of the rail weld shall be finished to within plus 0.090 inch to plus 0.20 inch of the parent section. Finishing shall eliminate cracks visible to the unaided eye.
  - c. Notches created by offset conditions shall be eliminated by grinding to blend variations. Protrusions and gouges in the welded area shall be removed, and the weld area shall be blended into the rail contour by grinding in a manner that will eliminate fatigue crack origins. Defects visible to the unaided eye shall be removed by grinding, except that if removal by grinding cannot be accomplished without damaging the rail,



the weld shall be removed. Grinding pressure that would overheat the rail surface shall not be permitted.

- d. Heavy grinding of the weld shall be completed while the weld is still hot from welding.
9. Contractor shall inspect that thermite welds ultrasonically in accordance with Article 102.E herein before. Contractor shall certify whether or not each weld meets the quality acceptance criteria. Thermite welds inspection and testing reports will be submitted and filed as part of construction quality control documentation.
10. Defective thermite welds, as specified in Article 104.F, Defective Thermite Welds, shall be repaired as specified in Article 104.G, Repair of Defective Welds.

F. DEFECTIVE THERMITE WELDS:

1. Defective thermite welds shall be determined as follows:
  - a. Weld quality, finishing alignment not in accordance with the above mentioned standards.
  - b. Welds showing a response at any level that is identified as a crack or lack of fusion will not be acceptable.
  - c. Welds showing a response that is less than 50 percent of the primary reference level will be acceptable.
  - d. Welds showing a response greater than 50 percent but that do not exceed the primary reference level will be acceptable, provided that the following apply:
    - 1) The defects are evaluated as slag or porosity.
    - 2) The largest defect does not exceed 0.180 inch in its largest dimension.
    - 3) The total area of the defects does not exceed 0.009 square inch.
    - 4) The sum of the greatest dimension of defects in a line does not exceed 3/8 inch.

- e. Welds showing a response that exceeds the primary reference level will not be acceptable.

G. REPAIR OF DEFECTIVE WELDS:

1. Pressure welds in rail rejected during final track inspection or testing by Rail Defect Car or thermite welds in rail rejected during inspection or testing shall be cut out and rewelded if possible, or replaced with at least a 19-foot rail welded in its place by two thermite welds in accordance with these Specifications.
2. Special Thermite Welds
  - a. Should a defective thermite weld replacement using an inserted piece of rail and two welds not be practical because of limitations due to precurved rails or adjacent special trackwork parts, the Contractor shall cut out the defective weld and replace it with a special wide thermite weld. Prior to use in track, this special weld shall be tested and accepted as in Article 102 above.

105. MEASUREMENT AND PAYMENT:

- A. Rail Welding will not be measured for payment.
- B. All costs in connection herewith will not be paid for directly, but will be considered incidental to the item of work to which they pertain.

**RECORD OF FIELD WELDS**

**DATE:** \_\_\_\_\_

**TIME:** \_\_\_\_\_

**TRACK DESIGNATION:** \_\_\_\_\_

**LOCATION: STA.** \_\_\_\_\_ **TO STA.** \_\_\_\_\_ **(LT.RT)**

**RAIL SECTION:** \_\_\_\_\_ **115RE** \_\_\_\_\_ **OTHER:** \_\_\_\_\_

**MILL BRAND:** \_\_\_\_\_

**YEAR ROLLED:** \_\_\_\_\_ **(AHEAD)** \_\_\_\_\_ **(BACK)**

**HEAT NUMBER:** \_\_\_\_\_ **(AHEAD)** \_\_\_\_\_ **(BACK)**

**TYPE OF RAIL:**    **HEAT-TREATED**        **CONTROL-COOLED**    **(CIRCLE)**

**RAIL CUT REQUIRED:** \_\_\_\_\_ **(YES)** **(NO)**

**MANUFACTURER OF FIELD WELD KIT:** \_\_\_\_\_

**AIR TEMPERATURE:** \_\_\_\_\_

**RAIL TEMPERATURE:** \_\_\_\_\_

**WEATHER CONDITION:** \_\_\_\_\_

**RAIL GAP (NEAREST 1/16 INCH):** \_\_\_\_\_

**TRACK ALIGNMENT AND CONSTRUCTION:** \_\_\_\_\_  
**(Curve, Tangent, Grade, Etc.)**

**NAME OF ENGINEER OR REPRESENTATIVE PRESENT:** \_\_\_\_\_

**NAME OF CONTRACTOR'S FOREMAN PRESENT:** \_\_\_\_\_

**NAME OF MANUFACTURER'S REPRESENTATIVE PRESENT:** \_\_\_\_\_  
**(Initialed by those present)**

**RECORDER:** \_\_\_\_\_

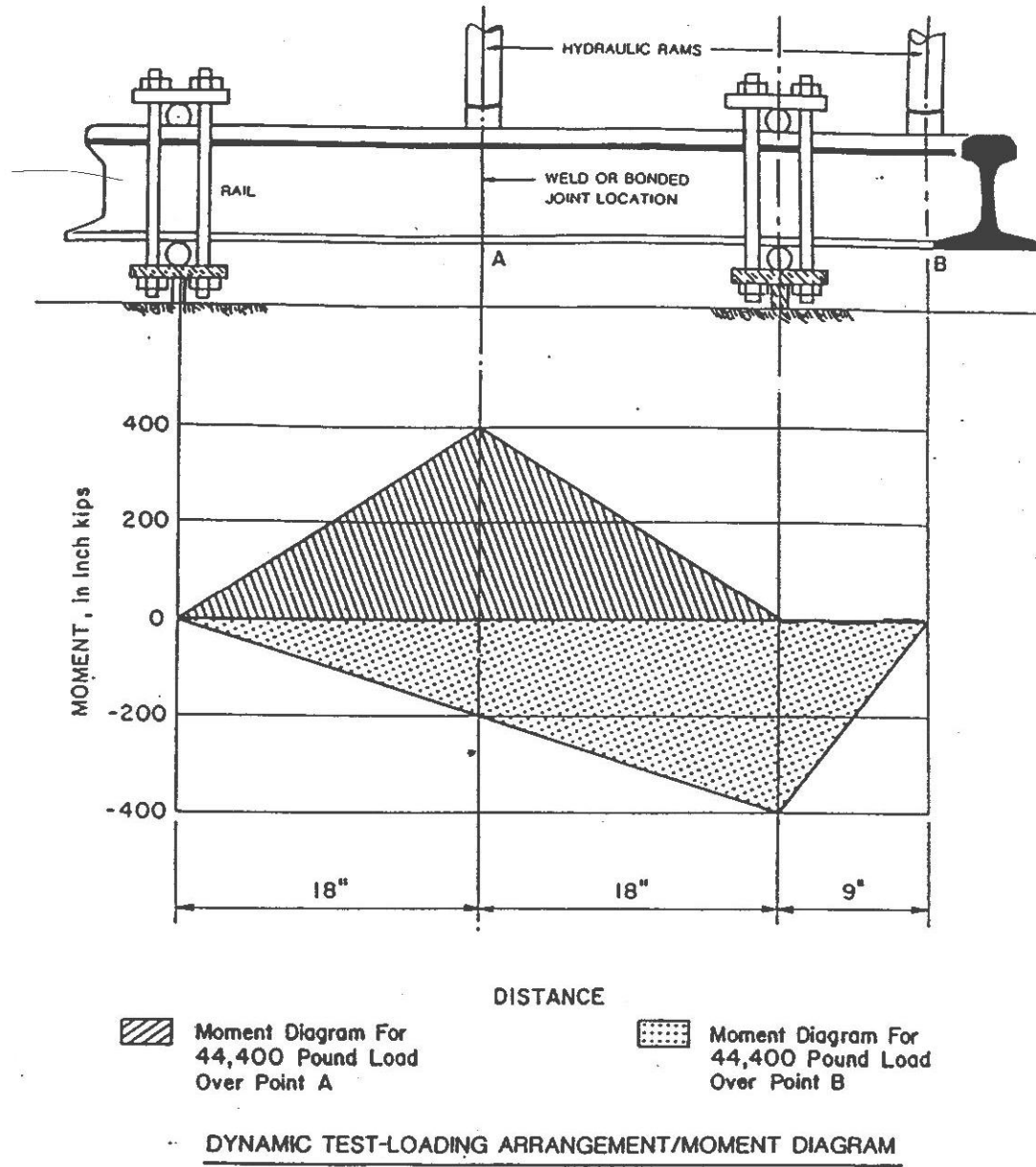


FIGURE 1: DYNAMIC TESTING OF RAIL WELDS

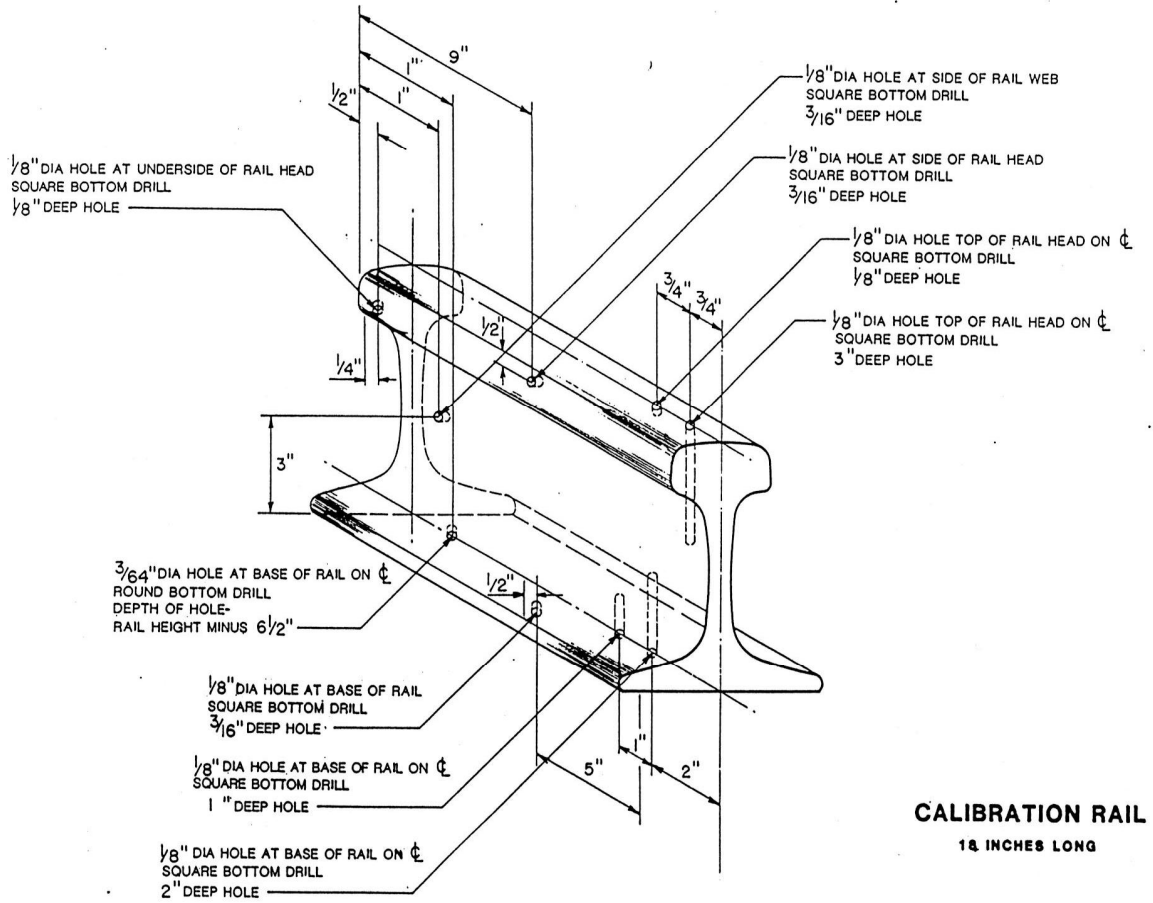


FIGURE 2: CALIBRATION RAIL

**DIRECT FIXATION RAIL FASTENERS**

105 DESCRIPTION:

- A. Work under this Section covers furnishing all labor, materials, and equipment for the manufacture, testing, fabrication and delivery of direct fixation rail fasteners as specified, and as otherwise required for the proper and timely completion of the Work of the Contract.
- B. This Section governs only the procurement of Direct Fixation Rail Fasteners for the Project, including fasteners, anchor bolts, inserts, washers and rail clips. Installation of the rail fasteners shall occur under Special Provision (Direct Fixation Rail Construction)
- C. The Contractor shall be fully responsible for integration and optimization of the design of the rail fastener system described herein, in accordance with the technical provisions of this Contract. Interface concerns shall be resolved by the Contractor or, if resolution is not possible, refer to the Engineer for direction.

106 REFERENCED STANDARDS:

Current editions as of the date of advertisement of this Contract

- A. American Railway Engineering and Maintenance-of-way Association (AREMA, formerly AREA): *Manual for Railway Engineering* and the *Portfolio of Trackwork Plans*.
- B. American National Standards Institute (ANSI):
  - ANSI B1.1 - *Unified Inch Screw Threads (UN and UNR Thread Form)*
  - ANSI B1.3 - *Screw Thread Gaging Systems for Dimensional Acceptability - Inch and Metric Screw Threads (UN, UNR, UNJ, M and MJ)*
  - ANSI / ASME B18.2.1 - *Square and Hex Bolts and Screws*
  - ANSI B18.21.1 - *Lock Washers*
  - ANSI B18.22.1 - *Plain Washers*
- C. ASTM International (formerly American Society for Testing and Materials) 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959  
<http://www.astm.org> ASTM Customer Service: [service@astm.org](mailto:service@astm.org) .
  - ASTM A36 *Standard Specification for Structural Steel*
  - ASTM A123 *Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products*
  - ASTM A148 *Standard Specification for Steel Castings, High Strength, for Structural Purposes*
  - ASTM A325 *Standard Specification for Structural Bolts, Steel, Heat Treated,*

*120/105 ksi Minimum Tensile Strength*

ASTM A449 *Standard Specification for Quenched and Tempered Steel Bolts and Studs*

ASTM A536 *Standard Specification for Ductile Iron Castings*

ASTM A615 *Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement*

ASTM A730 *Standard Specification for Forgings, Carbon and Alloy Steel, for Railway Use* (Specification withdrawn by ASTM during 2004)

ASTM B117 *Standard Test Method for Salt Spray (Fog) Testing*

ASTM B633 *Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel*

ASTM B695 *Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel*

ASTM C31 *Standard Practice for Making and Curing Test Specimens in the Field*

ASTM C39 *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*

ASTM D149 *Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies*

ASTM D256 *Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics*

ASTM D395 *Standard Test Methods for Rubber Property - Compression Set*

ASTM D412 *Standard Test Methods for Rubber Properties in Tension*

ASTM D429 *Standard Test Methods for Rubber Property - Adhesion to Rigid Substrates*

ASTM D471 *Standard Test Method for Rubber Property - Effect of Liquids*

ASTM D518 *Standard Test Method for Rubber Deterioration - Surface Cracking*

ASTM D573 *Standard Test Method for Rubber - Deterioration in an Air Oven*

ASTM D638 *Standard Test Method for Tensile Properties of Plastics*

ASTM D621 *Test Methods for Deformation of Plastics Under Load* (Specification withdrawn by ASTM during 1994, but often cited in manufacturer's literature)

ASTM D648 *Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position*

ASTM D695 *Standard Test Method for Compressive Properties of Rigid Plastics*

ASTM D746 *Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact*

ASTM D1149 *Standard Test Method for Rubber Deterioration - Surface Ozone Cracking in a Chamber*

ASTM D1229 *Standard Test Method for Rubber Property - Compression Set at Low Temperatures*

ASTM D1248 *Standard Specification for Polyethylene Plastics Molding and Extrusion Materials*

ASTM D1505 *Test Method for Density of Plastics by the Density-Gradient Technique*

ASTM D1525 *Standard Test Method for Vicat Softening Temperature of Plastics*

ASTM D1531 *Standard Test Methods for Relative Permittivity (Dielectric Constant) and Dissipation Factor by Fluid Displacement Procedures*

ASTM D1566 *Standard Terminology Relating to Rubber*

ASTM D1693 *Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics*

ASTM D2240 *Standard Test Method for Rubber Property - Durometer Hardness*

ASTM D5992 – *Appendix X5 – Guide for Dynamic Testing of Vulcanized Rubber and Rubber-Like Materials Using Vibratory Methods*

ASTM E23 *Standard Test Methods for Notched Bar Impact Testing of Metallic Materials*

ASTM G101 *Standard Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels*

D. Rubber Manufacturers Association, Inc. (RMA):

RMA Publication - *Rubbers Handbook*

E. Society of Automotive Engineers (SAE):

SAE J429 *Mechanical and Material Requirements for Externally Threaded Fasteners*

F. SSPC: The Society for Protective Coatings (formerly Steel Structures Painting Council):

SSPC Vis 1 *Guide to Pictorial Surface Preparation Standards for Painting Steel Surfaces*

SSPC Surface Preparation Commentary Section 7 *Visual Standards.*

SSPC Surface Preparation Commentary Section 11 *Degree of Cleaning*

107. DEFINITIONS:

Wherever in this specification the following terms are used, the associated definition shall apply unless the context of the sentence clearly indicates otherwise.

- A. “Direct fixation rail fastener”, “direct fixation fastener”, “fastener” or similar language shall mean the entire direct fixation rail fastener assembly consisting of a fastener body, anchorage assemblies, rail hold-down assemblies, and any other parts necessary for a complete installation.



- B. “Anchorage assemblies” or similar language shall mean all anchor bolts, inserts, washers, lock washers, and other hardware used to anchor the fastener body to a concrete invert.
- C. “Rail hold-down assemblies”, “rail clips”, “spring clips”, “elastic rail clips”, or similar language shall mean the clips used to hold a rail on the fastener body and provide resistance against rotational and uplift forces applied to the rail and longitudinal movement of the rail.
- D. “Steel”, “steel plate” or similar language shall be interpreted to mean a fastener body component made of ferrous metal which can be composed of either rolled or forged steel or ductile iron.
- E. The term “fastener set”, as used during fastener qualification testing and production testing, shall mean two complete direct fixation rail fasteners being tested in tandem so that the fasteners are sharing the test load.

#### 108. SYSTEM DESCRIPTION:

##### A. General System Configuration

1. The direct fixation rail fasteners shall be composed of the following primary elements:
  - a. Fastener Body: Either of the following, subject to successful qualification testing:
    - 1) A fastener body which has a steel top plate for support of the running rail and securing of elastic rail clips, a steel base plate for distribution of vertical loads to a concrete substructure, and an elastomeric element between them which is bonded to both metal elements during the elastomer vulcanization process.
    - 2) A configuration with the elastomer laterally contained on all sides (as seen in plan view) by a steel frame, with the bottom surface of the elastomer bearing directly on the track concrete, and including a ferrous top plate that is at least partially contained within the same casting.
  - b. Regardless of general configuration, the elastomer shall be bonded to the surface of all other metal components of the fastener body with which it comes in contact.

- c. Two elastic (“spring”) rail clips, one on each side of the rail, for securing the running rail to the metal top element of the fastener body.
  - d. Two anchorage assemblies, comprised of female anchorage inserts for embedment in the concrete trackbed, anchor bolts for securing the fastener to the concrete trackbed, and an adjustment feature to enable the fastener to be laterally repositioned in a direction perpendicular to the rail.
  - e. Hot-dip galvanized A36 steel shims used for height adjustment, and placed between the fastener base and the concrete trackbed to be provided and installed by others.
2. Provide rail fastener comprised of as few components as is economically and technically practical for ease of assembly, disassembly and maintenance. Design rail fastener to permit installation and replacement of the entire assembly or any of its components by one track worker using standard, conventional hand tools.
  3. The new replacement direct fixation rail fasteners need not share any dimensional characteristics with the original Landis fasteners.
  4. Anchorage assemblies for the replacement fasteners shall be in the opposite quadrants of the rail fastener plan from the location of the anchor bolts on the existing Landis fasteners. No existing anchorage assemblies will be re-used. As a result, the new fasteners will be compatible with right-hand rail clips.
  5. See the contract drawings for fastener dimensional requirements.

#### C. Design Functional Requirements

1. The direct fixation fasteners shall have the following primary functions
  - a. Provide vertical and lateral stability to the rail.
  - b. Incorporate rail hold down assemblies that restrain rail from movement in the longitudinal direction.
  - c. Attenuate vibration energy transmitted to the concrete structure and dampen rail vibration.
  - d. Electrically insulate rail from trackbed.

2. Service Life - Design direct fixation rail fasteners to have a service life not less than 25 years under the loading and environmental conditions of the project site.
3. Direct fixation rail fasteners shall be designed to match the installation configurations shown on the contract drawings.
4. The track on which these fasteners will be used is used by freight and passenger trains operated by the New England Central Railroad and Amtrak respectively. Based on a projection of typical traffic types and frequencies through the Project Area the direct fixation fasteners are expected to endure to the following service loading conditions:
  - a. Average wheel loads per year: 0.50 million
  - b. 90th Percentile Dynamic Wheel Load: 30 kips
  - c. 99th Percentile Dynamic Wheel Load: 42 kips
  - d. 99.9th Percentile Dynamic Wheel Load: 58 kips
5. Consider longevity of the fastener under this loading environment to be of paramount importance in meeting the requirements of this specification. In the event that design provisions contained herein are inconsistent with the stated service life and loading conditions, notify the Railroad and seek clarification of requirements.

#### D. Dimensional Requirements

1. Design direct fixation rail fastener for use with 115RE rail.
2. Fastener shall impart a 1:40 cant to the rail when placed on a level surface.
3. Length and Width:
  - a. Design the fastener so that it can fit entirely on a plinth of the dimensions shown on the contract drawings.
  - b. Physically asymmetrical fasteners shall have the long side of the fastener body clearly marked in letters not less than ½ inch high.
4. Vertical

- a. The overall distance between the top surface of the concrete track bed supporting the fastener and the base of the rail with the rail fastener in the installed position shall be between 1-1/2 inches and 2-1/4 inches, exclusive of a maximum 1/2 inch base shim.
- b. No portion of the completely assembled fastener, including rail clips and anchor bolts, shall extend any higher than 4 inches measured vertically from the base of rail at the rail centerline

5. Dimensional Tolerances

- a. Length and width: Plus or minus 1/16 inch;
- b. Thickness: Plus or minus 1/32 inches;
- c. Squareness: Plus or minus one degree;
- d. Centering of holes: Plus or minus 1/32 inch;
- e. Diameter of holes: Plus or minus 1/32 inch;
- f. Rail seat uniformity and flatness: +/- 1/64 inch maximum deviation from flat

E. Rail Restraint

1. Lateral - Fasteners shall provide on each side of the rail base a positive means of preventing more than a total of 1/8-inch total lateral movement of the rail base relative to the fastener in event of failure or loosening of one or both elastic rail clips.
2. Longitudinal - The rail fastener shall provide zero longitudinal restraint to the rail.
3. Symmetry - The fastener shall be designed so that the longitudinal and lateral rail restraint properties shall be uniform in all directions, i.e., longitudinal restraint shall be identical in both directions along the axis of the rail centerline and lateral restraint shall be uniform in both directions perpendicular to the plane formed by the vertical axis of the rail.

F. Adjustability

1. All requirements of this Section shall be satisfied for all increments of fastener adjustment.

2. Lateral Adjustment - Each rail fastener shall provide a means of lateral adjustment having a minimum range of plus or minus 1/2 inch (total of 1 inch) in increments of 1/8 inch.
  - a. Provide lateral adjustment integral with the anchorage assemblies. Do not provide lateral adjustment at the rail hold-down assemblies.
  - b. Do not use friction alone as a means of holding adjustment.
  - c. Furnish each rail fastener with all components required for all specified increments of lateral adjustment. Design rail fastener so that lateral adjustment of rail for specified increments is made by a method that does not require substitution or addition of component to fastener, and does not require the movement of an anchor bolt laterally.
  - d. If serrations are used for lateral rail adjustment, not fewer than three interlocking serrations shall be engaged in any position of lateral adjustment. Provide a minimum of three linear inches of serration engagement per anchor bolt assembly. Serrations shall have a minimum profile of 1/10" wide by 1/10" high and shall project above the top surface of the bottom plate. Serrations that project into the plate or are positioned vertically along the edges of an adjustment slot are not acceptable.
- 3 Vertical Adjustment
  - a. Vertical rail adjustment design capability shall include a maximum of 1/2 inch in 1/16 inch increments, provided by steel shims to be furnished by others.

#### G. Vibration Attenuation

1. Design rail fastener to attenuate vibration transmitted by vehicle operation on the rail to the concrete trackbed by attenuating lateral and vertical vibration forces transferred to the concrete surface supporting this fastener and the anchor bolts.
2. Design rail fastener to reduce peak wheel static loads transmitted to the fastener.
3. Fully bond the elastomer used to achieve vibration attenuation to both the top plate and the bottom plate or frame of the fastener body. Do not use separate elastic washers under the anchor bolt, separate resilient pads between rail base

and the fastener rail seat or separate resilient pads between the fastener base and concrete trackbed, or any other non-bonded elastomeric element, other than the shims.

4. The attenuation performance of the fastener shall not be compromised in any position of lateral adjustment.
5. The vertical spring rate of the rail fastener shall be as specified in Paragraph 115.B.1 of this Section.

#### H. Electrical Isolation

1. The fastener shall provide an electrical surface leakage distance of not less than 1-1/2 inches measured from the grounded portion of the fastener to the charged portion by the most direct path that does not pass through an insulating material, and not less than 1/4 inch when measured passing through an insulating material.
2. Meet insulation requirements within the elastomeric portion of the fastener body. Do not provide separate or detachable insulating components such as rail base pads or spring clip insulators.
3. Recesses in the fastener shall be free draining in all positions of lateral adjustment and at maximum track superelevation of 2 inches. Fastener surfaces shall be resistant to conductive oil and dirt buildup and facilitate effective periodic cleaning by track maintenance equipment and personnel.

#### I. Component Requirements

1. Fastener Body
  - a. Rail fastener body shall consist of an elastomer element sandwiched and bonded between two steel components: a top element not less than 1/2 inch thick in the rail seat area and a bottom element. If a continuous plate is used for the bottom element, the plate shall be at least 3/16 inch thick throughout.
  - b. The elastomeric material shall be fully cured and bonded by vulcanization.
  - c. The fastener assembly rail seat shall be solid steel or ductile iron casting and continuous across the full width of the fastener.

- d. Bearing: The underside of the fastener base shall be a flat plane and without projections into the concrete surface supporting the elastomer. The base uniformity shall be within +/- 1/32 in. deviation from flat. Design rail fastener so that the top plate of fastener has full bearing on elastomer. Elastomer may bear directly against the concrete or shim. In this case the elastomer shall engage the concrete or shim with approximately 0.02 in. +/- 0.01 in. precompression when installed in track to damp rail vibration propagation.
  - e. Welding shall not be used in the fabrication or assembly of any fastener body component.
  - f. The bottom plate and top plates of the fastener shall include keying, peg and socket, or turned up bottom plate edges such that loss of elastomer bond does not result in complete loss of the fastener's ability to hold line and track gauge. The stability of the fastener in any direction shall not be dependent solely upon the strength the bonding of the elastomer to metal.
  - g. Exposed metal surfaces on the sides of the fastener shall be covered by at least a 1/8 inch thickness of the same elastomer as used in the fastener body. The elastomer covering shall be securely bonded to the metal surfaces during the same vulcanization process as the rest of the elastomer. Neither the rail seat nor the bottom bearing surface shall be covered with elastomer, except 1/32 inch maximum thickness of elastomer surface flash will be allowed to extend 1/2 inch maximum from edges onto elastomer-free surfaces.
2. Elastomer Component of Fastener Body
- a. Determine all dimensions affecting the shape of the elastomer in the rail fastener to ensure complete conformance to the specified physical requirements.
  - b. Compressive Strain on Elastomer: Design fastener so that the compressive strain on the elastomer measured as the deflection of the top plate relative to the bottom plate divided by the average separation between the top and bottom plates does not exceed 25 percent of its unloaded thickness for a load of 15,000 pounds per fastener applied vertically to the rail during the vertical load test.
  - c. Elastomer Fatigue Life: Elastomer shall be compounded and molded to achieve a 25-year minimum service life under the loading conditions specified. Demonstrate that stresses in rubber are within acceptable endurance limits. Such documentation may include but not be limited to

engineering calculations, further supported by finite element analyses, at the discretion of the Engineer.

- d. The anchorage assembly shall directly retain the bottom plate to the concrete surface supporting the base of the fastener.
- e. The anchorage assembly shall not restrain top plate motion relative to the base of the fastener.
- f. Pre-compression of the elastomer by the anchorage assembly when the anchor bolts are tightened to the design installation torque shall not be permitted except as specified above with respect to elastomer bearing directly against the concrete or shim:

### 3. Rail Hold Down Assemblies

- a. The primary component of the rail hold-down assembly shall be a threadless, detachable elastic rail clip as specified in Article 114 of this Section.
- b. No lateral adjustment shall be permitted in the rail hold-down component area.
- c. Threaded elements shall not be used in the rail clip assembly.
- d. The elastic rail clip shall be installed into a fixed shoulder that is an integral part of the fastener top plate.
- e. Shoulders to help hold the rail to line and gauge shall be integrally cast with the metal top element along the entire rail bearing surface and shall be set parallel on both sides of the rail base.
- f. The rail fastener shall permit the release of the rail clips so that the rail may be removed by lifting it vertically until it is completely free of the fastener without disturbing the horizontal or vertical alignment or location of the fastener body.

### 4. Anchorage Assemblies

- a. Provide four anchorage assemblies with each direct fixation rail fastener including bolts, lock washers, adjustable lateral plate washers and anchor inserts for securing the rail fastener to the concrete track bed.
- b. Anchor Inserts



- 1) Provide embedded female threaded anchor inserts for 7/8-inch anchor bolts to secure the rail fastener to the concrete track bed as specified in Article 114 of this Section.
  - 2) Design anchor inserts to be installed in existing concrete by coring and grouting. Grout material shall be as specified in Article 114 of this Section.
  - 3) Anchor inserts shall be of sufficient length to achieve adequate embedment length in the second pour plinths.
- c. Anchor Bolts:
- 1) The anchor bolts shall be symmetrically located with respect to the fastener centerline taken perpendicular to the rail.
  - 2) The anchor bolt length shall be sufficient to provide not less than 1-1/2 inches of thread engagement in the anchor insert with or without 1/2 inch maximum shimming of the fastener above the concrete trackbed.
- d. Bonding of the rail fastener to the concrete trackbed or any leveling pad shall not be permitted.

109 SUBMITTALS:

A. Contractor's Shop Drawings and Data:

1. Unless otherwise specified, each submittal shall consist of 1 reproducible and 10 legible copies, or 3 sample sets, as applicable.
2. Each submittal shall contain, at a minimum, the following:
  - a. Submittal Number
  - b. Contract Number and Title
  - c. Name of Contractor
  - d. Identification of material, equipment, or work represented, reference to Specification Section(s), and location in the Work
  - e. Name of Manufacturer including Model Number or Brand, as applicable

- f. If a drawing, Drawing Number, Title, Date, and Revision Number
  - g. Where required, the name, registration number, and seal of the Licensed Professional Engineer who prepared the submittal
3. Shop Drawings shall show the general arrangement, bill of materials, detailed dimensions, material composition of components and other such details as necessary to evaluate the proposed fastener assembly for fit and for compliance with the specifications. The scale shall be sufficient to show the aspects of each item and its method of connection.
  4. Contractor's Shop Drawings furnished under this Section may be no smaller than 11 inches by 17 inches and no larger than 22 x 34 inches. All shop drawings shall be the same sheet size. On each drawing, provide a 3 inch square blank area, located near the title block, for placement of the review disposition stamp.
  5. Submit all drawings, data and schedules in accordance with the specified time requirements. If time requirements are not specified, submit in timely manner to permit no less than 21 days for appropriate review by the Engineer.

B. Samples:

1. Unless otherwise indicated, submit not less than two identical samples of the direct fixation fastener with associated hardware.
2. Label each sample indicating:
  - a. Contract Name and Project Number.
  - b. Name of Contractor and Subcontractor.
  - c. Material or Component and Brand.
  - d. Reference Specifications Section and Article Number.
3. Mail under separate cover a letter in triplicate submitting each shipment of samples. Enclose a copy of the letter with the shipment.

C. Quality Assurance / Control Submittals

1. Design Data

- a. Provide written certification from the manufacturer of the elastic rail clips that they have reviewed and approved the proposed configuration of the shoulder component of the direct fixation rail fastener body and will warrant the performance of their elastic rail clips in the overall direct fixation rail fastener system proposed.
2. Test Reports - Provide written reports of all Qualification Testing and Production Testing.
3. Certificates - Provide certificates of compliance for products furnished.
- D. Manuals - Compile consolidated manuals incorporating all relevant manufacturers' data for the direct fixation rail fasteners, including the anchorage and rail hold down assemblies. Include in this manual instructions to railroad maintenance personnel for installation, maintenance, adjustment and removal of fasteners.
- E. Closeout Submittals - Provide project record documents prior to Final Inspection.

110 QUALITY ASSURANCE:

- A. Develop and maintain a Quality Control Work Program which shall include, at a minimum, all qualification and production tests contained herein. Address qualification and production tests separately. Quality Control Work Program shall describe any proposed refinements to or deviation from the test program described herein.
- B. Keep complete records of all inspection Work by the Contractor available to the Engineer during the performance of the Contract; and to such other agencies and for longer periods as may be specified elsewhere in the Contract.
- C. Testing Laboratory Criteria:
  1. Testing shall be performed by an independent testing laboratory. The same testing laboratory, using the same equipment and, to the degree possible, the same testing personnel, shall be used for both qualification testing and production testing.
  2. Use only a laboratory that has been accepted by the Engineer. Laboratory shall meet the requirements of the American Association for Laboratory Accreditation [[www.a2la.org](http://www.a2la.org)] An independent testing laboratory shall be a member of the American Council of Independent Laboratories

[[www.acil.org](http://www.acil.org)].

3. The selected laboratory shall use the proper equipment and qualified testing personnel for elastomeric and metal material and assembly performance testing such as are described in this Section. Approval is required by the Engineer prior to qualification testing. Submit the following information:
    - a. The name and address of the laboratory.
    - b. A description of the facilities and testing equipment that will be assigned for this testing. Testing equipment shall be certified to be in good operating condition, of adequate capacity and range, and accurately calibrated. Testing equipment calibrations shall be traceable to the National Institute of Standards and Technology within one year immediately preceding the test date.
    - c. The names, experience, and qualifications of the personnel that will be assigned for this testing, and
    - d. A list of experience in testing other fasteners or fastener-like assemblies by the laboratory.
  4. The Engineer reserves the right to witness testing. Provide reasonable advance notice to enable the Engineer to witness such testing, in no case less than three working days for testing that will occur within 300 miles of New York City and seven calendar days for testing that will occur more than 300 miles from New York City.
  5. The testing facility shall be located within the continental United States or Canada.
- D. Qualification Testing - Perform qualification tests in the sequence indicated on Figure 3 and in accordance with the procedures given in Part 3 of this Section.
1. Static Tests: Perform each test on a two-fastener assembly. The loads as specified in the reference articles are test loads for a two-fastener assembly. They shall be applied in a manner that produces the additionally referenced “per fastener body” load.
  2. Electrical Tests: Perform each test on a single fastener assembly
  3. Dynamic Tests: Perform each test on a two-fastener test assembly. The loads as specified in the reference articles are test loads for a two-fastener

assembly. They shall be applied in a manner that produces the additionally referenced “per fastener body” load.

4. Post-Fatigue Static Retests.

E. Production Testing

Upon Engineer acceptance of the results of qualification testing, begin production of the direct fixation rail fasteners. Production testing will be required as specified in this Section. Direct fixation rail fasteners shall not be installed in track prior to Engineer acceptance of production testing reports.

1. Perform the following production testing and certification requirements as prescribed in Article 115 of this Section.
  - a. Static Tests: Perform each test on a two-fastener test assembly. The loads as specified in the reference articles are test loads for a two-fastener assembly. They shall be applied in a manner that produces the additionally referenced “per fastener body” load.
    - 1). Vertical Load Test
    - 2). Lateral Load Test
    - 3) Longitudinal Restraint Test
    - 4) Lateral Restraint Test
    - 5) Vertical Uplift Test
  - b. Electrical Tests: Perform each test on a single fastener assembly.
    - 1) Voltage Withstand Test
    - 2) Electrical Resistance Tests
  - c. Dynamic Tests: Perform each test on a two- fastener test assembly. The loads as specified in the reference articles are test loads for a two-fastener assembly.
    - 1) Dynamic to Static Stiffness Ratio Test:

- 2) Vertical and Lateral Repeated Load Test: 400,000 cycles as specified in Article 115.A.2, at the higher loading threshold stipulated for that number of cycles.
2. Two direct fixation fasteners from each 1,500 production fasteners or portion thereof produced thereafter shall be selected for testing. Should either fastener fail to meet the test requirements, two additional fasteners of the same type from the production lot shall be tested. In the event either of the two additional fasteners fail, 100 percent of the lot shall be rejected or tested and only those successfully passing all tests shall be incorporated in the finished work.
3. Not less than seven days prior to each shipment of fasteners from the Contractor's facility, certified statements for each elastomer batch used in the manufacture of the fasteners being delivered shall be submitted to the Engineer. Assure compliance of each elastomer batch with the requirements as specified in Article 114.C, Elastomer by stating that each elastomer compound batch has been manufactured and processed in the same manner as the original compound having met the Qualification series of tests.
4. In addition to the specific production testing required by this Section, the Engineer reserves the right to require specific testing of fasteners and fastener components, including the elastomer, at any time during the Contract. Such testing may be performed at the Contractor's facility providing that facilities and testing procedures are approved by the Engineer. Test procedures will be as specified in this Section. Should the test fasteners pass such testing, the Contractor's actual documented cost of testing will be paid for under a change order to the Contract. Should the test fasteners fail the Contractor shall:
  - a. Bear the cost of the failed testing.
  - b. Provide a plan for bringing the furnished material into compliance with the Contract within 30 days of the failed testing, and
  - c. Bear the cost of additional testing required to document the success of the product revision.
5. Six copies of the results of all production tests shall be submitted to the Engineer at least seven days prior to shipment of the fasteners from the Contractor's facility.

#### 111. MATERIAL IDENTIFICATION:

- A. Records - Material identification shall be as specified below. At the time the completed fasteners are shipped, a copy of the production lot records shall be shipped with them and another copy shall be submitted separately.
- B. Part Numbers - Part numbers shall be assigned to fastener components and to finished assemblies. Part numbers shall be used on related drawings, correspondence, and documents. Part numbers shall identify specific items in specific configurations. All parts identified by the same part number shall have the same physical dimensions, material composition, performance characteristics, and durability. If parts are altered in any fashion during testing or at any other time, separate part numbers shall be assigned to the superseding parts and duly indicated on the fastener shop drawings and as-built drawings for resubmittal.
- C. Identification Marking - A lot and fastener numbering system shall be developed for marking each fastener and submitted. The lot number, a daily production identification number, and the Contractor's name or trademark shall be permanently and clearly molded on the top of each fastener so that they are readily visible when the complete assembly is in the installed position. Indentations in the elastomer or metal components will not be allowed.

#### 112. DELIVERY, STORAGE, & HANDLING:

In accordance with this Section and the manufacturer's recommendations.

- A. Packing, Shipping, Handling, and Unloading: Direct Fixation Rail Fasteners, including all subcomponents, shall be packaged to permit outdoor storage in a secured area. Packaging shall be sufficiently durable to survive two full years of outdoor storage in a climate such as can be expected in Hartford, Vermont.
  - a. Fastener bodies shall be palletized and banded.
  - b. Rail hold-down assemblies, anchor inserts, bolts, washers, and other loose items shall be packaged by component type in durable, secured shipping kegs or boxes and clearly identified by component content.
- B. Fasteners shall be packed and shipped in a manner that shall prevent a load on any fastener from exceeding 1,000 pounds.
- C. Acceptance at Site: Provide Engineer notice of intent to deliver two weeks prior to plan delivery date. Unload fasteners from delivery vehicles and provide inventory of materials with each shipment at the Contractor's storage site.
- D. Do not store fasteners in a wet location or where the ambient temperature will exceed 120°F.

113. SCHEDULE:

A. The schedule of submittals under this Section shall be as follows. Days indicated denote the number of days after Notice to Proceed.

1. Submit fastener footprint: Day 45
2. Submit detailed fastener system drawings and design documentation: Day 90
3. Submit quality control work program: Day 120
4. Deliver prototypes for qualification testing: Day 145
5. Complete qualification testing: Day 190
6. Submit qualification testing report: Day 200
7. Deliver fasteners: Day 240

114. MATERIALS:

A. GENERAL

1. Basis of Design: The design for this project was based on the Accoustical Loadmaster direct fixation rail fastener as produced by Amstead RPS (formerly Advanced Track Products) Mattituck, NY 11952.
2. Preapproved Products: No product, including the one cited in the Basis of Design article above, is preapproved for the project. However, in recognition of the small quantity of direct fixation rail fasteners necessary for this project, existing designs that have successfully passed a qualification testing program similar to that specified herein and which also have an acceptable in track service record under loading and traffic conditions at least as severe as the project site will be considered for acceptance.

B. METAL COMPONENTS – GENERAL:

1. Metal plate components shall be made from one-piece rolled, forged or cast steel or ductile iron.
  - a. Rolled steel shall be ASTM A36 with the addition of not less than 0.20 percent copper, or other steel having the equivalent or greater strength and corrosion resistance. Higher grade rolled steel may be used, subject to approval by the Railroad.



- b. Cast steel shall be ASTM A148, Grade 80-40 or equal. Higher grade rolled steel may be used, subject to approval by the Railroad.
  - c. Forged steel shall be in accordance with former ASTM A730, Grade C or equivalent current specification. Higher grade rolled steel may be used, subject to approval by the Railroad.
  - d. Ductile iron shall be ASTM A536, Grade 65-45-12 or equal. Higher grade ductile iron may be used, subject to approval by the Railroad.
2. A Corrosion Resistance Index shall be calculated for all rolled steel products and any other steel with a chemical content within the composition range listed in ASTM G101 and containing less than 1.0 percent manganese. The minimum Corrosion Resistance Index shall be 4.0.
  3. The rail seat and clip mating surfaces of the top element shall be smooth, free from injurious warp and other imperfections in surface and projecting fins of metal caused during forming. Rail seat uniformity shall be as specified in Article 108.D, above.

#### C. ELASTOMER

1. The elastomeric component of the elastomer (exclusive of non-elastomeric filler materials) shall be no less than 51% natural rubber. The minimum percentage shall be relative to other base elastomeric materials contained in the design compound, not the entire compound.
2. The design Durometer Shore A shall be  $55 \pm 10$  for natural rubber as measured in accordance with ASTM Designation D2240, Test for Rubber Property - Durometer Hardness.
3. The elastomer shall perform as specified when tested in accordance with the following test methods:
  - a. Tensile Properties: ASTM Designation D412, Tests for Rubber Properties in Tension.
    - 1) Rubber - Tensile Strength: Minimum 2,500 psi.
    - 2) Ultimate Elongation: Minimum 350%.
  - b. Resistance to Compression Set: ASTM Designation D395, Method B, Tests for Rubber Property Compression Set.

- 1) Test Condition: Natural Rubber - 22 hours at 70°C.
  - 2) Rubber – Maximum Set 25%.
- c. Low Temperature Compression Set Test:
- 1) Test Method - Using ASTM D1229, test for 70 hours at a temperature of minus 10°C.
  - 2) Acceptance Criteria - The compression set at 30 minutes after release (plus 30 reading) shall not exceed 65 percent.
- d. Resistance to Aging in Air: ASTM Designation D573, Tests for Rubber - Deterioration in an Air Oven.
- 1) Test Condition: 72 hours at 70°C.
  - 2) Natural Rubber - Retention of Tensile Strength: Minimum 75%.
  - 3) Retention of Ultimate Elongation: Minimum 75%.
  - 4) Change in Hardness: Maximum 10 points Durometer Shore A.
- e. Resistance to Ozone Cracking: ASTM Designation D518, Procedure A, Test for Rubber Deterioration - Surface Cracking and ASTM Designation D1149, Tests for Rubber Deterioration -Surface Ozone Cracking in a Chamber (Flat Specimens).
- 1) Test Condition: Specimens prepared in accordance with Procedure A of ASTM Designation D518 shall be tested in accordance with ASTM Designation D1149 at a temperature of 40° C and an ozone concentration of 50 parts per million.
  - 2) Acceptance Criteria: The elastomer shall not exhibit any cracking when examined in accordance with ASTM D1149 at the end of a 100-hour exposure.
- f. Adhesion to Metal: ASTM Designation D429, Method B, Tests for Rubber Property -Adhesion to Rigid Substrates.
- 1) Test Condition: Test specimen shall duplicate actual rail fastener fabrication in respect to type of steel, preparation of steel, bonding agents, and elastomer.

- 2) Acceptance Criteria: The failure of the elastomer must be type R failure, i.e., elastomer tears before bond fails.
- g. Resistance to Oil: ASTM Designation D471, Standard Test Method for Rubber Property-Effect of Liquids.
- 1) Test Condition: 70 hours at 23°C in ASTM No. 1 oil.
  - 2) Acceptance Criteria: Volume change not to exceed minus 10 percent or plus 20 percent.

#### D. ANCHOR BOLTS

1. Anchor bolts shall be high strength steel conforming to the chemical and mechanical requirements meeting or exceeding ASTM A325 Type 3, ASTM A449, or SAE J429 Grade 5. Threads shall be Class 2A fit and bolt head shall be Heavy Hex style in accordance with ASME B18.2.1.
2. If bolts are used other than ASTM A325 Type 3, provide zinc plating to the full bolt surface, including threads. Zinc plating shall conform to ASTM B633, Type III, SC2 or ASTM B695, Type II, Class 8.
3. Anchor bolts shall be 7/8-inch diameter and of sufficient length to provide a minimum of 1-1/2 inch of insert thread engagement when the faster body has been shimmed a maximum of 1/2 inch vertically above the track concrete.
4. All anchor bolts in the fastener assembly shall include a positive means of preventing the loosening of the element due to in-service vibrations.
5. All bolts shall be coated with a water resistant coating for thread protection against rusting prior to installation.
6. Threaded element installation data shall include both the required bolt tension in pounds and the resulting bolt torque range in foot-pounds. The torque range shall provide the minimum tension as specified by the American Institute of Steel Construction - Steel Construction Manual.

#### E. ANCHOR INSERTS

1. The anchor inserts shall, as a minimum, conform to the chemical and mechanical requirements of ASTM A325 Type 3, ASTM A449, SAE J429 Grade 5 or ASTM A536 Grade 65-45-12. Threads shall be Class 2B fit.

2. Provide a feature in the insert design to prevent rotation of the insert in the concrete during tightening of the bolt. Also provide flares or lobes in the bottom outside surface of the insert to engage the epoxy embedment in the reinforced deck and resist tensile forces on the bolt. Avoid sharp corners on the outside surface of the insert. Design the shape of the bottom of insert so as not to create an entrapped air bubble.
3. Submit drawings of the insert for approval.
  - a. One drawing shall show sections at the locations of the largest and smallest insert cross sectional areas. Draw circles to circumscribe both the largest and smallest cross sectional areas. The diameter of the larger circle, plus 1/8 inch, shall be no larger than 1.5 times the diameter of the smaller circle.
  - b. One drawing shall show the extreme limits of bolt insertion length, under the conditions of 1/2 inch shimming with 1/4" depression of the insert, versus no shimming and insert flush with bottom of fastener. These drawings shall demonstrate that the bolt will not bottom out in the insert at its maximum insertion and will have a sufficient thread engagement length, as defined in this Section, at its minimum insertion.
4. Insert Lengths
  - a. Design threaded portion of insert to meet the following criteria:
    - 1) A single length of bolt shall accommodate all conditions from no shims to a combination of 1/2" of shims and 1/4" depression of the top of the insert below the plinth surface.
    - 2) Inserts shall have a minimum of 1-1/2 inch of engaged thread under all conditions.
    - 3) Provide a minimum of 1/4" of space in the insert below the bottom of the bolt when the bolt is used without shimming the fastener.
5. In the installed position, the top of the anchor insert shall provide a flat surface parallel to the rail base with a minimum of 1/8 inch bearing width surrounding the anchor bolt hole.
6. Furnish inserts with an installed plug of metal or plastic material to preclude the entrapment of any moisture, concrete, or other foreign materials.

- a. Use plugs designed to be removed by using a socket wrench or other common device.
  - b. Plugs shall be capable of reinsertion, and if reinserted, still be capable of excluding concrete and other materials from entry.
7. Furnish inserts without an epoxy resin coating.

#### F. RAIL HOLD DOWN ASSEMBLIES

1. General - The rail hold down assembly system shall include elastic rail clips and toe plates so as to restrict the rail from vertical uplift and lateral movement while still allowing longitudinal movement.
  - a. Use component part shapes that are easily recognizable and minimize the possibility of incorrect installation.
  - b. Furnish a rail hold-down assembly system comprised of as few components as economically and technically feasible for ease of assembly, disassembly, and maintenance.
  - c. Design rail hold-down assembly system so that the rail clips can be installed from the right side and replaced in the field by one man using hand tools commonly used for the maintenance of conventional ballasted railway track.
  - d. Construct fastenings so that when the rail clips are removed, the rail may be lifted vertically until it is completely free of the fastening shoulder without disturbing the horizontal or vertical alignment of the shoulder or the fastener.
2. Shoulder
  - a. Furnish shoulders that are an integral part of the top plate of the direct fixation rail fastener body. Detachable, "hook-in", type shoulders will not be acceptable.
  - b. Provide positive means of lateral restraint extending at least 3/8 inch above the rail base, but not higher than 1-3/4 inches above the base of rail in the installed position.
  - c. Detail the dimensional relationship between the shoulders and the elastic rail clips such that the elastic rail clips produce not less than the toe load

required by this specification but are also not overstressed in the installed position due to allowable variations in the shimmed height of the direct fixation rail fastener as specified in Special Provision (Direct Fixation Track Construction).

### 3. Elastic Rail Clips

- a. So-called “e-clips” shall not be acceptable. Use the identical clip design on the field and gauge side of the rail at the rail seat.
- b. Rail clips shall be elastic, threadless and detachable with simple tools.
- c. The clips shall be reusable after removal through repeated applications without any effect on the operating performance of the system.
- d. Neither the rail clip assembly nor the means of preventing lateral rail movement shall make point contact against the rail.
  - 1) Rail clip contact with the base of rail, in both the static or dynamic state, shall be not less than 0.125 inches in any dimension and not less than 0.15 square inches in area.
  - 2) Design rail clips so that lateral rail movements within the confines of the shoulders does not produce transverse denting, carving, or scoring of the rail base.
  - 3) Design rail clips so that longitudinal rail slippage does not produce overstressing, bending, twisting, or other damage to the clips, and shall not damage the rail.

## G. MATERIALS REQUIRED FOR FASTENER SYSTEM TESTING

### 1. Hot-Dip Galvanized Steel Shims

- a. Use shims fabricated from hot-dip galvanized A36 steel meeting the requirements of ASTM A36 and ASTM A123.
  - 1) The shims shall project 1/4-inch minimum beyond all sides of the fastener body in all positions of fastener lateral adjustment.
  - 2) Anchor bolt holes through shims shall be 1-inch diameter round. Slotted holes shall not be permitted in shims.

2. Epoxy resin grout: Factory proportioned and packaged two-component solvent free, moisture insensitive structural epoxy adhesive meeting ASTM C881 Type IV Grades 2 or 3.
  - a. The epoxy adhesive shall be packaged in a two cartridge, dispensing/mixing system. A two-part bulk epoxy mixing unit is not acceptable.
  - b. Prepared mix shall have a gel time of not less than 10 minutes at working temperature.
  - c. Anchoring adhesive shall be: 1:1 ratio with 100% solids epoxy and containing no solvents. Independent testing, conforming with ICC - AC58 test methods for "In Service Temperature Test Series 18", must meet or exceed values: for a 1/2" diameter anchor embedded 4-1/2" deep installed in a 9/16" diameter hole and tested at 135°F to determine the adhesive reduction factor for that substrate temperature. Using the reduction factor calculate allowable tension load (based on a 4:1 safety factor) and that value must meet 4,439 lbs in f'c 2,000 psi normal weight concrete.
3. Test Block Materials
  - a. First Pour
    - 1) Concrete: ready-mix, complying with ASTM C 94
    - 2) Cement: conform to the requirements of ASTM C 150 Type II cement.
    - 3) Fine aggregate and coarse aggregate: graded in accordance with ASTM C 33.
    - 4) Reinforcement: Deformed bars in accordance with ASTM A615, Grade 40
  - b. Second Pour
    - 1) Concrete: Pre-packaged Portland cement grout, capable of attaining a compressive strength between 5,000 lb. and 7,000 lb. at the time of insert testing.
    - 2) Reinforcement: None.

#### H. SPARE PARTS

1. In addition to the direct fixation rail fasteners required for initial construction, provide the following spare parts.
  - a. 8 additional rail fastener bodies, without anchorage assemblies or rail hold down assemblies.
  - b. 25 additional rail hold down assemblies, including elastic rail clips and toe plates.
2. Package spare parts in weatherproof containers for secure long term storage in a covered but not indoors storage area.
3. Coordinate delivery of spare parts to the New England Central Railroad through the Engineer.

115. EXECUTION:

A. TESTING

1. Qualification and Production Tests are required for the rail fastener system. Perform testing in conformance with the procedures stipulated in this Part. Laboratory-specific test procedures shall be developed, submitted and approved prior to commencing any testing, unless otherwise approved by the Railroad.
2. Some or all of the qualification tests described in this Section may be waived, at the sole discretion of the Engineer, for existing fastener designs.
  - a. Minimum conditions for testing to be waived shall be that existing fastener designs have been produced for rails with 6-inch bases and for freight railroad loading with static axle loads commensurate with a 315,000 pound freight car.
  - b. Submit all previous qualification test results on the proposed fastener to the Engineer to support the request for waiving the testing.
  - c. Submit a list of specific parts of this specification Section where the proposed fastener does not conform to the requirements of this Section. List shall include a tabulation of salient data. Columns shall include the Section reference, parameter cited in Section, value or requirement specified in Section, and value or requirement met by the proposed fastener.



- d. Provide specific dates when fasteners were installed, the name of the track owner, contact information for an engineering management level reference on the track owner's staff and the amount of elapsed traffic since installation.
  - e. Submittal of all these materials will not guarantee waiver of qualification testing by the Engineer.
  - f. The Engineer, at his sole discretion, may elect to waive minor differences between the testing regimen specified and previously conducted test, such as small differences in the vertical or lateral loads.
3. Fastener Assembly Test Preparation:
- a. A minimum of 6 complete fastener assemblies are required to conduct the Qualification Tests. Prepare a minimum of 10 complete rail fastener assemblies manufactured in accordance with accepted shop drawings. From those 10 fasteners, the Railroad will select the 6 fasteners to be subjected to Qualification Testing.
  - b. Except as otherwise specified herein, each test shall be performed on a pair of completely assembled fasteners that are spaced thirty inches on center and with a section of 115RE rail not less than 42 inches long mounted and clipped thereon. Vertical or lateral loads shall be applied to the rail at a point centered between the fasteners to ensure that each fastener is equally loaded. Each fastener in the pair shall be distinctly labeled and the test report shall clearly indicate the performance of each fastener separately. For the acceptance of fastener design, each fastener shall satisfy the test requirements without failure.
  - c. Before assembly, metal parts and elastomer shall be wiped clean and dry. The fasteners shall be assembled as shown on test apparatus working drawings, as accepted by the Engineer and as outlined in the accepted test procedures. Two ¼ -inch shims shall be placed under the fastener. The anchor bolts shall be tightened to the design installation torque submitted with the installation procedures accepted by the Engineer. The torque of each bolt shall be measured and noted in the test report.
  - d. Before commencing each test, unless otherwise specified herein, the fastener and concrete test block shall be stabilized at a temperature of 23 degrees C, plus or minus 4 degrees C, for at least four hours. Testing shall be performed within the same temperature range.

- e. Except as otherwise noted, the test loading shall be applied to the rail at the midpoint between the centerlines of the two fasteners. The test report shall clearly indicate the performance of each of the fasteners separately. Failure of any of the fasteners will be sufficient cause for the rejection of the fastener design.
  - f. Visual inspection: Measure and examine each of the fasteners for conformance with specifications and in compliance with shop drawings accepted by the Engineer.
4. Concrete Test Block for Fastener Assembly Testing
- a. Test block for fastener assembly testing shall have a minimum length of four feet, with two pairs of anchorage inserts at 24-inch spacing center-to-center centered within the test block.
  - b. Design mix for test block concrete that will attain a compressive strength not greater than 5000 psi during the test period.
  - c. Make test cylinders in compliance with ASTM C31.
  - d. Test cylinders in accordance with ASTM C39 within one week of commencement of fastener testing to verify compressive strength of the concrete test block at that time. Submit test results to Engineer.
  - e. Except as otherwise specified herein, use the same test block for all static and dynamic testing.
5. Testing of Rail Clips:
- a. Rail clips that will be used during fastener qualification testing shall be inspected and tested by non-destructive means to verify that they have no pre-existing flaws that might lead to a failure during the testing, thereby delaying the test program.
  - b. The clips selected for use shall be approved by both the fastener manufacturer and clip manufacturer, shall meet the provisions of this specification and shall be identical to clip provided under this procurement for installation in track.
  - c. During the Vertical and Lateral Repeated Load test the zero longitudinal restraint rail clip assemblies shall be replaced with high longitudinal restraint rail clips of compatible design from the same manufacturer.

#### 6. Test Failure:

- a. Should any component of a fastener system fail a test, the individual failed component shall be replaced and, unless otherwise directed in writing by the Engineer, the entire sequence of tests shall be re-performed.
- b. If the failed fastener assembly must be modified to pass any test, prepare and submit Shop Drawings of the new design. The revised design shall have been approved by the Engineer before qualification testing is resumed. The entire testing sequence shall be performed on a new set of complete fasteners that have been fabricated to the revised design.
- c. The revision, acceptance and re-test cycle shall continue until fasteners have passed testing, but no longer than sixteen weeks after approval of the new design. There shall be no extensions in the Contract time of completion granted as a result of test failures.
- d. The cost of all such additional designing, manufacturing, and testing caused by failure of any component that does not comply with these Specifications, including expenses for witnessing tests, shall be at the Contractor's sole expense.
- e. After the Engineer has accepted the fastener system, no change in the design, materials, or manufacturing process shall be made without written approval by the Engineer. Should the Contractor propose a change, the Engineer may require retesting of the rail fastener system as altered. All such testing shall be performed in the same laboratory on the same equipment and insofar as possible, by the same laboratory personnel as the qualification test.

### B. STATIC TESTS

#### 1. Vertical Load Test:

- a. Procedure: Restrain a concrete test block within the test frame. Assemble two fasteners spaced 24 inches on centers with a 42-inch section of 115RE rail. Position the actuator directly above the centerline of the two fastener assembly to allow vertical loading normal to the rail head. Position deflection dial gage perpendicular to the top of the rail head at the centerline of each fastener body to measure vertical rail head movement. Preload the test assembly to 75,000 pounds (37,500 pounds per fastener), maintaining the preload for 15 seconds and returning to zero load. Prior to running the test set the deflection gages to zero. Apply a vertical load increasing in increments of 2,000 pounds to a maximum

load of 75,000 pounds per fastener pair at a rate per minute not less than 1,000 pounds and not more than 4,000 pounds downward at the center of the rail head at the centerline of the fastener assemblies normal to the rail. For each increment of load, measure the vertical deflection of the rail head to the nearest 0.001 inch. Remove the load and measure and record the final position of the rail head within one minute of no load condition. Plot the recorded values for vertical loads versus deflection on a graph.

- b. Test acceptance criteria:
  - 1) The fastener stiffness shall be defined over three load ranges:
    - a) The low range stiffness, defined as the slope of a straight line determined by standard linear least squares regression of the load versus deflection with load as the dependent variable (response), and deflection as the independent variable, over the load range of 2,000 lb/fastener to 8,000 pounds per fastener, shall be between 160,000 lb/in per fastener and 220,000 lb/in per fastener.
    - b) The intermediate range stiffness, defined as the slope of a straight line determined by standard linear least squares regression of the load versus deflection with load as the dependent variable (response), and deflection as the independent variable, over the load range of 10,000 lb per fastener to 14,000 lb per fastener, shall be between 170,000 lb/in per fastener and 250,000 lb/in per fastener.
    - c) The high range stiffness, defined as the slope of a straight line determined by linear least squares regression of the load versus deflection with load per fastener as the dependant variable (response), and the deflection as the independent variable, over the load range of 16,000 lb/fastener to 24,000 lb/fastener, shall be between 186,000 lb/in per fastener and 271,000 lb/in per fastener.
  - 2) After removal of the maximum load, the fastener shall return to within 0.005 inch of its original position within one minute.
  - 3) At no time during the test shall any fastener component exhibit any sign of failure by slippage, yielding, or fracture. Slippage is defined herein to mean any movement of the fastener components relative to their initial position not attributed to deflection of the elastomer. The values obtained when this test is repeated on same fastener assembly shall be within 20 percent of the initial test values.

## 2. Lateral Load Test:

- a. Procedure: Restrain a concrete test block within the test frame. Assemble two fasteners spaced 24 inches on centers with a 42-inch section of 115RE rail. Position two lateral deflection dial gauges at each rail fastener, for a total of four. Set the first and second gauges perpendicular to the side of the rail head at the centerline of each fastener, 5/8 inch below the top of the rail head. Set the third and fourth gauges against the vertical edge of the rail base at the centerline of each fastener, perpendicular to the rail vertical axis. (Alternatively, at each fastener base, set two gauges equidistant from the centerline of the fastener, both measuring the same side of the rail base, and record and average the readings on the two gauges.) Apply a vertical load of 20,000 pounds to the fastener pair, offset 3/4 inch from the center of the rail head towards the gauge line, and directly above the centerline of the dual fastener assembly. The vertical load shall be applied using a stud extending from the load cell and free from lateral restraint. Position a lateral actuator midway between the dual fastener assembly normal to the side of the rail head at 5/8 inch below top of rail head at the gauge side. Preload the test assembly laterally to 14,000 pounds per fastener pair, maintaining the preload for 15 seconds and returning to zero lateral load. Prior to running the test, set the deflection gages to zero. Apply a lateral load increasing in increments of 1,000 pounds to a maximum of 16,000 pounds per fastener pair. Apply the lateral load at the rate of not less than 1,000 pounds per minute and not more than 3,000 pounds per minute. For each load increment, hold the load and record movement of each gauge to the nearest 0.001 inch. Remove the lateral load and, within one minute, measure and record the final rail position from the gauges. Report each deflection reading for each fastener. Average the two lateral deflection readings at the rail head. Separately average the two lateral deflection readings at the rail base. Plot separate curves for rail head average deflection and rail base average deflections on a graph showing load per fastener on one axis and average lateral deflection on the other axis.
- b. Test acceptance criteria: The average lateral deflection of the rail head for a lateral load of 14,000 pounds per fastener pair shall not exceed 0.300 inch for fasteners tested prior to the Repeated Load Test, nor 0.325 inch for fasteners tested after the Repeated Load Test. The difference between the original and final positions of the rail head shall not exceed 0.062 inch. At no time during the test shall any fastener component exhibit any sign of failure by slippage, yielding, or fracture. Lateral deflection of the rail base shall be reported for information only.

- c. If an asymmetrical fastener is provided, reverse the fastener in the test block and rerun this entire test, with the lateral forces acting to the opposite side of the fastener from the previous test. Rail head deflections shall meet the criteria stated in the paragraph above. The lateral deflections shall not vary more than 10% between the first and second test.
3. Longitudinal Restraint Test: Not used in this Contract.
  4. Vertical Uplift Test: Not used in this Contract
  5. Corrosion Test:
    - a. Test Method - The direct fixation rail fastener system, including the fastener body, the rail hold down assemblies, and the anchorage assemblies with the exception of the female inserts, shall be exposed to a 5 percent chloride solution in accordance with ASTM B117 for 1000 hours. Spring steel elements shall be placed in the test chamber under load so as to be at their maximum service duty deflection during the test. Solution shall be a 50-50 combination of sodium chloride and calcium chloride.
    - b. Acceptance Criteria - Acceptance shall be based upon visual comparison between actual metal surface condition after completion of the test and the pictorial surface preparation standards presented in SSPC-Vis 1. The condition of the coated, including galvanized, metal surfaces shall match or be superior to Rust Grade B, wherein there is no more than light surface rust, mill scale has only begun to flake and there is no pitting. There shall be no evidence of adhesion loss of adhesive coating. Areas of ductile iron components which only have an adhesive coating are not required to meet the above condition, but when cleaned shall not exhibit section loss of more than 5% and shall not exhibit pitting depths greater than 1/32".
  6. Heat Aging Process:
    - a. Method - Age test the fastener body, without rail, concrete test block, rail clips or anchorage assemblies, in an air oven for 336 hours at a temperature of 70°C as per ASTM D573.
    - b. Acceptance Criteria - This is a conditioning process prior to subsequent testing and there are no acceptance criteria.

## C. ELECTRICAL TESTS

1. Voltage Withstand Test:
  - a. Procedure: Mount a complete, fully assembled clean and dry fastener to an isolated test block configured as specified. Connect a 10,000 volt (dc) power supply to the fastener assembly by placing the positive potential to the rail head and the ground potential to one anchor bolt. Apply a 10,000 volt potential for one minute. In the event of breakdown, record the breakdown voltage.
  - b. Test acceptance criteria: The elastomer shall complete this test with no visible damage such as splits, cracks, pinholes, or fractures. There shall be no evidence of arcing, arc tracking or other voltage breakdown.
2. Electrical Resistance Tests (Dry and Wet):
  - a. Dry Procedure: Mount a complete, fully assembled clean and dry fastener to an isolated test block configured as specified with ambient conditions of 60 degrees F to 80 degrees F and a 50 to 70 percent relative humidity. Assemble the fastener with a section of 115-pound RE rail, not less than one foot in length. Mount the test fastener on a 1/4-inch-thick metallic ground plate sized to extend 1/2 inch beyond all edges of the fastener. Use anchorage assemblies supplied, or similar to that for use in actual field installation, to mount the fastener to the ground plate. Use the same number of bolts (or other devices) that shall be used to anchor the fastener in-service. Connect a 100-volt (dc) power supply to the fastener assembly by placing the positive potential to the railhead and ground potential to the 1/4-inch metallic ground plate. Apply 100 volts (minimum) dc between the rail head and the ground plate for three minutes. Measure the applied current flow and calculate the resistance. Measure the current with an accuracy of plus or minus two percent. Instrumentation used for direct measurement shall have a minimum 100 volt output capacity.
  - b. Dry test acceptance criteria: The fastener assembly shall demonstrate not less than 10,000,000 Ohms.
  - c. Wet Procedure: Perform this test on the same fastener that passed the dry electrical resistance tests. Place an assembled fastener in a nonmetallic trough or other suitable container. Note that the assembly shall not require a test block and that "loose" anchor inserts shall be used to provide a complete test anchorage simulation. Size the container such that there is a minimum of two inches between the sides and bottom of the fastener/ground plate assembly and the sides and bottom of the

container. Ambient temperature of fastener surfaces (prior to immersion), water, and air shall be from 60 to 80 degrees F and a relative humidity of not greater than 70 percent. Pour water into the container to a level midway up the rail web covering all surfaces of the fastener. Maintain this level of immersion for 72 hours. Water resistivity shall be 1,000 to 1,500 ohm-cm (use potable water and adjust resistivity by addition of Sodium Chloride). Drain the water from the container to a level 1/2-inch below the test assembly ground plate. Connect a 100 volt (dc) power supply to the fastener assembly by placing the positive potential to the railhead and ground potential to the 1/4 inch metallic ground plate. Apply 100 volts (minimum) dc between the rail head and without drying or otherwise disturbing the fastener or creating a condition that causes the fastener surfaces to dry, measure the current within an accuracy of plus or minus two percent at three minutes after voltage application and at 15 minute intervals thereafter. The test shall be discontinued after one of the following criteria is met. (1) The calculated resistance is greater than 700,000 ohms for no less than two consecutive recordings, or (2) a period of greater than two hours has elapsed.

- d. Test acceptance criteria: The fastener assembly shall demonstrate not less than 700,000 Ohms within the test time limit of two hours.

### 3. Electrical Impedance Test:

- a. Test Method - A complete, fully assembled fastener, as specified, shall be tested for electrical impedance. A potential of 50 volts AC RMS shall be applied to the rail head for three minutes for each increment of measurement for frequencies from 20 Hz to 10 kHz, in increments of 20 Hz up to 100 Hz, 200 Hz up to 1,000 Hz, and 2,000 Hz up to 10 kHz. The impedance after three minutes shall be measured with an accuracy of plus or minus two percent and recorded for each frequency. Upon approval by the Engineer, electrical resistance may be calculated by measuring current flow, and impedance may be calculated from the measurements of resistance and capacitance using the impedance equation that applies to a resistance and capacitance in parallel.
- b. Acceptance Criteria - The minimum impedance for any frequency between 20 Hz and 10 kHz with 50 volts AC RMS shall be 10,000 ohms.

## D. DYNAMIC TESTS

### 1. Dynamic to Static Stiffness Ratio Test:



- a. Procedure: Restrain a concrete test block within the test frame. Assemble two fasteners spaced 24 inches on centers with a 42-inch section of 115RE rail. Position an actuator midway between the dual fastener assembly normal to the top of the rail head. Place a dial indicator vertically normal to the rail head at positions along the centerline of each fastener body. A dynamic vertical (compression) load shall be applied to the rail head. Begin dynamic rail loading in a sinusoidal waveform over a range from 12,000 pounds (6,000 pounds per fastener) to 20,000 pounds (10,000 pounds per fastener) at a rate of 10 cycles per second. After a minimum of 1,000 cycles of sinusoidal monitoring, record the loads and deflections. Discontinue the loading cycle and allow the fasteners to stabilize for one minute at 12,000 (6,000 pounds per fastener). After stabilization, begin vertical loading the fastener assembly from 12,000 pounds (6,000 pounds per fastener) to 20,000 pounds (10,000 pounds per fastener) at a rate not exceeding 2,000 pounds per minute (1,000 pounds per minute per fastener). At each 2,000 pound (1,000 pounds per fastener) load increment, record the load and deflection readings. The deflections shall be measured within an accuracy of 0.001 inches.
  - b. Test Acceptance Criteria:

The dynamic stiffness shall not exceed 1.7 times the static stiffness.

    - 1) The dynamic stiffness shall be calculated by dividing the difference between the recorded maximum and minimum load value (the dynamic load) by the difference between the recorded maximum and minimum deflection (the dynamic deflection).
    - 2) The static stiffness shall be calculated by applying the least-squares linear regression method to the recorded data to obtain a straight line and determining the slope of the static load-deflection curve.
2. Vertical and Lateral Repeated Load Test:
- a. Procedure: Restrain a concrete test block within the test frame. Assemble two fasteners spaced 24 inches on centers with a 42-inch section of 115RE rail. Tighten anchor bolts to their recommended installation torque. Position an actuator midway between the dual fastener assembly normal to the top of the rail head. Position a lateral actuator midway between the dual fastener assembly normal to the gauge side of the rail head at 5/8 inch below top of rail head. The lateral load shall be capable of both tension and compression through a rotational clevis devise.

Vertical and horizontal loads shall be applied to the rail head. If an asymmetrical fastener is provided, turn fastener so that the longer portion of the fastener base extends toward the gauge side of the rail. Begin vertical sinusoidal oscillation loading until oscillation nears 0 to 43,000 pounds (21,500 pounds per fastener). At this point in the test, concurrent with the vertical loading, begin sinusoidal oscillation of the lateral load until oscillation ranges from 13,000 pounds (6,500 pounds per fastener) compression to the gauge side of the rail head and 1000 pounds (500 pounds per fastener) tension away from the gauge side of the rail head. Continue this loading cycle for 400,000 cycles.

Upon completion of 400,000 cycles, measure and report the torque required to loosen each bolt. Retighten bolts to their recommended installation torque. Adjust loading mechanism to load fastener test set to 32,000 pounds (16,000 pounds per fastener) vertically. Lateral loading shall be changed to 9,600 pounds outward and 1,000 pounds inward. Testing then shall commence for an additional 2,600,000 cycles.

A cycle shall consist of one complete lateral reversal from compression to tension with each peak lateral force receiving a vertical load. The Qualification Test shall consist of a total of 3,000,000 complete cycles at the test thresholds listed above. Production testing shall consist of 400,000 cycles at 43,000 pounds vertical and 13,000 pounds lateral loading.

The frequency shall be regulated to prevent the temperature of the components from exceeding 70°C. Retorquing of threaded elements subsequent to the completion of the initial 400,000 cycles of loading shall not be permitted without written acceptance from the Engineer.

- b. Test Acceptance Criteria: The fastener shall withstand the required number of cycles of load application with no evidence of failure. The fastener assembly shall be disassembled and upon visual inspection, no component of the fastener shall exhibit any evidence of failure by slippage, yielding, abrasion, or fracture at any time during the test. The rail shall exhibit no evidence of wear or grooving at the fastener clip location that would contribute to a failure of the rail. The concrete test block at the anchorage shall exhibit no evidence of failure as a result of the dynamic test.
3. Repeated Load Test With One Anchor Bolt Loosened:
    - a. Test Method - After completion of the vertical and lateral repeated load test, reassemble the fasteners using only the original components

previously tested. Then, with the gauge side anchor bolt on one of the two fasteners loosened and backed out 1/4 inch, repeat the vertical and lateral repeated load test for 15,000 cycles at a vertical load of 31,000 pounds and horizontal loads of 13,000 pounds outward and 1000 pounds inward.

- b. Acceptance Criteria - The fastener shall withstand the specified total number of cycles of loading with no evidence of failure by slippage, yielding, or fracture. The rail shall exhibit no evidence of wear or grooving that could contribute to failure of a rail.

#### 4. Uplift Repeated Load Test:

##### a. Test Method:

- 1) A fully assembled fastener shall have loads applied to the rail head so as to produce alternately a vertical downward load of 13,000 pounds and a vertical upward load of 2,000 pounds. Apply the loads alternately for a total of 1.5 million complete cycles. The frequency shall be regulated to prevent component temperature reaching 50°C. Do not reposition rail clips or re-torque threaded elements without written approval by the Engineer.
- 2) During the final 500,000 cycles, a longitudinal load shall be applied to the rail at its base. Increase the load in increments of 100 pounds up to 600 pounds at intervals of at least one increment per 100 cycles of vertical loading. For each load increment, measure and record the longitudinal deflection of the rail to the nearest 0.001 inch. Then remove the longitudinal load and measure and record the longitudinal position of the rail. Plot the recorded values for the longitudinal load versus deflection on a graph.

- b. Acceptance Criteria - The fastener shall withstand 1.5 million cycles of load application with no evidence of failure. Upon visual inspection, no component of the fastener shall exhibit evidence of failure by yielding, abrasion, slippage or fracture. The rail shall exhibit no evidence of wear or grooving that could contribute to its failure. The plot of the load versus deflection curve shall indicate the elastic deformation and the residual deflection. The residual deflection shall not exceed 0.005 inch.

#### 5. Push-Pull Test

##### a. Test Method:

- 1) The rail end shall be supported on a roller or other frictionless support properly elevated to prevent the longitudinal load from binding the rail in the fasteners. Apply a cyclic longitudinal load at the base of the rail to slip the rail approximately 1/2 inch back and forth about its initial position for a total of 2,000 cycles without repositioning rail clip or re-torquing bolts. The 1/2 inch slip shall be measured with respect to a fixed point on the testing machine. Following this, components shall be checked against the acceptance criteria. Next, a cyclic longitudinal load at the rail base shall be applied to slip the rail approximately 1/8 inch back and forth about its initial position for a total of 1 million cycles.
  - 2) Repositioning of the rail clip will not be allowed during the second phase of the test. Loading frequency shall be regulated to prevent the temperature of components from exceeding 50°C. Clean water may be applied occasionally as a spray in order to keep the temperature below 50°C.
- b. Acceptance Criteria - The fastener shall withstand the specified number of cycles of load application with no evidence of failure. Upon visual inspection, no component shall exhibit evidence of failure by slippage, yielding, or fracture at any time during the test, nor shall a rail clip show evidence of sliding out or backing out of its hold-down housing more than 1/16 inch. The rail shall exhibit no evidence of wear, beyond minor polishing and grooving, that could contribute to failure of a rail.

#### E. ANCHORAGE ASSEMBLY TESTS

1. Anchorage Test Block Preparation
  - a. Prepare two test blocks for anchorage assemblies, which shall be tested at different temperatures. Each shall consist of two pours, and testing will be conducted after each pour. Test blocks shall be large enough for ten inserts to be epoxy grouted into each and tested without interfering with adjacent inserts. Materials: See Article 2.06 of this Section.
  - b. Test block shall be reinforced similar to Figure 4 except that top of first pour may be level, without blockouts, for this test. Submit test block detail to Engineer for review prior to casting.
2. Perform Restrained Pullout Test on all 5 anchor bolts on each block.
  - a. Test method: Adjust the bolt to its minimum insertion length as shown in Article 2.03 of this Section. Set up a hydraulic ram to apply a vertical

pullout load, using the configuration described in Article 3.05.A.4.h of this Section. Apply a vertical load of 10 kips to the ram, then increase the load at a rate not to exceed 1 kip per minute, until the installation fails. Note the maximum load attained before failure occurs and the mode of failure, e.g. stripping of bolt threads, stripping of insert threads, yield of epoxy/concrete bond, etc.

- b. Acceptance criteria: Load shall exceed 14 kips on each insert.

#### F. TESTING FASTENER BODY METAL

##### 1. Charpy Impact Test:

- a. Test Method - Prepare three Charpy impact test specimens in accordance with ASTM E23 from the same metal used for the top and base elements of the fastener body. If different grades of steel or iron are used for the two elements, prepare three specimens of each. Conduct a Charpy impact test on each specimen at a temperature of 21°C in accordance with ASTM E23. The test report shall include the information in paragraph twelve of ASTM E23.
- b. Acceptance Criteria - The fracture energy shall be greater than three foot-pounds for iron and 15 foot-pounds for steel.

2. In lieu of the above, submit previous test data demonstrating that the type of material being proposed clearly meets the above criteria. The Engineer will review the data and determine whether or not additional testing is required.

#### G. FABRICATION

1. Fabricate and deliver direct fixation rail fasteners in accordance with indicated requirements.

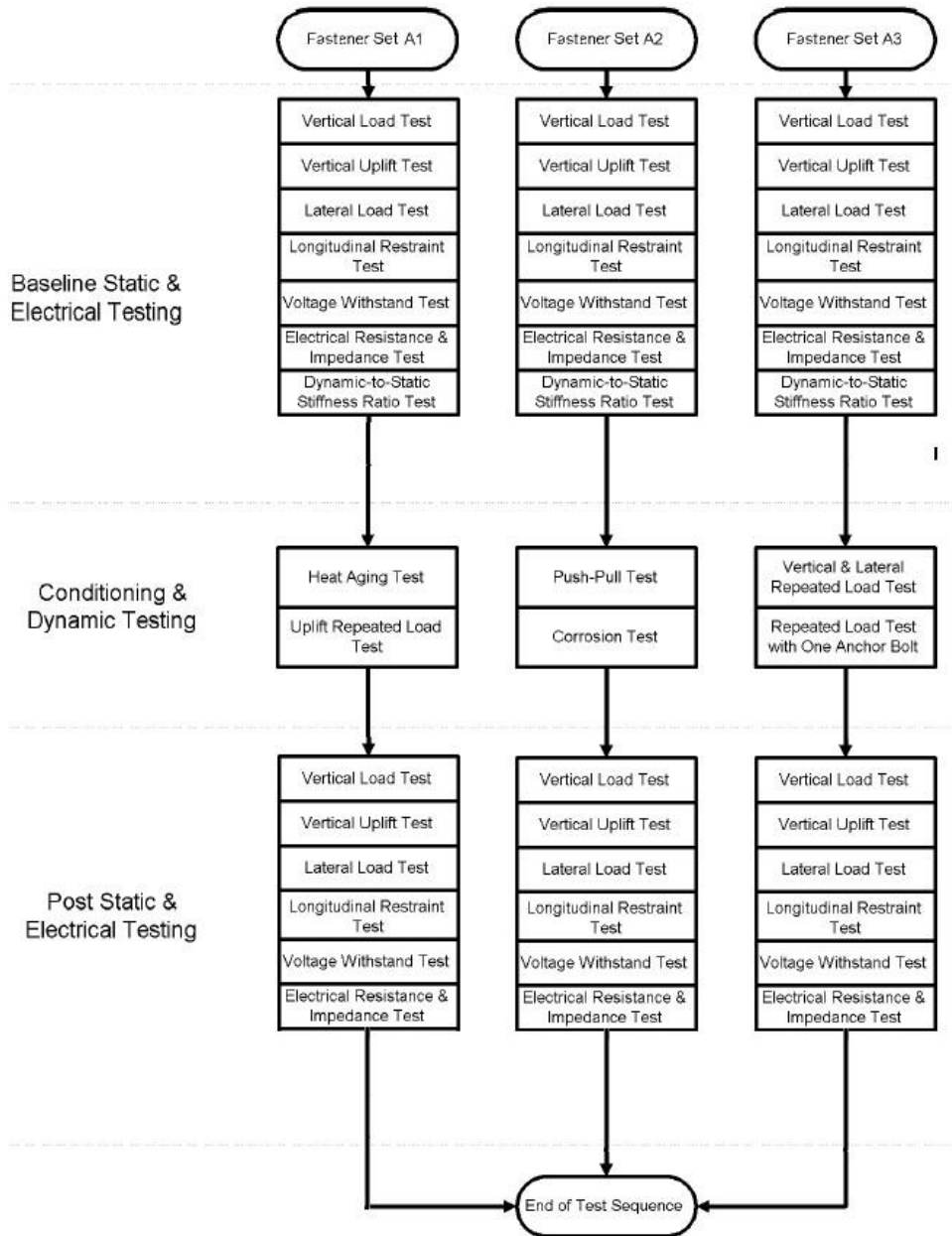
**FIGURE 3- FASTENER DETAILS**

<b>BILL OF MATERIALS PER ASSEMBLY</b>		
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>QUANTITY/FASTENER</b>
<b>1</b>	<b>FASTENER BODY</b>	<b>1 EACH</b>
<b>2</b>	<b>ANCHOR BOLT AND LOCKING DEVICES</b>	<b>4 EACH</b>
<b>3</b>	<b>RAIL HOLD-DOWN ASSEMBLY WITH RAIL CLIP AND TOE PLATE, COMPLETE</b>	<b>2 EACH</b>
<b>4</b>	<b>HIGH LONGITUDINAL</b>	<b>2 EACH, ONLY FOR SPECIFIED</b>

	<b>RESTRAINT RAIL HOLD DOWN ASSEMBLY</b>	<b>TEST PROCEDURES.</b>
<b>5</b>	<b>THREADED ANCHOR INSERT</b>	<b>4 EACH</b>
<b>6</b>	<b>STEEL SHIMS, 1/4"</b>	<b>2 EACH FOR TESTING ONLY</b>

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**FIGURE 4**  
**FASTENER TEST SEQUENCE**



**CONTAINMENT AND DISPOSAL OF LEAD PAINT CLEANING RESIDUES**

116. DESCRIPTION:

- A. This work shall consist of the containment, collection, temporary storage, transportation, and disposal of waste from lead paint removal operations. Waste requiring containment and control includes, but is not limited to, old paint, spent abrasives, corrosion products, mill scale, dirt, dust, grease, oil, salts, and water used for cleaning the surface of existing lead coatings.

117. GENERAL REQUIREMENTS:

- A. The existing coatings contain lead and may also contain other toxic metals. This specification provides the requirements for containment and for the protection of the public and the environment from exposure to harmful levels of toxic metals that may be present in the paint being removed or repaired. The Contractor shall take reasonable and appropriate precautions to protect the public from the inhalation or ingestion of dust or debris from the operations, and is responsible for the clean-up of all spills of waste at no additional cost to the Agency.
- B. The Contractor shall comply with the requirements of this specification and all applicable Federal, State, and Local laws, codes, and regulations. These include but are not limited to the regulations of the United States Environmental Protection Agency (USEPA), Vermont Occupational Safety and Health Administration (VOSHA), Vermont Department of Health (VDOH), and the Vermont Agency of Natural Resources (ANR). The Contractor shall comply with all applicable regulations even if the regulation is not specifically referenced herein. If a Federal, State, or Local regulation is more restrictive than the requirements of this specification, the more restrictive requirement shall prevail as determined by the Engineer.

118. SUBMITTALS:

- A. The Contractor shall submit to the Engineer, in accordance with Subsection 105.03 for Construction Drawings, the following information for completing the work. Complete submittals shall be provided a minimum of 21 days prior to the anticipated start of the work. For the duration of the project, the Contractor shall also maintain on site printed copies of the following standards and regulations referenced herein:
  - 1. SSPC Guide 6: *Guide for Containing Debris Generated During Paint Removal Operations;*



2. *SSPC Guide 7: Guide for Disposal of Lead Containing Surface Preparation Debris;*
3. *29 CFR 1926.62 – Lead in Construction;*
4. *SSPC Guide 16: Guide to Specifying and Selection Dust Collectors; and*
5. *SSPC TU-7 – Conducting Ambient Air, Soil, and Water Sampling Activities During Surface Preparation and Paint Disturbance Activities.*

a) Containment Plan:

- 1) The Containment Plan shall include drawings, equipment specifications, and calculations (wind load, air flow, and ventilation when negative pressure is specified). The plan shall include copies of the manufacturer's specifications for the containment materials and equipment that will be used to accomplish containment and ventilation. The plan shall note the type of abrasive that is to be used and account for the weight of spent abrasive on the containment system.
- 2) The submittal shall provide calculations that assure the structural integrity of the bridge under all loading conditions. Loading conditions shall include but not be limited to all equipment, materials, and containment system loads. The calculations and drawings shall be prepared, signed, and sealed by a qualified Licensed Professional Engineer. The Licensed Professional Engineer shall inspect the containment system, review the materials used for its construction, and certify that the as-erected containment is in conformance with the drawings.
- 3) The design shall indicate the maximum wind speed allowed for the containment system.
- 4) When working over the railroad or navigable waterways, unless otherwise directed by the Engineer, the Contractor shall provide evidence that the Railroad, Coast Guard, Corps of Engineers, and other applicable agencies are satisfied with the clearance provided and other safety measures that are proposed.

b) Site Specific Health and Safety Plan:

- 1) The Health and Safety Plan shall identify the Contractor's Health and Safety Officer. The plan shall discuss the contractor's lead testing

program for workers and what course of action will be followed if the levels become too high.

- 2) The plan shall also identify the VOSHA Competent Person for the VOSHA regulated activities. The Competent Person should have completed the SSPC C3 course or equivalent, and have a minimum of two years field experience on lead removal projects. The Competent Person shall be on site during the progress of the regulated activities. In addition to the lead removal activities the plan should emphasize best practice fall protection and prevention and include plans for rescuing individuals hanging from fall arrest devices.
  - c) Environmental Monitoring Plan. The Environmental Monitoring Plan shall address the visual inspections and cleanup of the soil and water that the Contractor will perform, including final project inspection and cleanup. The plan shall address the daily visible emissions observations that will be performed and the corrective action that will be implemented in the event emissions or releases occur.
  - d) Waste Management Plan. The Waste Management Plan shall address all aspects of waste handling, storage, testing, hauling, and disposal. The plan shall include the names, addresses, and a contact person for the proposed licensed waste haulers and disposal facilities (for hazardous waste, non-hazardous waste, and waste water) and the name and qualifications of the laboratory proposed for Toxicity Characteristic Leaching Procedure (TCLP) analysis. The use of any steel or iron based material, such as but not limited to grit, shot, fines, or filings as an abrasive additive, is prohibited.
  - e) Contingency Plan. The Contractor shall prepare a Contingency Plan for emergencies including fire, accident, failure of power, failure of dust collection system, failure of supplied air system, or any other event that may require modification of standard operating procedures during lead removal. The plan shall include specific procedures to ensure safe egress and proper medical attention in the event of an emergency.
  - f) Permits. The Contractor shall submit a copy of the site specific Lead Abatement Permit issued by the Vermont Department of Health (VDOH) for the project.
- B. When the Engineer accepts the submittals, the Contractor will receive written notification. The Contractor shall not begin any work until the Engineer has accepted the submittals. The Contractor shall not construe Engineer acceptance

of the submittals to imply approval of any particular method or sequence for conducting the work, or for addressing health and safety concerns. Acceptance of the plans does not relieve the Contractor from the responsibility to conduct the work according to the requirements of Federal, State, or Local regulations, this specification, or to adequately protect the health and safety of all workers involved in the project and any members of the public who may be affected by the project. The Contractor remains solely responsible for the adequacy and completeness of the programs and work practices, and adherence to them.

119. CONTRACTOR QUALIFICATIONS:

- A. The cleaning and painting Contractor shall possess current SSPC-QP1 and SSPC—QP2 certifications and shall maintain certified status throughout the duration of the painting work under the Contract.

120. QUALITY CONTROL (QC) INSPECTIONS:

- A. The Contractor shall perform first line, in process QC inspections of all environmental control and waste handling aspects of the project to verify compliance with these specification requirements and the accepted drawings and plans. The Contractor shall use an environmental daily report form approved by the Engineer to record the results of the inspections. The completed reports shall be provided to the Engineer before work resumes the following day.
- B. Contractor QC inspections shall include, but not be limited to, the following:
1. Proper installation and continued performance of the containment system(s) in accordance with the Containment Plan.
  2. Visual inspections of emissions into the air and verification that the cause(s) for any unacceptable emissions is corrected.
  3. Visual inspections of spills or deposits of contaminated materials into the water or onto the ground, pavement, soil, or slope protection. Included is verification that proper cleanup is undertaken and that the cause(s) of unacceptable releases is corrected.
  4. Proper implementation of the Waste management Plan, including laboratory analysis and providing the results to the Engineer within the time frames specified herein.
  5. Proper implementation of the Contingency Plan for emergencies.

- C. The personnel providing the QC inspections shall possess current SSPC-C3 certification or equal, including the annual training necessary to maintain that certification (SSPC-C5 or equal), and shall provide evidence of successful completion of 2 projects of similar or greater complexity and scope that have been completed in the last 2 years. References shall include the name, address, and telephone number of a contact person employed by the project owner. Proof of initial certification and the current annual training shall also be provided.

121. QUALITY ASSURANCE (QA) OBSERVATIONS:

- A. The Engineer will conduct QA observations of any or all of the QC monitoring inspection that are undertaken. The presence or activity of Engineer observations in no way relieves the Contractor of the responsibility to provide all necessary daily QC inspections and to comply with all requirements of this specification. The Engineer and/or the Engineer's designee shall be allowed access to all work areas, including the containment.

122. CONTAINMENT REQUIREMENTS:

- A. The Contractor shall install and maintain containment systems surrounding the work for the purpose of controlling emissions of dust and debris according to the requirements of this specification. Working platforms and containment materials that are used shall be firm and stable. Platforms shall be designed to support the workers, inspectors, spent surface preparation media (e.g., abrasives), and equipment during all phases of surface preparation and painting. Platforms, cables, and other supporting structures shall be designed according to VOSHA regulations. If the containment needs to be attached to the structure, the containment shall be attached by bolting, clamping or similar means. The Contractor shall obtain written approval from the Structures Engineer prior to drilling into the structure. Welding onto the structure is prohibited.
- B. The containment shall be dropped in the event of sustained winds of 64 kph (40 mph) or greater and all materials and equipment secured.
- C. The Contractor shall provide drawings showing the containment system and indicating the methods(s) of supporting the working platforms and containment materials to each other and to the bridge. When the use of negative pressure and airflow inside containment is specified, the Contractor shall provide all ventilation calculations and details on the equipment that will be used for achieving the specified airflow and dust collection.
- D. The Contractor shall submit calculations and drawings, signed and sealed by a qualified Licensed Professional Engineer registered in the State of Vermont, that

assure the structural integrity of the bridge under the live and dead loads imposed, including the design wind loading.

- E. When working over railroads, the Contractor shall provide evidence that the proposed clearance and the safety provisions that will be in place (e.g., flagman) are acceptable to the railroad. In the case of work over navigable water, the Contractor shall provide evidence that the proposed clearance and provisions for installing or moving the containment out of navigation lanes is acceptable to authorities such as the Coast Guard and Army Corps of Engineers. The Contractor shall include plans for assuring that navigation lighting is not obscured, or if it is obscured, that temporary lighting is acceptable to the appropriate authorities (e.g., Coast Guard) and will be utilized.
- F. Engineer review and acceptance of the drawings and calculations shall not relieve the Contractor from the responsibility for the safety of the working platforms; safety and operation of the containment; and for providing ample ventilation to control worker and environmental exposures. After the work platforms and containment materials are erected, additional measures may be needed to ensure worker safety according to VOSHA regulations. The Contractor shall institute such measures at no additional cost to the Agency.
- G. Containment for the cleaning operation of this Contract is defined as follows:
  - 1. The containment system shall maintain the work area free of visible emissions of dust and debris according to all provisions of this specification, with no debris permitted outside of the regulated area at any time. All debris within the regulated area and within the containment shall be collected at the end of the last shift each day or every 24 hours for continuous operation, and properly stored in sealed containers.
  - 2. The containment systems shall comply with the specified SSPC Guide 6 classifications.
  - 3. The Contractor shall take appropriate action to avoid personnel injury or damage to the structure from the installation and use of the containment system. If the Engineer determines that there is the potential for structural damage caused by the installed containment system, the Contractor shall take appropriate action to correct the situation.
  - 4. In addition to complying with the specific containment requirements in SSPC Guide 6 classifications for each method of removal, the Contractor shall provide and maintain coverage over the ground in the areas to be cleaned. This coverage shall be capable of catching and containing surface preparation media, paint chips, and paint dust in the event of an accidental

escape from the primary containment. The containment materials shall be cleaned of loose material prior to relocation or dismantling. If paint chips or dust are observed escaping from the containment materials during moving, all associated operation shall be halted and the materials and components shall be re-cleaned by HEPA vacuuming.

5. Identify the methods that will be used to route run-off from the existing deck drains through the containment, if required.

H. The containment systems shall also meet the following requirement:

1. Dry Abrasive Blast Cleaning – Full Containment with Negative Pressure (SSPC Class 1A):
  - a) The enclosure shall be design, installed, and maintained to sustain maximum anticipated wind forces, including negative pressure. Flapping edges of containment materials are prohibited and the integrity of all containment materials, seams, and seals shall be maintained for the duration of the project. Airflow inside containment shall be designed to provide visibility and reduce worker exposures to toxic metals according to VOSHA regulations and as specified in the submitted Containment Plan. The minimum airflow shall be 1.70 m<sup>3</sup>/min. (60 cfm) for down draft systems and 2.8 m<sup>3</sup>/min. (100 cfm) for cross draft system.
  - b) When the location of the work on the bridge permits, the blast enclosure shall extend a minimum of 1 m (3 feet) beyond the limits of surface preparation to allow the workers to blast away from, rather than into, the seam between the containment and the structure. The blast enclosure shall have an airlock entryway to allow entrance and exit from the enclosure without allowing the escape of blasting residue.
  - c) All spent abrasive shall be removed from the containment at the conclusion of each work shift at a minimum, and as often as required based on load calculations.
  - d) If recyclable metallic abrasives are used, the Contractor shall operate the equipment in a manner that minimizes waste generation. Steps shall also be taken to minimize waste generation. Steps shall also be taken to minimize dust generation during the transfer of all abrasive/paint debris (expendable or recyclable abrasives) for recycling or disposal. Acceptable methods include, but are not limited to vacuuming, screw or belt conveyance systems, or manual conveyance. Manual conveyance is only permitted if the work is performed inside a containment that is

equipped with an operating ventilation system capable of controlling the dust that is generated.

- e) Appropriate filtration shall be used on the exhaust air of dust collection and abrasive recycling equipment as required to comply with VDOH Lead Abatement Permit and State and Federal regulations. The equipment shall be enclosed if visible dust and debris are being emitted and/or the regulated area or high volume monitor lead levels are not in compliance.
- f) Areas beneath containment connection points that were shielded from abrasive blast cleaning shall be prepared by vacuum blast cleaning or vacuum-shrouded power tool cleaning after the containment is removed.

2. Vacuum Blast Cleaning (SSPC-Class 4A):

- a) Vacuum blasting equipment shall be fully automatic and capable of cleaning and recycling the abrasive. The system shall be designed to deliver cleaned, recycled blasting abrasives and provide closed system containment during blasting. The removed coating, mill scale, and corrosion shall be separated from the abrasive and stored for disposal.
- b) The Contractor shall ensure that the vacuum shrouds are fully engaged while the tool is in use to prevent the escape of abrasive and lead paint chips. The Contractor shall attach containment materials around and under the work area to catch and contain abrasive and waste materials in the event of an accidental escape from the vacuum shroud. This containment is in addition to the ground covers specified earlier.
- c) It is possible that the close proximity of some structural steel members, such as the end diaphragms or end cross-frames underneath transverse deck expansion joints, preclude the use of the vacuum blasting equipment for the removal of the old paint. For surfaces that are inaccessible for the nozzles of the vacuum blasting equipment, the Contractor shall remove the paint by means of full containment inside a complete enclosure as directed by the Engineer.

3. Vacuum-Shrouded Power Tool Cleaning (SSPC-Class 3P):

- a) The Contractor shall ensure that the vacuum shrouds are fully engaged while the tool is in use to prevent the escape of abrasive and lead paint chips. The Contractor shall utilize power tools equipped with vacuums and High Efficiency Particulate Air (HEPA) filters. The Contractor shall attach containment walls around the work area and install containment

materials beneath the work area to catch and contain waste materials in the event of an accidental escape from the vacuum shroud. This containment is in addition to the ground covers specified earlier and shall be installed within 3 m (10 feet) of the areas being cleaned.

4. Power Tool Cleaning with Vacuum (SSPC-Class 2P):
  - a) When the use of power tools without vacuum attachments is authorized by the Engineer, the Contractor shall securely install containment walls and flooring around the work area to capture and collect all debris that is generated. The containment material requirements for this Class 2P are similar to Class 3P used for vacuum-shrouded tools, but the supporting structure will be more substantial in Class 2P to better secure the containment materials from excessive movement that could lead to the loss of waste paint chips and debris. Containment beneath the work shall be with 3 m (10 feet) of the areas being cleaned, and is in addition to the ground covers specified earlier.
  
5. Water Washing, Water Jetting, or Wet Abrasive Blast Cleaning (SSPC Class 2W-3W):
  - a) Water washing of the bridge for the purpose of removing chalk, dirt, grease, oil, bird nests, and other surface debris, and water jetting or wet abrasive blast cleaning for the purpose of removing paint and surface debris, shall be conducted with a containment designed, installed, and maintained in order to capture and contain all water and waste materials. The containment shall consist of impermeable floors and lower walls to prevent the water and debris from escaping. Permeable upper walls and ceilings are acceptable provided paint chips, debris, and water, other than mists, are collected. A fine mist passing through the permeable upper walls is acceptable, provided the environmental controls specified herein are met. If paint chips, debris, or water, other than mists, escape the containment system, impermeable walls and ceiling shall be installed.
  - b) When water is used for surface cleaning, the collected water shall be filtered to separate the particulate from the water. Recycling of the water is preferred in order to reduce the volume of waste that is generated. The water after filtration shall be collected and disposed of according to the waste handling portions of this specification.
  - c) If high pressure water jetting is proposed, the Contractor's Health and Safety Plan shall clearly identify the respiratory protection that will be used to protect against aerosol form of lead ingestion.



### 123. ENVIRONMENTAL CONTROLS AND MONITORING:

A. The Contractor shall prepare and submit to the Engineer an Environmental Monitoring Plan for review and acceptance. The purpose of the plan is to address the observations and equipment monitoring undertaken by the Contractor to confirm that project dust and debris are not escaping the containment into the surrounding air, soil, and water.

#### 1. Soil and Water:

- a) Containment systems shall be maintained to prevent the escape of paint chips, abrasives, and other debris into the water, and onto the ground, soil, slope protection, and pavements. Releases or spills of paint chips, abrasives, dust and debris that have become deposited on surrounding property, structures, equipment or vehicles, and bodies of water are unacceptable. If there are inadvertent spills or releases, the Contractor shall immediately shut down the emissions-producing operations, clean up the debris, and change work practices, modify the containment, or take other appropriate corrective action as needed to prevent similar releases from occurring in the future.
- b) When feasible, water booms, boats with skimmers, or other means as necessary shall be used to capture and remove paint chips or project debris that falls or escapes into the water.
- c) At the end of each workday at a minimum, the work area inside and outside of containment, including ground tarpaulins, shall be inspected to verify that paint debris is not present. If debris is observed, it shall be removed by HEPA-vacuuming. If wet methods of preparation are used, the damp debris can remain overnight provided it is protected from accidental release by securely covering the waste, folding the waste in the ground tarps, or by other acceptable methods. Prior to commencing work the next day, the debris from the folded ground tarps shall be removed.
- d) Upon project completion, the ground and water in and around the project site are considered to have been properly cleaned if paint chips, paint removal media (e.g., spent abrasives), fuel, materials of construction, litter, or other project debris have been removed, even if the material being cleaned was a preexisting condition.

#### 2. Visible Emissions:

- a) The Contractor shall conduct observations of visible emissions and releases on an ongoing daily basis when dust-producing activities are underway, such as paint removal, clean up, waste handling, and containment dismantling or relocation.
- b) If visible emissions or releases are observed, the Contractor shall immediately shut down the emission-producing operations, clean up the debris, and change work practices, modify the containment, or take other appropriate corrective action as needed to prevent similar release from occurring in the future.

124. REGULATED AREAS:

- A. Physically demarcated regulated area(s) shall be established around exposure producing operations at the OSHA Action Level for the toxic metal(s) present in the coating. The Contractor shall provide all required protective clothing and equipment for personnel entering into a regulated area. Unprotected street clothing is not permitted within the regulated areas.

125. HYGIENE FACILITIES/PROTECTIVE CLOTHING/BLOOD TESTS:

- A. The Contractor shall provide clean lavatory and hand washing facilities according to VOSHA regulations and confirm that employees wash hands, forearms, and face before breaks. The facilities shall be located at the perimeter of the regulated area in close proximity to the paint removal operation. Shower facilities shall be provided when workers' exposure exceed the Permissible Exposure Limit. Showers shall be located at each bridge site. The shower and wash facilities shall be cleaned at least daily during use.
- B. All wash and shower water shall be filtered and containerized. The Contractor is responsible for filtration, testing, and disposal of the water.
- C. The Contractor shall make the decontamination facilities on the project available for use by Agency personnel and other Agency representatives assigned to the project.

126. SITE EMERGENCIES.

- A. Stop Work. The Contractor shall stop work at any time the conditions are not within specifications and take the appropriate corrective action. The stoppage will continue until conditions have been corrected to the satisfaction of the Engineer. Standby time and cost required for corrective action is at the Contractor's expense. The occurrence of any of the following events shall be

reported in writing to the Agency and shall require the Contractor to automatically stop lead paint removal and initiate cleanup activities:

1. Break in containment barriers.
2. Visible emissions in excess of the specification tolerances.
3. Loss of negative air pressure when negative air pressure is specified (e.g., for dry abrasive blast cleaning).
4. Serious injury within the containment area.
5. Fire or safety emergency.
6. Respiratory system failure.
7. Power failure.
8. Wind velocities exceed the maximum allowable from the design calculations.

**B. Contingency Plans and Arrangements:**

1. The Engineer will refer to the Contingency Plan for site specific instructions in the case of emergencies. The Contractor shall prepare a Contingency Plan for emergencies including fire, accident, failure of power, failure of dust collection system, failure of supplied air system, or any other event that may require modification of standard operating procedures during lead removal. The plan shall include specific procedures to ensure safe egress and proper medical attention in the event of an emergency. The Contractor shall post the telephone numbers and locations of emergency services including fire, ambulance, doctor, hospital, police, power company, and telephone company on clean side of personnel decontamination area.
2. A copy of the Contingency Plan shall be maintained at each bridge during cleaning operations and during the time the Contractor's personnel are at the bridge site under this Contract. The Contractor shall designate the emergency coordinator(s) required who shall be responsible for the activities described.

**127. COLLECTION, TEMPORARY STORAGE, TRANSPORTATION, AND DISPOSAL OF WASTE:**

- A. All paint removal wastes shall be considered hazardous regardless of the TCLP test results. The Contractor and the Agency are considered to be co-generators of the waste.
- B. The Contractor is responsible for all aspects of waste collection, testing and identification, handling, storage, transportation, and disposal according to these specifications and all applicable Federal, State, and Local regulations. The Contractor shall provide for Engineer review and acceptance a Waste Management Plan that addresses all aspects of waste handling, storage, and testing, and provides the names, addresses, and a contact person for the proposed licensed waste haulers and disposal facilities. The Agency will not perform any functions relating to the waste.
- C. The Contractor is responsible for paying all taxes, fees, and permit costs associated with the removal, transportation, and disposal of waste.
- D. All surface preparation/paint residues shall be collected daily and deposited in all-weather containers supplied by the Contractor as temporary storage. The storage area shall be located outside of any flood plain and secure (with signs around the perimeter) to prevent unauthorized entry or tampering with the containers. Acceptable measures include storage within a fully enclosed (e.g., fenced-in) and locked area, within a temporary building, or implementing other reasonable means to reduce the possibility of vandalism or exposure of the waste to the public or the environment (e.g., securing the lids or covers of waste containers and roll-off boxes). Waste shall not be stored outside of the containers. Waste shall be collected and transferred to bulk containers, taking extra precautions as necessary to prevent the suspension of residues in air or contamination of surrounding surfaces. Do not place hazardous waste on the unprotected ground. Waste shall be stored on pallets or impermeable tarpaulins. Precautions may include the transfer of the material within a tarpaulin enclosure. All waste storage containers shall be placed on tarpaulins.
- E. Transfer into roll-off boxes shall be planned to minimize the need for workers to enter the roll-off box.
- F. No residues shall remain on surfaces overnight, either inside or outside of containment. Waste materials shall not be removed through floor drains or by throwing them over the side of the bridge
- G. Flammable materials shall not be stored around or under any bridge structures.
- H. The all-weather containers shall meet requirements for the transportation of hazardous materials. The Contractor shall insure that no breaks and no deterioration of these containers occurs and shall maintain a written log of

weekly inspections of the condition of the containers. A copy of the log shall be furnished to the Engineer upon request. The containers shall be kept closed and sealed from moisture except during the addition of waste. Each container shall be permanently identified with the date that waste was placed into the container, contract number, hazardous waste name and ID number, and other information required by ANR.

- I. The Contractor shall have each waste stream sampled for each project and tested by TCLP and according to EPA and disposal company requirements. The Engineer shall be notified in advance when the samples will be collected. The samples shall be collected and shipped for testing with the first week of the project, with the results due back to the Engineer within 10 days. Copies of the test results shall be provided to the Engineer prior to shipping the waste.
- J. Waste water generated from bridge washing, hygiene purposes, and cleaning of equipment shall be filtered on site to remove particulate and disposed of at a Publicly Owned Treatment Works (POTW) according to State regulations. The Contractor shall provide the Engineer with a letter from the POTW indicating that they will accept the waste water. If the POTW allows the filtered water to be placed into the sanitary sewer system, the Contractor shall provide a letter from the POTW indicating that based on the water test results, disposal in the sanitary sewer is acceptable to them. Water shall not be disposed of until the above letter(s) are provided to, and accepted by the Engineer.
- K. If approved abrasive additives are used that render the waste non-hazardous as determined by TCLP testing, the waste shall be classified as a non-hazardous special waste, transported by a licensed waste transporter, and disposed of at a permitted disposal facility.
- L. When paint is removed from the bridge without the use of abrasive additives, the paint, together with the surface preparation media (e.g. abrasive) shall be handled as a hazardous waste, regardless of the TCLP results. The waste shall be transported by a licensed hazardous waste transporter, treated by a permitted treatment facility to a non-hazardous special waste, and disposed of at a permitted disposal facility.
- M. The treatment/disposal facilities shall be approved by the Engineer, and shall hold an ANR permit for waste disposal and waste stream authorization for the cleaning residue. The ANR permit and waste stream authorization must be obtained prior to beginning cleaning, except that if necessary, limited paint removal will be permitted in order to obtain samples of the waste for the disposal facilities. The waste shall be shipped to the facility within 90 days of the waste generation. Arrangements for the final waste pickup shall be made

with the waste hauler by the time blast cleaning operations are completed, or as required to meet the 90 day limit.

- N. The Contractor's Competent Person shall prepare and sign a manifest approved by ANR for off-site treatment and disposal before transporting the hazardous waste off-site. The Contractor shall prepare a land ban notification for the waste to be furnished to the disposal facility. The Contractor shall obtain the handwritten signature of the initial transporter and date of the acceptance of the manifest. The Contractor shall send one copy of the manifest to ANR within two working days of transporting the waste off-site. The Contractor shall furnish the generator copy of the manifest and a copy of the land ban notification to the Engineer. The Contractor shall give the transporter the remaining copies of the manifest.
- O. All other project waste shall be removed from the site according to Federal, State, and Local regulations, with all waste removed from the site prior to final Contractor demobilization.
- P. The Contractor shall make arrangements to have other hazardous waste generated by the Contractor, such as used paint solvent, transported to the Contractor's facility at the end of each day that the waste is generated. These hazardous wastes shall be manifested using the Contractor's own generator number to a treatment or disposal facility from the Contractor's facility. The Contractor shall not combine solvents or other wastes with cleaning residue wastes. All waste streams shall be stored in separate containers.
- Q. The Contractor is responsible for the payment of any fines and undertaking any clean up activities mandated by State or federal environmental agencies for improper waste handling, storage, transportation, or disposal.
- R. Contractor personnel shall be trained in the proper handling of hazardous waste and the necessary notification and clean up requirements in the event of a spill. The Contractor shall maintain a copy of the personnel training records at each bridge site.

128. METHOD OF MEASUREMENT:

- A. The quantity of Special Provision (Containment and Disposal of Lead Paint Cleaning Residues) at the location specified to be measured for payment will be on a lump sum basis in the complete and accepted work.

129. BASIS OF PAYMENT:

A. The accepted quantity of Special Provision (Containment and Disposal of Lead Paint Cleaning Residues) will be paid for at the Contract lump sum price. Payment will be full compensation for performing the work specified, including soil, water, and air monitoring; containment, collection, temporary storage, transportation, testing, and disposal of all project waste; any hazardous waste generation taxes due; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

B. Payment will be made as follows:

1. Thirty (30) percent of the contract unit price will be paid when all submittal requirements have been met and accepted by the Agency, and the Contractor is fully mobilized to begin work.
2. An additional thirty (30) percent of the Contract unit price will be paid when the lead is 50% abated.
3. An additional thirty (30) per of the Contract unit price will be paid when the lead is 100% abated.
4. The final ten (10 percent of the Contract unit price will be paid when the Contractor has fully demobilized the containment equipment, properly disposed of the waste, and paid all hazardous waste generation taxes to the satisfaction of the Engineer.

C. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Containment and Disposal of Lead Paint Cleaning Residues )	Lump Sum