VERMONT AGENCY OF TRANSPORTATION

2015 ENGLISH/METRIC

CONSTRUCTION MANUAL

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FOREWARD

The Vermont Agency of Transportation (VTrans) has experienced several changes in administration, procedures, policies, personnel, and technology since the first publication of the Construction Manual in 1967. The dynamic nature of this industry necessitates that the manual be reviewed periodically. Updates provide current information regarding policies, procedures, industry practices, and new specifications in effect and their application.

This manual is not legally a part of any contract and does not provide authority for any action not specifically authorized in the plans and specifications. It is a guide, and with the ever increasing importance of documentation, conformance to this manual should promote uniform acceptance and application of current policies and procedures.

This manual, if used properly, will be an important asset to the successful execution of our duties and responsibilities.

3/19/15

David J. Hoyne, P.E.
Construction & Materials Bureau Director

Date

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2015 ENGLISH/METRIC
CONSTRUCTION MANUAL

INTRODUCTION

CONSTRUCTION SECTION MANDATE

The Construction Section of VTrans exists for the purpose of meeting the State of Vermont's obligation to provide direct supervision of the construction work and labor of any Federal-aid highway project and to ensure Federal funding secures the product specified in the Contract.

This document describes the Federal legislation, regulation, policy, guidance, and information mandate that form the basis of our process. The Construction Manual describes the process that VTrans has developed and employs to meet both our Federal obligations and our own State or VTrans requirements. It is important for the users of this manual to understand that the process we follow has its roots tied to our Federal obligations.

Responsible Charge

The "responsible charge" specified in the legislation takes on many forms and tasks, as follows:

- The Agency appoints a staff person to be in "responsible charge"; this individual is referred to as the "Resident Engineer." The Resident Engineer assigned with responsible charge must be a "full-time employed state engineer [that] applies even when consultants are providing construction engineering services." The guidance stipulates that this person "[m]aintains familiarity of day to day project operations," "[m]akes or participates in decisions about changed conditions or scope changes," and "[v]isits and reviews the project on a frequency that is commensurate with the magnitude and complexity of the project," among other administrative duties.

- Federal regulations require that projects receive adequate supervision and inspection to ensure our transportation projects are completed in conformance with approved plans and specifications.

- While the State may hire consultants for inspection services, it is the Agency that shall provide a full-time employed State engineer to be in responsible charge of the project.

- The Agency is responsible for having procedures in effect which will ensure that the quantities of completed work are determined accurately and any documentation shall be made a matter of record.

- The Resident Engineer is responsible for documenting and processing major changes in the plans and contract provisions and all major extra work.

- The Resident Engineer is solely responsible for ensuring Federal-aid participation in contract claims by providing that "any contract adjustments made are supported, and have a basis in terms of the contract." This means the Resident Engineer must keep detailed documentation throughout the contract in order to support the potential claim that may be filed later. Additionally, the Agency must support any request for Federal-aid with a sufficient "legal and contractual basis…together with the cost data and *other facts* supporting the award or settlement."

Background

The following definitions are paraphrased from FHWA's "Policy and Guide Center" and listed in order of precedence:

- **Legislation**. The term legislation is the law which has been promulgated (or enacted) by the U.S. Congress. Example document types include: *23 USC, SAFETEA-LU, NEPA*, and *Title VI*. Additionally, court decisions are treated with the same effect as legislation.

- **Regulation**. The term regulation is an agency statement of general applicability and future effect, *which has the force and effect of law*, that is designed to implement, interpret, or prescribe law or policy or to describe the procedure or practice requirements of an agency. Regulation is codified in the *Code of Federal Regulations* (CFR). Executive Orders are also considered to be a type of regulation.

- **Policy**. The term policy is an internal agency statement of general applicability and future effect (other than a regulatory action) that sets forth a course of action, plan, or procedure on a statutory, regulatory, or technical issue or an interpretation of a statutory or regulatory issue. Policy assists the agency with implementing a program, and is often cited with regulation to verify program compliance.

  The agency expectation is that policies will be implemented and adhered to without deviation.

Guidance. The term guidance is an agency statement of general applicability and future effect (other than a regulatory or policy action) that provides advice and assistance on a statutory, regulatory, policy, or technical issue. Guidance is used to influence decisions and actions to achieve an expected program outcome. *The term implies agency expectations that the content will be considered in making specific decisions or actions that are within the user's discretion*. Technical Advisories and Memoranda are commonly used to transmit guidance documents.

- **Information**. Information is the act of informing, or giving permanent and long-lasting definite knowledge acquired. The content is educational in nature. No agency expectation is implied that the user should consider it in their actions or decisions for specific situations.

Legislation

U.S. Code (USC): Title 23 - Highways provides the law for improving and maintaining highways receiving Federal-aid. *23 USC § 101(a)(4)* defines construction as "the supervising [and] inspecting…[of] the construction or reconstruction of a highway." This particular subpart further describes the type of engineering activities covered, including 3R, hazard elimination, and capital improvement projects, among others. Further along in *23 USC § 101(b)(3)(D),* Congress declares that the national interest is served by much of what we do, that is, providing for movement demands – both personal travel and freight – and how a transportation system provides for a strong and vigorous national economy, with an emphasis on a system that is "safe, efficient, and reliable."

23 USC § 106 – Project approval and oversight outlines the plans, specifications, and estimations (PS&E) requirements, the FHWA and Secretary of Transportation responsibilities, Value Engineering, Life-Cycle Cost Analysis, and the Oversight Program.

23 USC § 114 – Construction provides "[t]he construction of any Federal-aid highway…shall be undertaken by the respective State transportation departments or under their *direct* supervision." [Emphasis added] This section further stipulates that "[t]he construction work and labor…shall be performed *under the direct supervision* of the State transportation department." [Emphasis added] Other than prohibiting the use of convict labor, these are the sole stipulations governing the State's administration of Federal-aid highway construction projects: *all work shall be performed under the direct supervision of the State.* [Emphasis added]

Regulation

Code of Federal Regulations, Title 23, Chapter 1, Subchapter G, Part 630 - Preconstruction Procedures (23 CFR § 630) has three subparts that cover highway construction inspection and verification activities:

- *Subpart B– Plans, Specifications, and Estimates*
- *Subpart J – Workzone Safety and Mobility*
- *Subpart K – Temporary Traffic Control Devices*

The remainder of *23 CFR 630* does not pertain to the Construction Section mandate.

Subpart B– Plans, Specifications, and Estimates

Subpart B, § 630.205(b) provides that "[p]lans and specifications shall describe the location and design features…in sufficient detail to facilitate the construction…and estimation of construction costs…" and "[t]he estimate shall (be of) sufficient detail to provide an initial prediction of the financial obligations…and to permit an effective review and comparison of the bids received."

Subpart J – Workzone Safety and Mobility

Subpart J, § 630.1004 defines mobility, safety, work zone crashes, and work zone impacts. Mobility "pertains to moving road users *efficiently* through or around a work zone area with a *minimum delay* compared to baseline travel *when no work zone is present*." [Emphasis added.] "[C]ommonly used measures for highway safety are the number of crashes or the consequences of crashes." Commonly used measures for worker safety are "[t]he number of worker fatalities and injuries" within the work zone.

Subpart J, § 630.1004 also defines a work zone crash as any incident, beginning within the work zone, which involves "death, personal injury, or property damage of $1,000 or more." Work zone impacts "refer to work zone-induced deviations from the *normal range* of transportation system safety and mobility." [Emphasis added] "Normality" must first be defined by mobility and safety performance measures.

Next, *Subpart J, § 630.1006* provides that "[t]his policy *shall* address work zone impacts throughout the various stages of the project development and implementation process..." [Emphasis added]

Subpart J, § 630.1008(b) provides that States "…should develop…systematic procedures to assess work zone impacts in project development, and to manage safety and mobility during project implementation…" and *Subpart J, § 630.1008(e)* provides that States "…assess the effectiveness of work zone safety and mobility procedures, (by conducting) a process review at least *every two years*." [Emphasis added]

And lastly, *Subpart J, § 630.1010* defines significant projects as causing "…sustained work zone impacts…that are greater than what is considered tolerable based on State policy and/or *engineering judgment*." [Emphasis added.]

Subpart K – Temporary Traffic Control Devices

The purpose of *Subpart K* is to describe procedures and strategies to decrease the likelihood of highway work zone fatalities and injuries to workers and road users.

Subpart K, § 630.1104 defines exposure control measures, positive protection devices, traffic control measures, and work zone safety management. In conjunction with Agency standards and guides, the *MUTCD*, and the Roadside Design Guide, the application of these devices and practices "may be determined by a project-specific engineering study, or determined from agency guidelines" that consider project characteristics and highway geometric constraints. Many characteristics and factors are identified, but those requiring a higher degree of engineering judgment include escape paths for workers, consequences from and to road users resulting from roadway departure, the hazards presented by the devices themselves during service, placement, and removal, geometrics that increase crash risk, and access to and from the work zone.

Subpart K, § 630.1108 provides that positive protection devices and longitudinal traffic barrier placement "shall be based on an engineering study" to "offer the highest potential for increased safety for workers and road users…" This section further defines "[l]ong duration work zones" as "two weeks or more" and "high…operating speeds" as "45 mph or greater."

Subpart K, § 630.1108 also provides that exposure control measures, which are traffic management strategies to avoid work zone crashes by eliminating or reducing traffic through the work zone or diverting traffic away from the work zone, be considered to avoid exposures to workers and road users while also considering the "potential impacts on mobility." This brings safety and mobility full circle.

23 CFR § 635 – Construction and Maintenance covers the process for both construction and maintenance operations, but only a few sections, of primarily *Subpart A – Contract Procedures*, pertain to the Construction Section mandate.

Subpart A – Contract Procedures

Subpart A, § 635.105 establishes the Agency as responsible "for the construction of all Federal-aid projects" by ensuring "projects receive adequate supervision and inspection" to ensure our transportation "projects are completed in conformance with *approved* plans and specifications." [Emphasis added.] *§ 635.105* further provides that while the State may hire consultants for inspection services, the Agency "*shall* provide a full-time employed State engineer to be in responsible charge of the project." [Emphasis added.]

Subpart A, § 635.120 covers contract changes and extra work. The contract must be in effect and the Agency must have already issued an authorization to proceed to secure formal approval of any "major changes in the plans and contract provisions and all major extra work…by the Division Administrator." Oral approvals are acceptable under certain emergency or other unusual conditions.

Subpart A, § 635.121 stipulates the Agency "*should* have adequate written procedures for the determination of contract time." [Emphasis added]

Subpart A, § 635.123 provides that the Agency "shall have procedures in effect which will provide adequate assurance that the quantities of completed work are determined accurately" and any documentation "shall be made a matter of record." In addition to the stipulation under *23 CFR § 635.105*, this provision would imply an Agency presence in order to document and verify pay quantities.

Subpart A, § 635.124 provides for Federal-aid participation in contract claims "on a case-by-case basis," provided that "any contract adjustments made are supported, and have a basis in terms of the contract." This means the Agency must keep detailed documentation throughout the contract in order to support the potential claim that may be filed later. Additionally, the Agency must support any request for Federal-aid with a sufficient "legal and contractual basis…together with the cost data and *other facts* supporting the award or settlement." [Emphasis added] In other words, in addition to the cost justification, some form of schedule must be maintained to support any time-based issue.

Subpart A, § 635.127 provides that the Agency "shall establish specific liquidated damages rates applicable to projects" that may be project-specific or documented as a catalogue based on contract value. Liquidated damages "shall…cover the estimated average daily construction engineering…costs associated with the…project" and, with FHWA concurrence, may also include "project related delays or inconveniences to…the public." Once FHWA initially approves liquidated damages, the Agency "shall review the rates at least every 2 years."

23 CFR § 637 – Construction Inspection and Approval covers the quality assurance procedures for construction. However, although the purpose covers "the quality of materials *and* construction," these regulations focus exclusively on the quality assurance program for material acceptance and independent assurance. [Emphasis added]

Policy

The agency expectation is that policies will be implemented and adhered to without deviation.

The following policy statements, listed by date, provide additional explanation on the specified issues.

- "Construction changes and extra work orders," April 13, 1960 (Appendix L-1). It is incumbent upon "the representatives of the contracting authority to review at an early date…the probable items of changes or extras…to…'complete the project.'" Our field staff must assess and process any contract changes or extra work in an expeditious manner.

- "Participation in engineering errors," July 12, 1963 (Appendix L-2). Carelessness, negligence, incompetence, or insufficient staffing are not considered to be acceptable excuses for engineering errors.

- "Construction engineering costs – staking performed as part of Contract," September 7, 1977 (Appendix L-3). This policy memorandum cites the definition of "construction engineering" to include "supervising construction activities" and "staking activities necessary for the State to control construction operations."

The common theme among these policies is an explicit requirement of the State to sufficiently staff the field operations to administer the Contract and supervise the work.

Guidance

Guidance implies an agency expectation that the content will be considered in making specific decisions or actions that is within the user's discretion.

The following guidance memorandum pertains to the Construction Section mandate:

- "Responsible Charge," August 4, 2011 (Appendix L-4). This guidance defines what "responsible charge" is and what duties are expected. The regulation requires the person in "responsible charge" be a "full-time employed state engineer [that] applies even when consultants are providing construction engineering services." The guidance stipulates that this person "[m]aintains familiarity of day to day project operations," "[m]akes or participates in decisions about changed conditions or scope changes," and "[v]isits and reviews the project on a frequency that is commensurate with the magnitude and complexity of the project," among other administrative duties.

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ORGANIZATION OF CONTENTS

This manual is arranged in 11 sections, with each section having a separate and distinct purpose. The overall purpose of this manual is to provide a ready reference to the policies and procedures now in effect in the Construction Section with regard to personnel matters and transportation construction. While it is intended that the use of this manual is meant to standardize methods and final results, it does not preclude the development of new ideas and procedures. As changes in policy occur, changes in this manual will be made.

SECTION I - GENERAL

Section I explains the organization of VTrans and the relationship of the Construction Section to the other sections and divisions that make up VTrans. The policies and guides under which the Construction Section operates are discussed and the duties of the various personnel are explained.

SECTION II - CONTRACT ADMINISTRATION

Section II outlines the administrative work necessary during the active life of a construction contract, from contract award through all phases of construction phase to the time the project is complete and ready for final payment. The various contract documents and forms are also explained.

SECTION III - ENGINEERING AND CONSTRUCTION SURVEYING

Section III describes engineering work and survey methods used to locate the roadway and structures in the field. Also included are directions for sectioning borrow pits, measuring quantities, and checking grades using survey methods and taking original and final cross sections.

SECTION IV - CONSTRUCTION AND INSPECTION DETAILS

Section IV is a basic guide for the administration and inspection of construction items; this includes engineering requirements prior to and during construction, the sampling and testing of materials, construction procedures and inspection, and the measurement and documentation of quantities. The major portion of this section is devoted to item specific descriptions and explanations of what is required in terms of: General, Required Submittals, Engineering, Sampling & Testing, Construction & Inspection, and Measurement & Documentation.

SECTION V - SAMPLE FIELD BOOK

Section V provides general guidelines for setting up and maintaining project field books and prescribes a standard system for the numbering of field books. Example field book pages have been provided in this section that represent preferred method of detailing item quantities and recording other field information.

SECTION VI - FINALS UNIT PROCEDURES

Section VI provides detailed instructions for performing work required after completion and acceptance of a project. This work includes the determination of the final quantities, the preparation of the final estimate, record plans, and the compiling and filing of project records.

SECTION VII - TABLES AND CHARTS

Section VII contains a collection of tables, charts, and diagrams to aid in performing field work and computing quantities.

SECTION VIII - EVALUATIONS

Section VIII provides descriptions of the evaluation processes that take place within the Construction Section such as; the evaluation of prime contractors, subcontractors, temporary employees, and consultants. Also included are sample evaluation forms.

SECTION IX - SITEMANAGER

Section IX provides an introduction to the use of the *SiteManager User Manual* as well as detailed instructions related to the use of *SiteManager*.

SECTION X - SAFETY

Section X outlines the Agency's expectations related to safety and proper safety procedures while on VTrans construction sites.

SECTION XI - ENVIRONMENTAL

Section XI provides necessary information related environmental policies, procedures, regulations, permits, and documentation.

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STATE OF VERMONT

AGENCY OF TRANSPORTATION

CONSTRUCTION DIVISION

2015

ENGLISH/METRIC

CONSTRUCTION MANUAL

SECTION I

GENERAL INFORMATION

1-100 ORGANIZATION

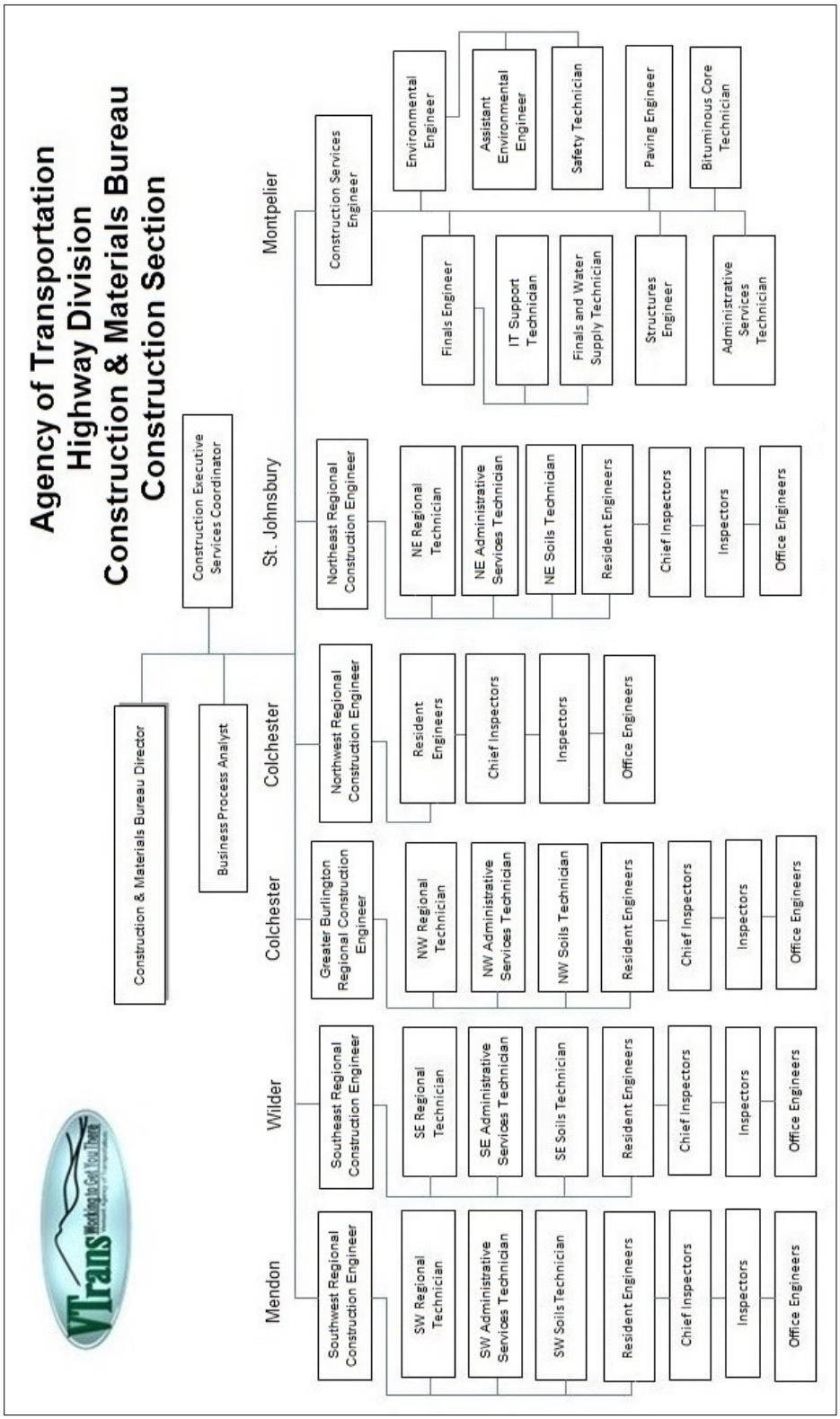
The Vermont Agency of Transportation (hereinafter referred to as VTrans) is organized to plan, design, construct, and maintain the transportation system in the State of Vermont. VTrans also provides technical and financial assistance to the towns, villages, and city road departments. The executive branch of VTrans is composed of the Secretary of Transportation, Deputy Secretary of Transportation, the Assistant Attorney General, and the Division Directors. The executive branch serves at the pleasure of the Governor.

The Transportation Board, consisting of seven members appointed by the Governor, is charged with the general supervision of the highway programs as approved by the Legislature. In general, all other employees of VTrans are classified State employees and fall under the State Personnel System.

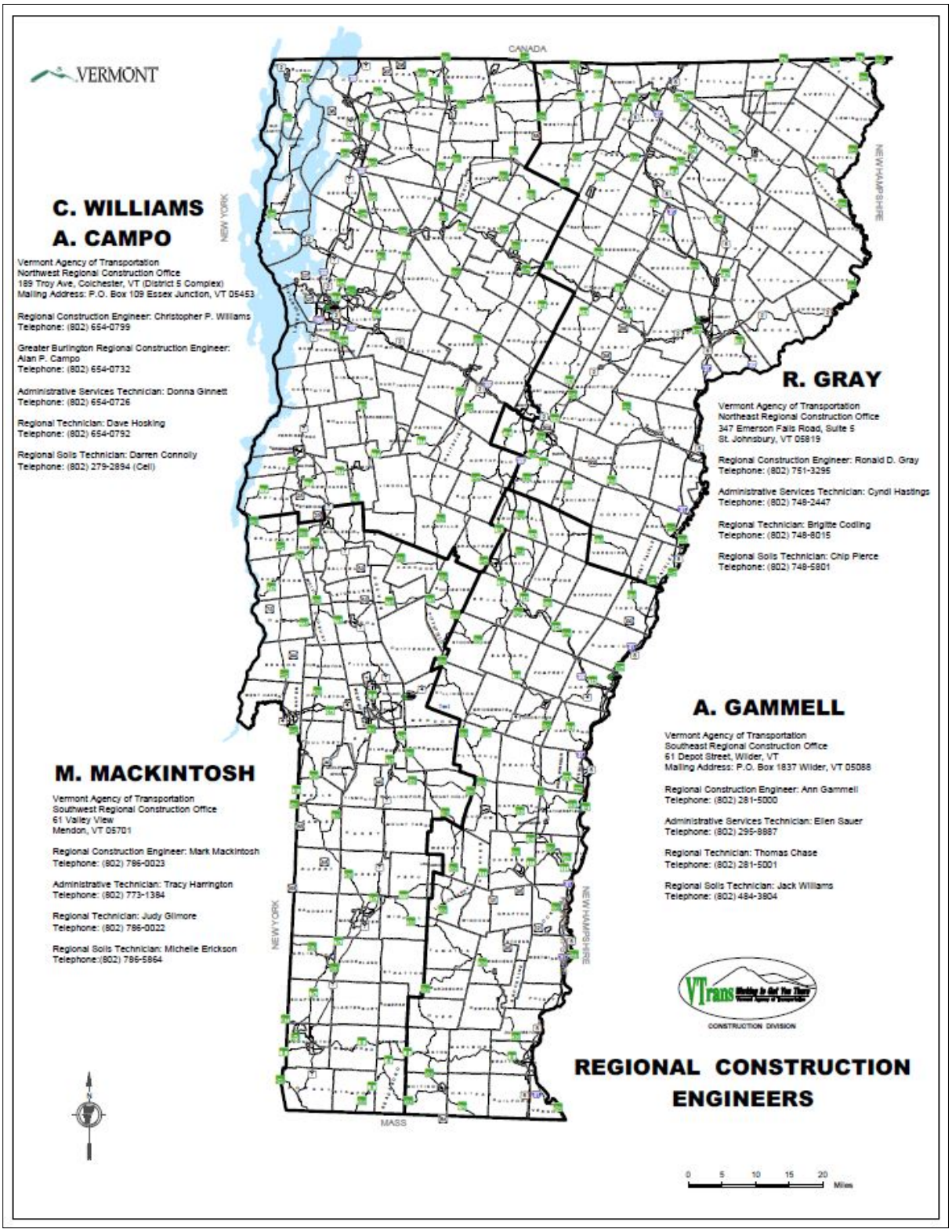
Within VTrans, the Construction Section is part of the Construction & Materials Bureau (CMB) under the Highway Division (HD) and is responsible for the administration and oversight of most capital improvement projects such as road, bridge, paving, rail, bike, pedestrian path, rest areas, and park-and-ride construction contracts. Furthermore, the Construction Section is tasked with advancing technology in construction and collaborating with industry partners to advance the state of practice.

The Construction Section plays an important role in the development of projects through constructability reviews and providing project managers feedback based on experience. The Construction Section serves the industry at large and participates in meetings with the Associated General Contractors, the Pave Association of Vermont, and with other sections within VTrans.

1-100.10 Highway Division Construction Section Organizational Chart



1-100.20 Highway Division Construction Section Regional Map



1-110 RESPONSIBILITIES OF PERSONNEL

1-110.10 General

The primary focus of all personnel in the Construction Section involves the administration and oversight of transportation construction projects under contract. These functions primarily consist of the direct inspection of a Contractor's field operations and the administrative work associated with the execution of the contract. There are many ancillary tasks that support the primary function of the Construction Section and development of the staff is one of these. There is a need to maintain a highly skilled work force and this requires continuous and extensive training.

In addition, some personnel may be temporarily assigned to other sections or divisions during the winter months to aid in road and bridge planning and design, right-of-way acquisition, traffic research, materials and research, and operations work. This provides cross training in addition to employee development.

What follows is a brief explanation of each of the positions with their primary responsibilities. These explanations are not intended to be all encompassing, but to provide a general overview of the organization of the Construction Section and the responsibility of the staff.

1-110.20 Construction Engineer

The Construction & Materials Bureau Director also serves as the Construction Engineer, the manager of the Construction Section. This position is responsible for directing the activities of the section; including the supervision of all staff in accordance with policies and labor contract provisions, administers the section budget, and oversees the engineering, inspection, administration, and final payment of all transportation projects under contract. This position reports directly to the Chief Engineer of the Highway Division.

1-110.30 Construction Executive Services Coordinator

Under the general supervision of the Construction & Materials Bureau Director, the Construction Executive Services Coordinator is responsible for providing administrative support to the Construction & Materials Bureau Director and the Construction Section staff. The Construction Executive Services Coordinator manages all personnel actions, manages all out-of-state travel requests, assists the regional staff with procedural matters, and provides technical support for consultant contracts, *Change Orders* (Appendix A-1), and other agreements or memorandums.

1-110.40 Regional Construction Engineer

The Regional Construction Engineer is directly responsible for all activities in their respective region. The state is divided into four regions. The Regional Construction

Engineer supervises permanent staff assigned to the region to support the project workload.

The Regional Construction Engineer is responsible for ensuring that contracts are administered in accordance with the contract documents, the environmental permits, and all safety regulations. The work must be carried out in conformance with standard operating procedures.

The Regional Construction Engineers are "working managers" and are directly involved with project matters that concern property owners, disputes between the Contractor and VTrans, assisting with claims analysis, and all other procedural matters.

The Regional Construction Engineers report directly to the Construction Engineer and as such are responsible for keeping the Construction Engineer informed of important matters as necessary. The Regional Process Manual outlines the specific tasks and processes that the regional staff follows in the execution of their duties.

1-110.50 Regional Administrative Services Technician

The Regional Administrative Services Technician is responsible for all of the administrative work at the regional level. The Regional Administrative Services Technician supports all staff assigned to the region and maintains project records in the regional office, including managing contract correspondence, assisting with the organization of preconstruction conferences, final inspection conferences, tracking *Change Orders*, and processing subcontractor approvals. The Regional Administrative Services Technician reports directly to the Regional Construction Engineer.

1-110.60 Regional Technician

The Regional Technician is responsible for generating reports and processing of progress payments to the Prime Contractor. The Regional Technician supports all staff in the region with all matters relating the use of the *SiteManager* system and other computer related issues, as necessary. Additional responsibilities include technical support in the development of *Change Orders* and their entry into the SiteManager system, evaluating and entering Subcontractor requests into the *SiteManager* system, and may act as Resident Engineer on select projects. The Regional Technician reports directly to the Regional Construction Engineer.

1-110.70 Regional Materials Technician

The Regional Materials Technician is responsible for the sampling and testing of materials as required by the contract specifications. The Regional Materials Technician performs compaction tests, material gradation tests, acceptance testing of concrete, and may be involved with the production and testing of Bituminous Concrete to aid the Resident Engineer. The Regional Materials Technician is responsible for ensuring a fully functional regional soils testing facility and reports directly to the Regional Construction Engineer.

1-110.80 Resident Engineer

The Resident Engineer is responsible for the administration and inspection of a specific project or projects under construction. The Resident Engineer may be assigned a varying number of Chief Inspectors, Inspectors and Office Engineers, who may be either VTrans personnel or consultants, to aid in the performance of their duties. The number of Inspectors is dependent upon the size and complexity of the project.

The Resident Engineer has a tremendous amount of responsibility. They must ensure that the project is constructed according to the contract documents and that all materials are in conformance with the specifications. The work must be accomplished in a timely manner and in accordance with all safety and environmental standards. The Resident Engineer must have a complete knowledge and understanding of the contract documents and is considered a master in this regard.

The Resident Engineer is the single point of contact for all project matters during construction. They must have the ability to solve complicated problems, placate difficult property owners, maintain accountability of the Contractor, supervise consultants or VTrans staff and maintain impeccable documentation. The job is very difficult and yet can be very rewarding.

Resident Engineers are assigned to any of the four regions in any given year. Their official work station is Construction Headquarters in Montpelier and they are required to work anywhere in the State. The Resident Engineer reports directly to the Regional Construction Engineer. See *Subsection 2-100.30 Instructions to the Resident Engineer*, for further information related to this position.

1-110.90 Chief Inspector

The Chief Inspector is responsible for the administration, engineering, and inspection of specific projects. The Chief Inspector works with the Survey Section on the initial project survey, including the baseline layout, verifying traverse points, and acquiring stakes, hubs, and paint. Other duties include monitoring field operations, including verifying field measurements and coordinating field sampling with the Regional Soils Technician. Traffic control, safety issues, public meetings, and general communication and documentation duties are also part of the Chief Inspector's responsibilities. The Chief Inspector delegates duties to the Inspector(s) and the Office Engineer. The Chief Inspector reports directly to the Resident Engineer.

1-110.100 Inspector

Under the direction of the Resident Engineer, the Inspector gives direct inspection to the performance of the work by the Contractor on a project and aids in the administrative,

engineering, and layout work. Refer to *Subsection 2-100.60 Instructions to Inspectors*, for further information related to this position.

1-110.110 Office Engineer

The Office Engineer is responsible for the administrative work for a specific contract, and may work on multiple contracts per construction season. The Office Engineer is responsible for project record compilation and documentation, including *SiteManager Daily Work Report* entries. Other duties include setting up the field office utilities, maintaining concrete, weather, and rain gauge logs, and monitoring civil rights payroll issues. The Office Engineer reports directly to the Chief Inspector.

1-110.120 Construction Services Engineer

The Construction Services Engineer is responsible for the oversight and management of the subject matter expert positions, the Finals Unit and the Construction Services Unit administrative position. This includes the Finals Engineer, the Structures Engineer, the Paving Engineer, the Bituminous Core Technician, the Environmental Engineer, and the Administrative Services Technician. The responsibility of the subject matter expert positions will be described later in this section.

The Construction Services Engineer provides critical support to the section by serving on several key committees including the prequalification committee. The Construction Services Engineer also plays a vital role in developing procedures for the section, processing *Change Orders*, and preparing *Bi-Weekly Estimates*. The Construction Services Engineer reports directly to the Construction & Materials Bureau Director.

1-110.130 Administrative Services Technician

The Administrative Services Technician is responsible for maintaining the Construction Section's equipment inventory list, preparing the yearly operating budget and budget reports, and is the contact person for ordering supplies and works with the regions to ensure proper procedures are followed. The Administrative Services Technician position reports directly to the Construction Services Engineer.

1-110.140 Construction Structures Engineer

The Construction Structures Engineer is charged with the role of expert technical resource for the field staff on all structural matters. The Construction Structures Engineer is also a liaison with the Structures Section and works during the development of plans and specifications to ensure a quality project. The Construction Structures Engineer is active in the field attending preconstruction conferences, routine site reviews, and assisting with solving complicated structural issues. The Construction Structures Engineer reports directly to the Construction Services Engineer.

1-110.150 Construction Environmental Engineer

The Construction Environmental Engineer provides guidance and technical assistance to Resident Engineers and contractors in order to maintain compliance with environmental regulations. In addition, the Construction Environmental Engineer directs and supervises the work of the Assistant Construction Environmental Engineer and the Construction Safety Technician. The Construction Environmental Engineer is also a liaison with the Environmental Section and works during the development of plans and specifications to ensure designers have accurate information regarding the Erosion Prevention Sediment Control (EPSC) requirements. The Construction Environmental Engineer is active in the field, attending preconstruction conferences, conducting routine site reviews, and assisting with solving EPSC issues in a proactive manner. The Construction Environmental Engineer reports directly to the Construction Services Engineer.

1-110.160 Assistant Construction Environmental Engineer

The Assistant Construction Environmental Engineer provides guidance and technical assistance to Resident Engineers and contractors in order to maintain compliance with environmental regulations. The Assistant Construction Environmental Engineer attends preconstruction conferences, performs regular field visits, and attends final inspections. The Assistant Construction Environmental Engineer reports directly to the Construction Environmental Engineer.

1-110.170 Construction Safety Technician

The Construction Safety Technician is responsible for the implementation and management of safety initiatives within the Construction Section. The Construction Safety Technician visits active construction projects and monitors AOT employee safety and Contractor compliance with VOSHA and MUTCD standards. The Construction Safety Technician act as a subject matter expert for construction field staff regarding questions related to safety and/or compliance and investigates any accidents that occur on VTrans-administered construction projects. The Construction Safety Technician reports directly to the Construction Environmental Engineer.

1-110.180 Construction Paving Engineer

The Construction Paving Engineer is charged with the role of subject matter expert for the field staff on all paving matters. The Construction Paving Engineer is also a liaison with the design community and works during the development of plans and specifications to ensure a quality project. This position is the Bureau's representative to the Technical Pave Committee. The Construction Paving Engineer is active in the field attending preconstruction conferences, conducting routine site reviews, and assisting with solving complicated material, placement, or payment issues. The Construction Paving Engineer reports directly to the Construction Services Engineer.

1-110.190 Bituminous Core Technician

The Bituminous Core Technician is responsible for processing all of the bituminous concrete cores sampled from paving activities in order to ascertain the percent compaction and corresponding pay factor. The Bituminous Core Technician is also responsible for operating and maintaining the bituminous core lab facility. The Bituminous Core Technician reports directly to the Construction Services Engineer.

1-110.200 Construction Finals Engineer

The Finals Engineer directs and supervises the work of the Finals Unit including the Finals and Water Supply Technician and the IT Support Technician. The Finals Unit is responsible for auditing final project quantities, the preparation of *Request for Extension of Time* (Appendix B-11) forms (including record plans for archiving), and preparing the final project documentation that terminates the contractual agreement.

The Finals Engineer also serves as a resource for Construction staff with regard to proper documentation of *Written Orders* (Appendix A-3) and *Change Orders*. The Finals Engineer reports directly to the Construction Services Engineer. Refer to *Section VI Finals Unit Procedures* for more information.

1-110.210 IT Support Technician

The IT Support Technician is responsible for supporting the computer software and hardware needs of the Construction Section as well as supporting the generation of *Bi-Weekly Estimates* for Contractor payment, and the development of ad-hoc queries and reports as requested by section management. The IT Support Technician reports directly to the Construction Finals Engineer.

1-110.220 Finals and Water Supply Technician

The Finals and Water Supply Technician is responsible for preparing accurate record plans and auditing field books, cross sections, and final quantities for accuracy, proper documentation, and contract compliance verification. The Finals and Water Supply Technician is responsible for keeping a uniform system of filing and archiving project documentation in the Headquarters Office either electronically or manually. The Finals and Water Supply Technician is also responsible for the investigation and replacement of water sources that are either to be acquired by VTrans or have been damaged by VTrans as a result of highway construction or maintenance activities. The Finals and Water Supply Technician reports directly to the Construction Finals Engineer.

1-120 DELEGATION OF AUTHORITY

1-120.10 Channels of Authority and Communication

Within the Construction Section, the Construction Engineer has the responsibility of administering construction contracts from the time of letting through the payment of the *Final Estimate*. However, it is impossible for the Construction Engineer to personally supervise all construction matters, so certain tasks are delegated to the management team or project staff. Delegation of authority is essential to the effectiveness of authority, communication, and accomplishment of necessary tasks.

Employees at all levels in the organization are responsible for their own duties, and also for any duties which they may delegate to subordinates, and it should be noted that although duties and authority can be delegated, responsibility cannot. In addition, whereas duties and authority are delegated only downwards through the channels of the organization, it is very important that communication flows both downwards, upwards, and laterally through the organization so that all people in the organization have the information they need.

1-120.20 Authority Vested in the Resident Engineer

The Regional Construction Engineer assigns a Resident Engineer to be the direct representative for VTrans on each construction project. The Resident Engineer is responsible for the administration of the contract, including construction inspection, required record keeping, and correspondence. To enable the Resident Engineer to carry out these functions, the Construction Engineer delegates the authority necessary for these responsibilities. The duties and authority of the Resident Engineer are clearly spelled out in *Subsection 105.10 Authority and Duties of the Resident Engineer* of the Standard Specifications for Construction. It cannot be overstressed that within the Construction Section, it is the Resident Engineer who has the direct responsibility, and the authority, for the successful completion of the construction project.

To aid the Construction Engineer, Regional Construction Engineers are assigned to give supervision over a group of projects in a specific region of the State. The Regional Construction Engineers advise the Resident Engineers on matters, assist with resolving problems, and are vital links within the flow of communications, upwards, downwards, and laterally. The Regional Construction Engineers are advisors to both the Resident Engineer and the Construction Engineer.

On most projects, the Resident Engineer will not be able to directly supervise all operations that may occur at one time, as most Resident Engineers will manage multiple projects each season. To assist the Resident Engineer with inspection, other VTrans staff and/or consultants will be assigned to assist with the inspection work.

The Resident Engineer will delegate tasks to the assigned staff, based on their skills and experience. When the Resident Engineer delegates a duty to assigned staff, they must also delegate the authority necessary to carry out the duty. In assigning duties to staff, the Resident Engineer must realize, though they can hold their staff responsible for the work assigned them, the Resident Engineer is still responsible for the overall administration of the project.

1-130 EMPLOYEE INTEGRITY

Integrity can be defined as the strict adherence to a code of moral values. VTrans is organized to administer the planning, design, construction, and maintenance of transportation facilities paid for by Federal, State, City, and Town funds derived from tax revenue. The objective of VTrans is to construct the highest quality transportation facilities possible in the most economical way. It is, therefore, the responsibility of all employees to conscientiously perform their duties to assure the best use of public tax dollars.

It is expected that VTrans employees will act appropriately when dealing with the public, Contractors, other VTrans representatives, as well as all other entities. When opportunities present themselves where an employee could use their position for personal gain, the opportunities must be rejected. Most positions in the Construction Section are relatively independent, so it is incumbent on each employee to do what is right and act accordingly.

Employees must be honest with VTrans and the State of Vermont. This means that they will record their time and expenses accurately according to established procedures and the labor contract. The employee will faithfully perform their duties with a fiduciary responsibility related to the expenditure of public funds. Employees must insist that Contractors comply with the plans and specifications for the individual project or that any changes allowed are for the good of the project and are well documented. If the employee is responsible for the payment to the Contractor for work performed or materials furnished, they must be accurate in the measurement of the quantities, and pay the Contractor only what they are due under the terms of the contract.

VTrans employees must avoid becoming indebted to a Contractor in any way. VTrans employees shall not accept funds in any form, for any reason; nor shall they accept materials or personal gifts from a Contractor. All Contractors and suppliers are asked to refrain from offering gifts in any form. If gifts are offered, the employee will tactfully decline. Any gift or favor, however small, and even though given and received in good faith, may compromise public trust in the employee as well as VTrans.

There are certain functions and gatherings of a social or professional nature to which the employee may be invited as a guest of a Contractor. In many cases it may be felt that attendance at these functions is in the best interest of VTrans. Attendance at these functions must be authorized by the Secretary of Transportation or the Chief Engineer. Integrity is established by employees who act appropriately. Always consult your supervisor for guidance.

1-140 RELATIONS

The Resident Engineer, even though skilled in engineering and having proper authority and sense of responsibility, must still follow certain policies and principles in dealing with people in order to maintain effective control of the project. Usually more can be accomplished by positive persuasion than by the use of the full authority given to the Resident Engineer. People that the Resident Engineer may come in contact with fall into eight groups, as follows:

1. Other VTrans personnel
2. Contract employees (consultants)
3. The Contractor and their representatives
4. Subcontractors
5. The traveling public
6. Various Municipalities and Utilities
7. Federal Highway Administration personnel
8. Other Sister Agency and Regulatory personnel

1-140.10 Relations with Other State Personnel

The Resident Engineer is responsible for the project and, therefore, is responsible for making the best use of the staff assigned to them. The Resident Engineer will assign to their staff duties that will provide the best support for managing the project and delegate the authority necessary to carry out these duties. The Resident Engineer is responsible for mentoring and training of those under their direction. An effective method to exert influence is for the Resident Engineer to set the proper example in relationships with all parties involved with the project.

The Resident Engineer is a role model and new employees will tend to pattern themselves by the example the Resident Engineer displays. It is important that the Resident Engineer brief all the staff under their supervision regarding the technical aspects of the job and the procedures that are to be followed. Clearly setting expectations in advance will lead to a more productive working environment. The Resident Engineer should be familiar with each employee's background in order to make assignments within their capabilities and follow up routinely to ensure the work is accomplished according to the expectations or provide guidance as necessary.

The Resident Engineer should provide support to their staff when disputes arise with the Contractor, provided there is a sound basis for their decision. There are instances when the Resident Engineer must overrule the staff's decisions based on their judgment and understanding of the contract. In these situations the Resident Engineer must use extreme

tact, carefully pointing out their reasoning for deciding in favor of the Contractor, and at the same time giving their staff credit for taking the initiative to make the best decision they determined appropriate at the time.

At times the Resident Engineer may not agree with the directives or decisions of their supervisor. The Resident Engineer should explain their position clearly to the supervisor but also acknowledge the final decision and move on. Where disagreements exist, it is important to discuss any differences in a professional and non-threatening way and move forward with the decision on record.

1-140.20 Relations with the Contractor

The Resident Engineer's relationship with the Contractor and their employees is often the key to a successful project. This relationship should be cordial and businesslike, and should be based on paying the full and fair price in return for quality work actually performed. The Resident Engineer must preserve the ability to make difficult decisions and not allow the relationship to influence the decision. They must also be able to see the Contractor's position on issues to make certain they base their decision on all the information available.

The Resident Engineer is looking for a quality end result and the methods used to accomplish the work, within the specification's requirements, are normally up to the Contractor. The Resident Engineer should refrain from trying to specify the methods to be used and from trying to act as a foreperson for the Contractor; but if through experience the Resident Engineer thinks they can improve the Contractor's operation, they should feel free to present their ideas to the Contractor for consideration.

We are in a period of rapidly changing construction equipment and methods, and the Resident Engineer should not condemn a new and unfamiliar technique until they have given the Contractor a chance to demonstrate the methods and the results. They may, however, warn the Contractor that a new method will be acceptable only if the end results are as described by the specifications. This will make the Contractor use caution in expending time and money on an untried piece of equipment or technique, and could prevent future problems.

The prompt initial layout of construction stakes should be accomplished as outlined in *Subsection 105.09 Construction Stakes* of the Standard Specifications for Construction. Waiting for engineering services that are the responsibility of the Resident Engineer may result in lost time on equipment and labor for the Contractor. It is the Contractor's responsibility to keep the Resident Engineer informed of their work schedule so that the Resident Engineer can plan their work to always stay ahead of the Contractor's needs. The Resident Engineer must also try to give prompt but accurate decisions as questions arise. Untimely responses can also mean lost time for the Contractor.

The Contractor is in business to make a profit on their investment. The Resident Engineer must be thoroughly familiar with the plans and specifications to know what work is included under the bid items. If the need arises to perform work that is not

covered by the contract items or specifications, a *Change Order* shall be initiated to establish a method and reason for payment. Contractors have the expectation that they will be fairly paid for their work.

The Resident Engineer must make it clear that within the prescribed policies of VTrans, the Resident Engineer is the State's authorized representative and is in charge of their particular project. The Contractor realizes that the Resident Engineer receives supervision from others in the Construction Section, so the Resident Engineer must support management in conversation with the Contractor. The Resident Engineer is also responsible for the actions of their staff, and they must set the tone on project on how to deal with the Contractor's representatives. The project will run smoothly only if all matters relating to the Contractor are handled in a fair and professional manner.

1-140.30 Public Relations

Construction and maintenance of infrastructure, by its nature, can at times cause inconvenience and may disrupt the lives of the traveling public and residents adjacent to the project.

When the Resident Engineer arrives on the project, they may find that local residents will hold them accountable for everything related to the project. It is important to gain the respect and confidence of the property owners and local residents if possible. This can be done by explaining the project to interested parties, and by listening sympathetically to individual concerns. The Resident Engineer must be careful not to promise work that is not covered in the contract. In some cases, the Resident Engineer must forward the complaints or concerns to the Regional Construction Engineer for consideration and possible action.

It is important that the public is regularly updated about the status of the project and it is the responsibility of the Resident Engineer to provide updates through the submission of their weekly status report to the Regional Construction Engineer and/or Regional Administrative Services Technician. The information from the weekly status reports will be disseminated to the VTrans 511 website and the VTrans Public Relations Office.

The Resident Engineer may occasionally be contacted by the local press for a story on the progress of the project. The Resident Engineer's comments should be factual, and they should refrain from giving a personal opinion regarding any controversial matter pertaining to the project. Detrimental comments should never be made regarding the Contractor, the Contractor's operations, local officials, or the Resident Engineer's subordinates or supervisors. All information must be given so concisely that it cannot possibly be misinterpreted.

The Resident Engineer should summarize the interview in an email message and send it to the following list of people:

- The Secretary of Transportation
- The Construction & Materials Bureau Director
- The Chief Engineer, Highways Division
- The Regional Construction Engineer
- The Agency Public Relations contact
- The Construction Executive Services Coordinator
- The Highways Executive Office Manager

1-140.40 Relations with the Federal Highway Administration

The *Federal-Aid Highway Program Stewardship and Oversight Agreement* between the Federal Highway Administration (FHWA) and VTrans is the guiding legal arrangement between the two agencies. FHWA maintains full oversight on select projects which places FHWA directly in the approval chain for all contract documents, including all modifications to the contract. Whether FHWA has full oversight or not, it is important for the Resident Engineer to establish and maintain an effective and professional working relationship with FHWA. If the contract plan's Title Sheet is signed by FHWA, that indicates full oversight by FHWA.

The *Federal-Aid Highway Program Stewardship and Oversight Agreement* may be found at the Federal Highway Administration website at the following URL:

http://www.fhwa.dot.gov/federalaid/stewardship/agreements/vt.htm

In addition, Design Build Activities Guidelines for VTrans projects that are conducted under FHWA oversight may be found at the following URL:

http://vtranscontracts.vermont.gov/sites/aot_contract_administration/files/documents/designbuild/FHWA%20Design-Build%20Activity%20Guideline.pdf

1-140.50 Personal Conduct

The personal conduct of VTrans personnel, both on and off the project, is of great importance because this is often the basis on which the public forms its impression of VTrans. The expectation is, as a representative of the state of Vermont, construction personnel will present a professional appearance and a customer-friendly attitude. When employees are required to stay overnight at the expense of the State, they are required to use discretion regarding their conduct after normal working hours.

1-150 PERSONNEL POLICIES AND RULES

1-150.10 General

All personnel of the Construction Section are known as classified employees, and are employed subject to the *Rules and Regulations for Personnel Administration* as set forth by the Department of Human Resources of the Department of Administration. A complete copy of these rules and regulations and the bargaining agreements are available for reference at Construction Headquarters. This information can also be found at the Vermont Department of Human Resources website at the following URL:

http://humanresources.vermont.gov/policy/manual

Employees are bound by and must adhere to the provisions of Vermont State Department of Personnel *Policies and Procedures #5.6, Employee Conduct*. This document may be found at the following URL:

http://humanresources.vermont.gov/sites/dhr/files/Documents/Policy%20Manual/Number%205.6%20-%20EMPLOYEE%20CONDUCT.pdf

Employees are also bound by and must adhere to the provisions of Vermont State Department of Personnel *Policies and Procedures 11.7, Electronic Communications and Internet Use*. This document may be found at the following URL:

http://humanresources.vermont.gov/sites/dhr/files/Documents/Policy%20Manual/Number%2011.7%20-%20ELECTRONIC%20COMMUNICATIONS%20AND%20INTERNET%20USE.pdf

Exceptions to this policy must be approved in writing by the Chief of Information Technology.

1-160 SALARY PAYMENT

1-160.10 General

At the end of each bi-weekly pay period, every employee must submit a *Time Report* via the Managing Assets for Transportation Systems (MATS) website, which is the VTrans electronic payroll system. MATS is an application that is available to all employees and details regarding its administration and use can be obtained from the Construction Executive Services Coordinator. The *Time Report* serves two purposes: it tracks salaries of employees so that the correct project can be charged; and it serves as documentation of the work performed by the employee.

Refer to *MATS Daily Work Report – Time Entry* for more information about submitting *Time Reports*.

1-160.20 Submittal Date

The original *Time Report* must be approved by the employee's supervisor no later than Monday morning at 8:00 AM of payroll week, unless otherwise requested earlier due to a holiday. Employees are expected to enter their time on a daily basis.

1-160.30 Directions for Completing a Time Report for Permanent Employees

The general instructions for completing *Time Reports* are as follows:

1. *Time reports* shall be completed within MATS and submitted via fax or scanned and emailed to the employee's Supervisor for approval and signature. All *Time Reports* shall include the employee's signature.
2. All work and leave hours must be accurately reported on the *Time Report* and include the correct expenditure account, sub-job, and activity code. The employee's Supervisor shall instruct the employee in th*e Use of Tim*e reports and ensure that they are properly completed. In the case of an employee's illness near the end of a pay period, the Supervisor shall complete the employee's time report.

It is required that a *Time Report* be submitted for each pay period. Without a *Time Report*, the employee will not receive a paycheck and may lose insurance benefits. More detailed instructions for *Time Reports* may be provided by the appropriate Regional Construction Engineer or by Construction Headquarters.

1-160.35 Transportation Resident Engineer Allowance Pay

Personnel specifically assigned as a Resident Engineer, or as an Acting Resident Engineer in the Resident Engineer's absence, may be eligible for Transportation Resident Engineer Allowance (REA) Pay as per *Article 75* of the *Vermont State Employee Association's Contract*.

The following eligibility criteria shall be observed:

1. The individual is assigned as the Resident Engineer, and,
2. The Contractor is actively working on the project(s), and,
3. More than 50% of the base 80 hours are spent on the project(s) they are designated as Resident Engineer while the Contractor is working on the project(s).
4. REA pay is limited to 15 pay periods per calendar year. If an employee goes over the 15th pay period without approval by the Secretary of Transportation

(in unusual circumstances) then the employee will repay the State any overpayment received.

1-160.40 Consultant Inspectors

VTrans maintains contracts with several consultant engineering firms to provide Consultant Inspectors for VTrans projects. The project's Resident Engineer and/or the Regional Construction Engineer should be responsible for managing the contract between VTrans and the Consultant Inspector. The Consultant Inspector is generally allowed to charge expenses using the same guidelines as for VTrans personnel unless otherwise noted in the contract. The Consultant Inspector's name should be noted on the project *Daily Work Report* and a two week summary (salary sheet) of their hours should be signed by the VTrans Supervisor (Resident Engineer or Regional Construction Engineer) and forwarded to Construction Headquarters for comparison with the Consultant Inspector's periodic billing.

The Resident Engineer shall review and approve the *Consultant Time and Expense Report*. The Consultant Inspector should use the *Consultant Time and Expense Report* to report their hours worked and expenses incurred every two weeks. The Consultant Inspector may substitute their own form if it contains all the required information. The Resident Engineer shall retain the signed and approved *Consultant Time and Expense Report* as part of the project records.

1-170 AUTHORIZATION FOR OVERTIME WORK

An employee will not work an hour or day classified as overtime unless authorized to do so by the Resident Engineer on the project, or the Regional Construction Engineer. Overtime hours will begin after eight hours of work, regardless of time when work started for the day. Overtime days include Saturday, Sunday, and Holidays. Refer to the latest *Vermont State Employees Association* (VSEA) contract for a further discussion of overtime work and compensation. The latest version of the employee contract may be found at the following URL:

http://humanresources.vermont.gov/policy/labor_relations/collective_bargaining_agreements

It is the directive of the Construction Engineer that employees will not work more than 12 hours in a 24 hour period and no more than six days in a week. If there are extenuating circumstances where an employee must be on project in excess of 12 hours in a 24 hour period, then they must obtain advance approval from their from their Regional Construction Engineer. Written approval must follow within 24 hours. This written request must include an explanation as to why they must be on project in excess of 12 hours. No time over a 14 hour work day (including travel time) will be allowed. The Regional Construction Engineer will ensure that proper staffing is in place so that these established limits are not exceeded.

When scheduled overtime can be predicted, based on more than eight hour days or working Saturdays, it must be approved. The Resident Engineer should submit a *Request for Overtime* form for each project for each construction season. The Resident Engineer shall enter the names and pay scale of all Agency employees who might work on the project and check their choice of receiving pay or compensatory time off. The minimum number of people should be used in an overtime status to adequately inspect the Contractor's work. Next, enter the specific reason why overtime authorization is being requested. The *Request for Overtime* should be signed by the Regional Construction Engineer and forwarded to Headquarters. Unscheduled overtime must be requested immediately.

1-170.10 Call-in Pay

Reasons for call-in pay shall be limited to those circumstances during an unplanned non-working hours event that require an employee to go to the project site to take action and/or address issues that are deemed necessary to protect the state's interest. The Resident Engineer must first consult with section management to determine if the situation on-site requires their presence before departing for the site. Approval by the Regional Construction Engineer shall be executed through an email message to the Resident Engineer, with a copy also sent to the Construction Engineer.

In the case of an emergency, it is recognized that it may not be possible for the Resident Engineer to get an immediate response from management. However, it is expected that the Resident Engineer would send to management an email or leave a voice mail message stating what has occurred and their intention to visit the site. As time permits, the Resident Engineer would then follow-up with the Regional Construction Engineer.

Reasons that may dictate a call-in situation are those which generally originate from the State Police, Operations, or Local officials summoning the Resident Engineer to the project. The concerns may range from the safety of the traveling public, the potential for an environmental incident, concerns for the structural integrity of a structure, theft, and vandalism. The purpose of visiting the site would be to confirm the existence of an issue and, if necessary, oversee the operations of the contractor in addressing the concern.

An example of a call-in situation would be for the State police to call the Resident Engineer on a Sunday morning stating there is a need for dust control on project. The expected response in this instance would be the Resident Engineer contacting the Contractor's emergency contact person and direct them to respond. In this case, there is no need for the Resident Engineer to be on site.

If, however, the incident on the project included a severe accident and/or the accident caused extensive damage to elements of the project where the traveling public could be at risk, then the employee, in consultation with the Regional Construction Engineer, may

determine that it is in the state's best interest to report to the project site, assess the damage, and direct the contractor as necessary to ensure public safety. In this case the provisions of call-in pay would then apply as set forth in the employee's VSEA contract.

It is the directive of the Construction Engineer that an employee cannot self-approve the use of call-in pay. Activities that are planned in advance, such as checking concrete cures, moving cylinders, monitoring environmental control features, or ensuring traffic control measures are not eligible for call-in pay.

1-170.20 Compensatory Time

In addition to the 56 hours of Compensatory Time Hours allotted by the VSEA contract, personnel may request additional accrual of compensatory hours by filling out a *Compensatory Time Request Form* (Appendix A-4) and submitting it for approval by their Supervisor and the Construction Engineer. The maximum amount of compensatory time construction personnel can accrue and have on the books at any one time is 120 hours. This directive will stay in effect until rescinded by the Construction Engineer.

1-180 TRAVEL EXPENSES

1-180.10 General

All employees are authorized to be reimbursed for their expenses for travel when they are required to work away from Construction Headquarters and away from their home. The policy for reimbursement of these expenses is established by the Finance Division of the Department of Administration. Reimbursable expenses are generally those actually paid by the employee and include travel expenses, meals, lodging, postage, telephone, miscellaneous incidentals, and supplies.

It is expected that all employees will submit for reimbursement only those expenses which they have actually incurred. Furthermore, all expenses incurred should be necessary and reasonable, and made with the interest of Vermont taxpayers in mind. Refer to the following section for current guidance and policies relating to travel expenses.

1-180.20 Transportation Expenses

The Vermont Agency of Administration issued a memorandum (dated July 1, 2014) regarding the new mileage reimbursement rates for the use of privately owned vehicles (POV). The primary objectives of these guidelines are to reduce costs, encourage energy conservation, and maximize the cost-effective utilization of State-owned vehicles.

These guidelines encourage the use of the least costly method of travel, which can be determined by using the Trip Calculator located on the Buildings and General Services (BGS) website at the following URL:

http://bgs.vermont.gov/business_services/fleet/forms

In conjunction with the Trip Calculator, the Car Availability Rationalization System (CARS) matrix is used to determine whether to use a POV or State Vehicle, and if a POV is used, which mileage reimbursement rate to claim on the Expense Report. The CARS *Vehicle Decision Matrix* is also found on the BGS website at the same URL as the Trip Calculator.

The GSA rate is determined by the following criteria:

Full GSA Rate: This rate for mileage reimbursement for POV use is paid for trips of less than 80 miles, when a POV is the most cost-effective option, or when a State vehicle (a Department, FMS Motor Pool, or Rental vehicle) is the most cost-effective option and a State vehicle is not reasonably available. Department heads may also authorize POV use for justifiable business reasons.

A *POV Approval Form* (Appendix A-5) must be submitted and approved by the Chief Engineer and retained for the Time and Expense Coordinator's files to receive the full GSA rate. The *POV Approval Form* must include a cost analysis that considers the unique circumstances of the travel situation and may also include the value of the employee's time as it relates to the use of a State vehicle.

There is a provision in the Agency of Administration's memorandum that allows for the use of a POV at the full GSA rate if the department head determines that there is a justifiable business reason to allow the employee to receive the full rate. A *POV Approval Form* must be submitted for a specific trip or annually. Annual renewals are due by July 1st each year.

For more information about completing a *POV Approval Form*, refer to *POV Approval Form - Sample Justifications* (Appendix A-6). Supervisors must review and initial all employee requests prior to submission for the Construction Engineer's approval as well as for authorization by the Chief Engineer. All requests must be routed through the Construction Executive Services Coordinator.

Reduced GSA Rate: This rate for mileage reimbursement is paid when a POV is not the most cost-effective option and a State vehicle is reasonably available. For round trips of greater than 80 miles, employees may reserve a State vehicle. If a State vehicle is not immediately available, the employee will receive a "Notice of Regret" and be eligible for reimbursement at the full GSA rate. The "Notice of Regret" must be submitted to the time and expense coordinator to justify receiving the full GSA rate.

Mileage reimbursement is allowed for travel from the employee's home to the project, regardless of their relationship to Construction Headquarters. An employee is not allowed mileage reimbursement for commuting from their home to their base work station. If possible, several employees going to the same project should travel together in

the same vehicle. In this case, only the vehicle's owner is eligible for any mileage reimbursement. This is the normal guidance for all staff performing survey work, whether preliminary, construction, or final.

If members of the field staff elect to travel to the project field office, Regional office, or Headquarters for the purposes of preparing the project Finals box while the Contractor is not working, then there will be no mileage reimbursement or any authorized use of a State vehicle to and from that location. Also, if members of the field staff are providing services to the Construction Services Unit or the Finals Unit in the Headquarters Office, there will be no mileage reimbursement or any authorized use of a State vehicle to and from the Headquarters Office.

Any employees required to visit a project site while stationed at the Headquarters Office will be eligible to receive mileage reimbursement or the use of an authorized State vehicle. Any employees driving more than 2,000 reimbursable miles per year are required to take the State's Defensive Driving course every 10 years. The Defensive Driving course is available to take on line, and is available at the Buildings and General Services (BGS) website at the following URL:

http://bgs.vermont.gov/business_services/fleet/forms

The State's Defensive Driving course is also available through VTrans and may be found at the following URL:

http://vtransoperations.vermont.gov/sites/aot_operations/files/documents/VTTC/VTTCTrainingBulletin.pdf

Mileage reimbursement will be paid for travel on the project, as well as to and from the place of lodging while subsisting on or near the project.

While subsisting away from home and from Construction Headquarters, travel time from the employee's home to the project and return will normally be allowed only once a week, usually Monday morning and Friday or Saturday night. However, if a holiday falls during the week, or if the employee takes leave during the week, they will be paid travel time to their home and return on the day preceding and the day following the holiday or leave.

If an employee subsisting away from home desires to return to home one night during the week, they may do so and receive the mileage reimbursement for up to a total of 160 miles round trip. Employees that receive this mileage reimbursement are not eligible to receive reimbursement for the evening or breakfast meal, or for the night's lodging. The employee must not allow any mid-week trips to interfere with their normal duties.

An employee called to Construction Headquarters from an active project for a meeting during the week will be allowed mileage reimbursement from the project to Construction Headquarters and the return trip to the project.

Employees who are required to travel to a project, but do not own a vehicle and who cannot obtain a ride with another employee, are authorized to travel by commercial means, such as rail or bus, if available. A cancelled ticket stub or other receipt must be submitted as a voucher for reimbursement. Employees in this situation may be allowed mileage reimbursement if they are delivered to the project by a parent, relative, or acquaintance and they have the Construction Engineer's approval to do so. No allowance shall be made for transportation by hitchhiking.

Employees are expected to commute to work when the distance from their residence to the project site is 50 miles or less. Employees are expected to stay overnight when the distance from their residence to the project is more than 80 miles. Travel distances between 50 and 80 miles require a decision from the Regional Construction Engineer. Exceptions to this provision must be examined on a case-by-case basis and have the approval of the Regional Construction Engineer.

1-180.30 Meals

Meals are reimbursed based on the rates published in the latest version of the VSEA Bargaining Agreement, which can be found at the Vermont Department of Human Resources website at the following URL:

http://humanresources.vermont.gov/policy/labor_relations/collective_bargaining_agreements

1-180.40 Lodging

Lodging for employees may be obtained at hotels, motels, or tourist homes, and will be reimbursed at actual cost. Receipts are required for reimbursement of lodging expenses. Many hotels and motels offer special government rates, and it is expected that employees will avail themselves of these rates. Two or more employees may occupy a room, with each paying and receiving reimbursement for only their pro-rated share of the room expenses.

Some hotels and motels may directly bill the Construction Section. In such a case, the invoice should be signed by the employee with the project name and number added. The employee's expense report should indicate "Lodging direct billed to the State."

The following special travel and lodging conditions may occur:

1. In the selection of lodging, consideration will be given to choosing the location requiring a minimum of travel to obtain meals and to get to the project.

2. An employee whose home is at least 80 miles from the project, and whose presence is essential on the project by 7:00 AM on Monday will be allowed to travel to the project on Sunday night and receive reimbursement for the lodging.
3. It is anticipated that these will be isolated cases and must be coordinated with, and the need substantiated by, the employee's Supervisor prior to incurring the expense.

On occasion, an employee may request the rental of an apartment or a house, henceforth referred to as a "unit." With the recommendation of the Regional Construction Engineer and the approval of the Construction Engineer, an employee may be authorized to be reimbursed for a "unit," provided the following conditions are met:

1. A cost analysis will be provided for approval demonstrating the rental of a unit is a cost-savings to the State.
2. Employees shall not be reimbursed for staying at their primary residence, at personally-owned property, or the residence of a relative or a friend.
3. The individual acknowledges that they are entering into the rental agreement at their own risk. The employee takes full responsibility for all costs associated with the rental of the unit not addressed in the approved cost analysis. If the individual's assignment changes and the unit is no longer needed, the State will not be liable for any outstanding costs or deposits due to the lease of the unit.
4. An employee on leave will not be eligible for reimbursement. An amount proportionate to the number of days worked as compared to the days on leave may be reimbursed with approval. This amount may be adjusted if a cost analysis shows that a higher proportion continues to be a cost-savings to the State.
5. A "unit" that has been authorized for reimbursement shall not be subleased without prior additional authorization of the sublease while an employee is receiving reimbursement for that "unit."
6. Approval may be rescinded for rental reimbursement at any time if deemed it in the best interest of the State

1-180.50 Miscellaneous Purchases

All miscellaneous purchases must be cleared through Construction Headquarters. Receipts must accompany expense reimbursement for postage and emergency supplies.

1-180.60 Expenses – Electronically within VISION

A request for reimbursement of expenses shall be made through the *VISION* website, and shall be used for all expense reimbursements made by VTrans. This request for reimbursement of expenses is required by the Department of Finance & Management and the Agency of Financial Services Division and must be utilized by VTrans employees to request reimbursement for expenses on the Finance Payroll System. Detailed instructions for filling out the form may also be found at the Department of Finance & Management *VISION* website at the following URL:

https://finance.peoplesoft.state.vt.us/psp/FMPRD/?cmd=login&languageCd=ENG&

The User Productivity Kit (UPK) link for creating expense reimbursement documents may be found at the following URL:

https://knowledge.peoplesoft.state.vt.us/Expenses/data/toc.html

Only the following items are eligible to be claimed by employees on their expense report as reimbursable expenses:

1. Mileage
2. Lodging
3. Meals
4. Miscellaneous expenses (Tolls, parking fees, other transportation expenses, tips, postage, etc.)
5. Boots (reimbursable per specified amount in *VSEA contract*)

Receipts for lodging, miscellaneous expenses, and boots must be submitted to the Construction Section's Time and Expense Coordinator. An out-of-state travel request is required for all out-of-state travel. Expense submittals shall be made in a timely manner.

1-190 VTHR ON-LINE RESOURCE CENTER

The Vermont Department of Human Resources (VTHR) has a self-service on-line resource featuring User Productivity Kits (UPKs) for state employees who want to make adjustments to their benefits, payroll and compensation, or personal information. The UPK link for self-service tutorials may be found at the following URL:

https://knowledge.peoplesoft.state.vt.us/ESS/data/toc.html

1-200 EQUIPMENT AND SUPPLIES

1-200.10 General

All of the equipment that is required by Construction Section is supplied by VTrans through Construction Headquarters. Equipment and supplies fall into four categories:

1. Survey, staking, and field equipment
2. Administrative office supplies
3. Laptops and supporting equipment
4. Cell phones

Construction Headquarters maintains an inventory database of all survey equipment assigned to the Construction Section. This database allows for a quick search of the equipment in the event that an employee is in need of a specific piece of equipment. This database is maintained by the Construction Administrative Services Technician.

The Agency's policy for employee use of computer hardware, software and mobile devices may be found at the following URL:

http://vtrans.vermont.gov/sites/aot/files/documents/policies/80153-VTrans-Computer-Hardware-and-Software-Use.pdf

1-200.20 Procurement

Survey equipment items, including total stations, data collectors, transits, and automatic levels, are issued only upon authorization by the Construction Engineer. Other nonexpendable items such as tapes, level rods, and hammers are issued as requested. Expendable items such as marking crayons, marking paint, flagging, grade stakes, and hubs are issued as needed through the Regional Offices.

Office supplies, including items such as pencils, pencil sharpeners, loose-leaf binders, and field books, are issued by the Regional Office or Construction Headquarters.

Laptops and supporting equipment are issued through the Construction IT Technician. Cell phones for employee use shall be requested by the Regional Engineer and approved by the Construction Engineer, then forwarded to the Highway Business Office for procurement.

The Construction Safety Technician will compile a list of personal protective equipment as required for each employee and submit it to the Construction Engineer for approval. This approved safety equipment list will then be forwarded to the Highway Division Business Office for procurement.

1-200.30 Transfer of Equipment

Often during the summer construction season, it is necessary to transfer non-expendable equipment such as total stations, transits, data collectors, or torque wrenches from one employee to another. It is the responsibility of the individual in current possession of the equipment to notify the Construction Administrative Services Technician in Headquarters to whom the equipment will be transferred. For further guidance regarding the transfer of equipment, refer to *Subsection 3-130.10 Assignment and Transfer.*

The Construction Administrative Services Technician is responsible for maintaining the Construction Section's equipment database so that management will know what is available for equipment at any given time.

Upon termination of employment, all equipment shall be returned to the Regional Construction Engineer.

1-200.40 Care of Equipment

Equipment will be properly cared for and safeguarded while in the possession of the employee. The Construction Section implements a yearly maintenance program for the VTrans equipment, which should be sent to Headquarters every winter for cleaning and calibration. Employees should take precautions against the loss or theft of equipment in their possession, as they may be held accountable for any equipment assigned to them which they cannot produce.

Lost or stolen equipment should be reported to Construction Headquarters (the Administrative Services Technician and the Administrative Executive Services Coordinator), who will forward the information to the Highway Division Business Office and to local law enforcement, with following information included in the account:

- Type of incident
- Date and time of incident
- Name of Employee(s) involved
- List of lost or stolen equipment
- Copy of Police Report (if applicable)

The *Equipment Assignment Record Form* (Appendix C-1) should be completed, with the above information included, by the Resident Engineer. The Highway Division Business Office will submit the report to the Risk Management Section.

1-200.50 Private Use of State-Owned Equipment

VTrans employees shall not, under any circumstances, use State-owned equipment, such as survey equipment, to engage in private work either on a paid or non-paid basis. The main reason for this is the complaint by incorporated engineering companies that work done by an individual who does not have to purchase their own equipment is done at an unfair competitive advantage over the person or company that does have to supply its own equipment. An employee owning their own equipment may perform outside work on their own time, if it in no way interferes with their VTrans employment.

1-210 CARE AND USE OF STATE-OWNED MOTOR VEHICLES

1-210.10 General

State-owned vehicles are provided for official use only, and only State officials and/or State employees are permitted to operate and ride in these vehicles unless this requirement is waived in writing by the Secretary of Administration. The uniform policy governing the use and care of State-owned vehicles is covered under the Agency of Administration's *Bulletin 2.3 - State Vehicles (Purchase/Usage).* This bulletin is found at the following URL:

https://aoa.vermont.gov/sites/aoa/files.pdf/AOA-Bulletin_2_3.pdf

This requirement has been waived for Town officials, officials of the Federal Highway Administration, officials of other Federal agencies, and visiting officials from other states.

1-210.20 Operation and Servicing

The vehicle operator is responsible for the care and maintenance of the assigned vehicle. Any major repairs resulting from the operator's neglect of maintenance could result in dismissal according to personnel rules and regulations. Vehicle maintenance is a continuous job requiring actions before operation, during operation, and after operation.

Items normally checked by the vehicle operator are gas, oil, water, antifreeze, tire air pressure, and necessary reports. Gasoline and oil should be obtained through the use of credit cards issued with each vehicle.

For more information about vehicle operator responsibilities, refer to the Fleet Management Services – Operation and Administration website of the Building and General Services Division, which may be found at the following URL:

http://bgs.vermont.gov/business_services/fleet/operation

For more information about vehicle rental and leasing, refer to the Fleet Management Services – Frequently Asked Questions website of the Building and General Services Division, which may be found at the following URL:

http://bgs.vermont.gov/business_services/fleet/faq

Each fleet vehicle has a Guidance Manual, including a vehicle log, a list of approved fuel vendors, and information about vehicle washing services. Required maintenance of Fleet Management vehicles shall be done by approved garages. Oil changes, tire replacements, and any other vehicle maintenance charges shall be billed directly to Fleet Management's office in Montpelier or may be covered by credit card if preapproved by Fleet Management.

1-220 PERFORMANCE EVALUATIONS

1-220.10 Purpose

Under the *1967 Vermont Compensation Plan*, the performance of each employee in the classified service shall be rated annually. In addition, employee ratings are required upon scheduled completion of a trainee, probationary, or warning period; upon separation from VTrans and at such other times as are necessary or desirable.

1-220.20 Supervisor Responsibility in Performance Evaluations

It is important to consider all essential factors if the performance evaluation report is to reflect an accurate evaluation of the employee's performance on the job. No hard and fast rules can be developed which will ultimately produce a perfect evaluation, mainly because of the human element involved in the rating procedures, with the quality of the supervisor's judgment the major factor in determining the quality of the final evaluation. The rater should evaluate the performance for the period being covered and should not be influenced by evaluations for prior periods.

The VTrans employee evaluation process is an opportunity to provide the employee with feedback of their performance as prescribed in the performance expectations section of their *Annual Performance Evaluation* and to detail new duties and expectations for the next evaluation period. Constructive feedback for areas requiring improvement or recognition of exemplary performance shall be clearly documented.

Employee evaluations shall be completed annually by each employee's supervisor, submitted to the Division Administration for review and signature, reviewed with the supervisor, and then reviewed with the employee as spelled out in the Vermont State Employee's Contract. Each supervisor shall keep track of when employee evaluations are due. Refer to the employee contract for more information about scheduling employee evaluations. The latest version of the employee contract may be found at the following URL:

http://humanresources.vermont.gov/policy/labor_relations/collective_bargaining_agreements

Employee ratings should be based primarily upon the relationship of the employee's work performance to the standards of performance applicable to the position and department. Performance evaluation reports for previous rating periods, length of time in state service, and comparisons with co-workers are not rating factors.

The primary purpose of a performance evaluation interview is to assist the employees to know their job and attain a fully satisfactory level of performance. A performance evaluation interview should be constructive and benefit both the employees and section. Through discussion between supervisor and employees a greater understanding of the relationship between individual position duties and section objectives can be developed.

Performance standards applicable to the position should be reviewed with the employees. They should be complimented on those aspects of their performance which presently meet the section's requirements and advised of specific ways in which performance below such standards may be improved.

At the conclusion of the performance evaluation interview, all copies of the report shall be signed and dated by the rated employee to indicate that they have received a copy and the report has been discussed with them; the employee's signature does not denote that they agree with the evaluation or the rating. The original shall then be returned to the Construction Executive Services Coordinator to be forwarded on to the Department of Human Resources.

An employee's request for review of any item contained in the evaluation should be submitted in accordance with the procedures contained in *Rules and Regulations for Personnel Administration.*

1-220.30 Peer-to-Peer Recognition Program

The Peer-to-Peer Recognition program provides VTrans employees a way to express their appreciation of their peers for exceptional work and professionalism, and to encourage increased productivity, ingenuity, and continuous improvement across the Highway Division.

Nominations for the Peer-to-Peer Recognition program are made by employees filling out the *VTrans Highway Division Peer to Peer Program Recognition Nomination Form*. Employees may submit a maximum of two nominations for the Peer-to-Peer Recognition program per calendar year. Employees may not nominate their supervisors, managers, or anyone else in their direct chain of command.

1-220.40 Outstanding Performance (Merit Award)

Upon recommendation of the appointing authority and approval of the Chief of Human Resources, an employee may receive a salary adjustment for Outstanding Performance (unless the amount is $1,500.00 or more), on a special project, at or between annual ratings. Such an adjustment may be in the form of a non-recurring bonus, or in the case of an employee not at the maximum salary step, an increase in base pay.

1-220.50 Employee Recognition Program

The *John T. Gray Manager of the Year* shall be selected by the Secretary of Transportation from nominations submitted by Agency Directors. The selected employee shall be recognized at a VTrans function and receive a plaque and bonus.

STATE OF VERMONT

AGENCY OF TRANSPORTATION

CONSTRUCTION SECTION

2015

ENGLISH/METRIC

CONSTRUCTION MANUAL

SECTION II

CONTRACT ADMINISTRATION

2-100 PROJECT ORGANIZATION

2-100.10 Determination of Manpower Needs

The assignment of personnel to a project by the Construction Engineer and/or the Regional Construction Engineer should be based on job size, location, complexity, and personnel available. Usually additional personnel are assigned at the start of the project to aid in the stake out, and at the completion to aid in the taking of final sections. Additional people may be assigned during the construction if needed for inspection, or to cover a special item, such as surface treatment or paving.

The total bid price for a contract is only one factor to be used in determining the necessary workforce requirements. Assignments will be made based on the complexity of the work the, the experience of the personnel, the availability of personnel, and the geographical distribution of both projects and staff.

Resident Engineers who are assigned to a Railroad Bridge project shall meet the qualifications of a Railroad Bridge Supervisor as defined by the *VTrans Rail Bridge Management Program*. To be designated a Railroad Bridge Supervisor, an individual must provide a resume showing that they meet the minimum qualifications. Refer to *Section 4. Designation, Qualifications and Responsibilities of Individuals* in the Rail Bridge Management Program Manual for information about these qualifications.

The Rail Bridge Management Program Manual may be found at the following URL:

https://outside.vermont.gov/agency/vtrans/RBM/Shared%20Documents/Forms/AllItems.aspx

2-100.20 Project Supervision

The project and the personnel receive supervision at all levels from the Chief Engineer down through the channels to the Resident Engineer. The Resident Engineer has direct responsibility for the project, as well as the staff working on the project.

A summary of activities that are performed by Resident Engineer, Chief Inspector, Inspector, and Office Engineer is listed in the *Activities and Field Positions Matrix* (Appendix B-1).

2-100.30 Instructions to the Resident Engineer

This section sets forth more instructions for the administration and control of the project. The Resident Engineer is responsible for the project to which they are assigned, and with the aid and advice of the Regional Construction Engineer, will, within the requirements of the plans and specifications, supervise the administration and inspection of the construction contract. As soon as possible after receiving a project assignment, the Resident Engineer should spend as much time as necessary to become familiar with all of the information pertaining to the project.

The Construction Services Unit subject matter experts are available for consultation. The Resident Engineer may also obtain additional background information from the various VTrans individuals and Sections as follows:

- The Project Manager, who is responsible for the design of the project, to learn of any unusual project conditions.
- The Right-of-Way Section, to learn about the land acquired for the project, and any special agreements made with the property owners.
- The Development Review & Permitting Services Section, to answer any questions regarding utility relocation work, the location of drives, and/or agreements associated with that work.
- The Materials Section subject matter experts, to obtain information regarding the materials anticipated to be used on the project. The Resident Engineer should consult the Materials Section Manager, or assigned staff, for possible material issues they may encounter in obtaining local materials such as borrow and gravel. The Regional Materials Technician may have information on the materials which will be found in the cuts and areas to be mucked, and the various characteristics of fills.
- The Independent Assurance Unit of the Materials Section, to answer any questions regarding the list of items to be used on the project that require sampling or certification.
- The Geotechnical Engineering Section, to answer any questions or concerns involving deep foundations, mechanically stabilized retaining systems, soils and embankment conditions, and boring logs.

- The Environmental Unit, to discuss any particular permit conditions included in the contract documents. The Environmental Unit staff is responsible for authoring permit applications and should provide an explanation for any conditions or restraints placed on the project. The Environmental Unit is also responsible for clearing the use of waste, borrow, and staging areas.

The Resident Engineer *shall read the contract* and become thoroughly familiar with all of the contract requirements. Any unique features or provisions which are thought to be in error or could be difficult with which to comply should be brought to the attention of the Regional Construction Engineer and Project Manager as soon as possible. Any errors should be resolved in an expeditious manner and at the lowest level possible.

The Resident Engineer should bring to the attention of the Contractor any items which they think may be misinterpreted, and go over these items with the Contractor. *Section 100 General Provisions* of the Standard Specification for Construction addresses general information relating to the administration of the contract.

The Resident Engineer should also accomplish the following tasks shortly after being assigned the contract:

1. Verify that the Contractor has an approved progress schedule, approved traffic control plan, approved *EPSC* Plan, and the necessary waste, borrow, and staging area approvals in place.
2. Verify that the utility companies and the Contractor have plans to coordinate their work.
3. Remind the Contractor that all Subcontractors must be approved before they start to work.
4. Remind the Contractor of the various labor and payroll provisions with which they must comply.
5. Maintain contact with property owners, Town or Municipal officials, and the District Transportation Administrator (DTA).

Functions that are the responsibility of the Resident Engineer throughout the duration of the contract are as follows:

1. Providing continuous oversight of the inspection team; sampling and testing of materials; inspection of the work; and the measurement, payment, and documentation of quantities. Refer to *Section IV Construction and Inspection Details* for more information.

2. Interpreting the plans and specifications for the Contractor and solve engineering problems within their ability. Resident Engineers are encouraged to seek help in solving engineering problems from the various subject matter experts in VTrans, especially those in the Construction Services Unit.
3. Verifying that only acceptable materials are incorporated into the project.
4. Actively promote the training of assigned personnel by observation, explanation, discussion, rotation of job assignment, follow up, and periodic critique of performance.
5. Supervising the taking of final cross-sections and measurements at appropriate times throughout the contract work.
6. Documenting the Contractor's work in accordance with their specific work activity.
7. Preparation of initial quantities and final quantities on an on-going basis throughout the project.

After the completion of the project and the final inspection and acceptance, the Resident Engineer will compile the final quantities for the project. Refer to *Section VI Finals Unit Procedures* for more information.

2-100.40 Instructions to the Chief Inspector

The Chief Inspector is responsible for the inspection and documentation of the project. The Chief Inspector will carry out the following duties:

1. Perform a survey of the project as required to ensure that the work is constructed in accordance with the contract.
2. Ensure and document that the project is in compliance with the contract's environmental permits and specifications.
3. Communicate with the Contractor's Superintendent and Safety Officer on a daily basis while work is in progress.
4. Inspect the traffic control package on a daily basis and report any deficiencies to the Contractor's Superintendent and/or Safety Officer.
5. Monitor the project for compliance with safety regulations and report any deficiencies to the Contractor's Superintendent and/or Safety Officer.
6. Complete Prime Contractor and Subcontractor evaluations, compile Project Manager closeout comments, and provide explanations for over runs and/or under runs, record plans, etc.

7. Delegate work to the Inspector(s) and Office Engineer assigned to the project.
8. Inspect and sample materials used for the work in accordance with the contract.

2-100.50 Instructions to the Office Engineer

The Office Engineer is responsible for the compilation and documentation of the project records upon the direction of the Resident Engineer and/or Chief Inspector. This involves entering data into SiteManager on a daily basis. The following duties are the general responsibilities of the Office Engineer:

1. Entering the *Daily Work Report* (DWR) (Appendix B-2) into SiteManager on a daily basis. The DWR should be a compilation of all of the various *Inspector's Daily Reports* (IDR) (Appendix B-3) and should include the equipment, personnel, and supervisory staff for all contractors on the project. DWR entries should make installments of any quantities that are appropriate on a daily basis. The names of the VTrans personnel involved in the project should also be part of the DWR.
2. Ensuring that all materials incorporated into the project meet specifications including:
    a. Proper material certification
    b. Samples are taken in conformance with the Materials Sampling Manual
    c. Passing samples as required for materials
3. Verifying that quantities are being checked and documented appropriately, including sectioning and measurements.
4. Ensuring that the Contractor is receiving *Bi-weekly Estimates* and that any issues with the estimates are resolved in a timely manner.

2-100.60 Instructions to Inspectors

The Inspector on a construction project, working under the direct supervision of the Resident Engineer and/or Chief Inspector, holds one of the most important and responsible positions within the Construction Section. The Inspector usually has more to do with the quality of the finished product than any other person connected with the project because they observe and inspect the actual work, item by item, as it is performed.

Although the Inspector has many functions, the most important duty by far is the inspection of the Contractor's physical operations. While ensuring that the Contractor adheres to the specifications for each item, the Inspector must maintain his/her integrity and be extremely conscientious. To do a thorough job, the Inspector must be completely familiar with the requirements of the item to be inspected.

The sources of information for Inspectors are as follows:

1. Item specifications provided in the Standard Specifications for Construction, the General Provisions, project specific Special Provisions, and Supplemental Specifications, included within the contract documents are the most important sources of information because they outline the specific requirements for items as they pertain to a specific project.

2. The Design Standard Drawings, which show graphically how certain items are to be constructed.

3. *Section IV Construction and Inspection Details,* which provide guidance on each item and give instruction to the Inspector regarding possible problems encountered in the performance of a particular item. This information is derived from the experience of many Resident Engineers and is of great value to the Inspector.

Note: This information is made available solely for the benefit of Construction Section employees; it is not binding on the Contractor, as this manual is not a part of any contract.

The Resident Engineer and the Chief Inspector should brief the Inspector on their duties and advise them on the inspection phases and quantity documentation of the items, along with advice as to which items may need special attention.

After becoming familiar with the specifications, the Inspector's job should be to see that the Contractor complies with these specifications. The Inspector should not specify the methods that the Contractor will use. They do not act as foremen for the Contractor; the Inspector should only verify that the final results are as described in the specifications. If the Inspector feels that the Contractor cannot follow the specifications exactly, the matter must be brought to the attention of the Chief Inspector or Resident Engineer. As stated above, the final quality of the project depends on how well the Inspector does their work.

As part of their duties while inspecting the Contractor's operation, the Inspector will maintain an *Inspector's Daily Report* (Appendix B-3), in which they will record their work each day, personnel and equipment involved in the work, unusual happenings, conversations with the Contractor, and measurements or estimates of the quantities which they have observed being incorporated in the work. These measurements may be used to justify bi-weekly payments to the Contractor, or may be transferred to the field books as part of the permanent project records. The *Inspector's Daily Report* should be kept in loose leaf form. Refer to *Subsection 2-150.20 Inspector's Daily Report* for more information.

Besides actual inspection, the Inspector may be assigned to other jobs by the Resident Engineer or Chief Inspector. These may include survey and layout work, sampling and testing of materials, measurement of quantities, checking of quantities, plotting of sections, and miscellaneous book work and record keeping. All of this work is described in the various sections.

2-100.70 Advance Preparations for Project Staking and Inspection

► Reference: *Section III Engineering and Construction Surveying*

The project should be staked as far in advance of construction activities as possible. Staking may be done under the supervision of the Resident Engineer, but if it is not, the Resident Engineer should ensure that the job is properly and accurately staked. Staking to be done includes centerline offset stakes with cuts or fills to the finish grade; culvert offset stakes with grades, and structure layout stakes.

Clearing and grubbing limits and slope stakes are normally set by the Contractor. Prior to clearing operations, survey control points must be accurately and thoroughly tied in. Culverts in fill sections should be staked as early as possible, but drainage in excavation sections should not be staked until the excavation is complete.

Plans for inspection should be formulated before construction begins. Items requiring manufacturer's certification should be brought to the attention of the Contractor by presenting them with the certification forms prepared by the Materials Section. Local sources of aggregate, gravel, or sand that the Contractor intends to use should be sampled and tested for preliminary approval.

A plan to give the most complete inspection coverage of all items with the available personnel should be developed by the Resident Engineer and the inspection team. A conference with the Contractor's superintendent to discuss their proposed work schedule and operation procedures will aid in arriving at a workable inspection plan.

2-100.80 Project Field Office

Field offices are supplied by the Contractor as a contract bid item. The designation of a particular property for the location for the field office must follow the *Off-Site Activity* application process for acceptance by the Environmental Unit. The Contractor must obtain all other necessary permits and clearances, including a *NPDES Construction Permit* and *Act 250* clearance for the field office prior to any site preparation or delivery of the trailer. The field office location must also comply with any local zoning regulations.

The Contractor should complete the *Emergency Contact & 511 Information Form* (Appendix B-4) to notify the Regional Office and Construction Headquarters that the field office has been established.

2-100.90 Setting Up Project Files in the Field

A filing system should be set up for proper storage of project records and correspondence. The extent of the system will vary with the size of the project, but in all cases it should be adequate to keep project papers readily available for reference by project staff on-site, and by VTrans and FHWA personnel.

Project files should be indexed and separated into the following categories at a minimum:

1. *Change Orders* (Appendix A-1)
2. *Written Orders* (Appendix A-3)
3. Material reports and certifications
4. Contractor *Daily Work Reports*
5. Project correspondence
6. On-the-job training information
7. Subcontractor approvals
8. All quantity slips (These should be retained in manila envelopes, sorted by item)
9. *Inspector's Daily Reports*
10. Contractor claims-related documents
11. Contractor payroll certifications
12. Calculation Binder
13. Contractor Progress Schedule

14. Shop Drawings
15. Environmental Plans and Reports
16. Consultant Time and Expenses Reports

Project files should be started as soon as the Resident Engineer has set up their project office. Files should be kept current and be expanded and revised as necessary to keep the files up-to-date and viable. If required, files should also be cross-referenced. Project files must be retained in a fire-proof file drawer supplied by the Contractor as part of the field office item. However, for mobile operations, project files may be kept by the Resident Engineer and stored in a locked vehicle.

Some project files should be both stored in the project field office and emailed to the Regional Office for electronic storage on the Construction Section's network drive, and for processing when necessary.

These types of project files include the following:

1. Draft *Change Orders* (Appendix A-1)
2. Draft *Written Orders* (Appendix A-3)
3. Decision-related project correspondence
4. Executed *Interim Subcontractor* forms
5. Formal *Subcontract Submittals* when provided to the Resident Engineer by the Contractor
6. Contractor claim-related documents
7. Materials-related *TA555/556/557* forms sent to the Materials Unit
8. All submittals specified in the contract, including the *EPSC* Plan, *CPM* schedule, etc.

2-100.100 Construction and Traffic Control Signs

► Reference: *Subsection 107.08 Traffic Control Devices* of the Standard Specifications for Construction

The Contractor is required to provide proper signs for the project. Construction signs are shown on the T Series sheets of the Design Standards, found in the contract plans, and must be in place before the start of construction. During construction, the traveling public must be protected by the proper use of barricades, warning, and detour signs.

The Manual of Uniform Traffic Control Devices for Streets and Highways (MUTCD), referenced in *Subsection 107.08 Traffic Control Devices* of the Standard Specifications for Construction, is State Law, and is available to every Resident Engineer. The Resident Engineer should continuously review their project for proper signing and maintenance of existing signs, with special attention to night signing and lighting, and should require the Contractor to make any corrections which are found to be necessary. If the Contractor refuses to properly provide for traffic control the Resident Engineer may hold the contract estimate or suspend work on all, or a portion of, the project until the required work is complete.

Once the proper construction signs are in place, the Resident Engineer should confirm that the Contractor has covered, relocated, or removed any conflicting VTrans-owned traffic signs. Prior to completion of project, VTrans owned traffic signs should be salvaged and reinstalled or installed new as per project plans or as directed by the Resident Engineer.

2-100. 110 Maintenance Of Traffic

► References: *Subsection 104.04 Maintenance of Traffic*, *Subsection 105.17 Maintenance of Project During Construction*, and *Subsection 107.07 Public Convenience and Safety* of the Standard Specifications for Construction

Proper maintenance of traffic is one of the primary responsibilities of the Resident Engineer. Before construction starts, the Resident Engineer should discuss this with the Contractor's representative to stress its importance and to determine the Contractor's plans for the use of detours and traffic control. If traffic must travel over sections of the highway which are under construction, the Contractor must plan their work so that traffic can be maintained at all times, in any weather, and with as little delay as possible.

Roadway Patrol Maintenance should be used in connection with the maintenance of traffic, but should not be paid to the Contractor during the normal construction operation of excavation, filling, or spreading of gravel. Refer to *Subsection 607.10 Roadway Patrol Maintenance* of the Standard Specifications for Construction for more information. This item is normally used when traffic must travel a section of the road not currently being worked on, and where the roadway surface is dirt or gravel.

Resident Engineers should contact the Transportation Systems Management & Operations (TSMO) Unit if and when they have questions, comments, or concerns dealing with the traffic control on their project. The TSMO Unit will conduct audits of the traffic control and signing packages and their recommendations should be acted upon.

2-100.120 Visit To The District Transportation Administrator (DTA)

As soon as possible after their arrival on the project, the Resident Engineer should visit the District Transportation Administrator (DTA) for the area in which the project falls. This visit will be of mutual benefit to the Resident Engineer and the DTA, as it will give the DTA a chance to point out possible trouble spots that they can foresee with future maintenance operations and it will introduce the Resident Engineer to a source of help and consultation throughout the duration of the project. As noted in *Subsection 2-130.30 Starting the Project*, the Resident Engineer should supply the DTA with the name, e-mail address, and telephone/cell phone number of the Contractor's representative to be notified in case of issues that arise on the project during non-working hours.

2-110 SCOPE OF WORK

2-110.10 Project Control Documents

► References: *Subsection 105.03 Plans and Working Drawings* and *Subsection 105.05 Coordination of Contract Documents* of the Standard Specifications for Construction

The exact amount of work to be accomplished under the contract is set forth in, and controlled by, a variety of documents. The Resident Engineer must understand what is covered in each document in order to effectively control the project.

In many cases, procedures described in one document are superseded or revised in another document, so the Resident Engineer must know in what order the various documents take precedence.

Project permits are the highest order of precedence. Any permit conditions must be followed even if they are contradictory to the Special Provisions, General Special Provisions, and/or Contract Plans.

The Special Provisions contain directions, provisions, or requirements pertaining to the particular project under consideration. They may indicate a specific order in which the work is to be accomplished, and set forth the final contractual intent as to the matters involved.

The Contract Plans are the main source of information as to the extent of the work to be performed. The Contract Plan sheets may also include special notes about work to be completed for property owners, or special items of construction.

The General Special Provisions are supplementary to the Standard Specifications for Construction, and contain additions or modifications to the Standard Specifications for Construction common to all the current contracts.

Supplemental Specifications cover items adopted after publication of the Standard Specifications for Construction, or items substantially changed in some aspect from the description in the Standard Specifications for Construction.

The Standard Specifications for Construction is the primary document for the control of the work. The directions for each item are found plus general requirements for the performance of the contract.

The Contract, which includes the above documents, also includes the basic agreement between the Contractor and VTrans, whereby the Contractor agrees to furnish the labor and materials and do the work and VTrans agrees to pay for the items according to the schedule of prices. Read the Contract.

Right-of-Way documents may include certain items of work to be done for property owners, and may show rights obtained from the property owner, such as slope or drainage rights. The most important of these documents to the Resident Engineer are the Right-of-Way Detail Sheet, and the Special Agreements. The Right-of-Way Detail Sheet is a separate sheet bound with the plans and shows parcel numbers, property owners' names, acreage taken, and rights (such as drainage rights) obtained from the property owner.

The Special Agreements sheet is made up by the Right-of-Way Section which summarizes the agreements made with the property owners, showing the rights obtained from the owner, such as slope rights and drainage rights; and the construction features granted to the property owner, such as drives or cattle passes.

A third Right-of-Way document is the Right-of-Way Plan, which is a reduced scale layout of the project, showing the property lines and right-of-way lines, and the stations and offset of all property corners. The property deeds make reference to this Right-of-Way Plan by parcel number, and use the plan to describe the property boundaries instead of using a verbal description of these boundaries.

2-110.20 Changes Within and Outside the Scope of the Contract

► References: *Subsection 2-160.10 Changes in Design / Supplemental Agreements* and *Section IX SiteManager*

Any changes to a VTrans construction contract shall be processed by the Construction Section. The Resident Engineer and the Regional Construction Engineer, and if necessary the Construction Engineer and Chief Engineer, are responsible for managing all changes to the Contract. Regardless the reason for making a contract change, such as Value Engineering, Alternate Technical Concepts, Errors and Omissions, or requests from any stakeholders, the approval process for any contract change is owned and managed by the Construction Section.

The Project Manager is responsible for the design or engineering of the work represented by the contract and, as representative of the Chief Engineer, maintains budget responsibility for the contract. The Resident Engineer must communicate with the Project Manager and seek direction for all engineered aspects of the project and approval for any additional funding required for the completion of the work. The Resident Engineer is not responsible for any design or engineered aspect of the project and must not assume such responsibility.

The Construction Section is responsible for ensuring that an inclusive process is followed, that the information is relevant and accurate, and that the cost and schedule impacts can be justified. The Resident Engineer and, if required, the Regional Construction Engineer, must lead the contract change process, take ownership of the series of actions, and maintain overall responsibility for the outcomes.

The Construction Section does the following to process construction contract changes:

- Facilitates, in a timely manner, the process of making changes to the contract
- Ensures that all impacts from the proposed change to the project are fully understood, including the cost, schedule, utilities, traffic, safety, permits, and ROW
- Ensures that all necessary information and documentation is current and part of the project file, including engineering, cost analysis, and approvals
- Negotiates the final terms of the agreement to include price and time
- Prepares the *Change Orders* and *Written Orders* that document the final agreements
- Communicates the final contract change outcomes to all stakeholders during and after the process is complete

As soon as the Resident Engineer is assigned to a project, they must carefully study the plan and other contract documents, and make a visual inspection of the job site to see that all items of construction are properly covered by the plans. If some item of work is found which the Resident Engineer feels is necessary to the successful completion of the project, but which has not been detailed or covered by the contract, they should take action to see that it is included. This may require a *Change Order*. It is critical that these required changes be found early in the construction so that the work can be progressed by the Contractor without delay.

In determining whether or not a change or addition to the planned work should be made, the Resident Engineer should be guided by the determination of whether the proposed change is a "nicety" or a "necessity". A change which is a "nicety" is one which may be an improvement to the project, but is not actually required for the successful completion of the project. A change classified as a "necessity" is one which is required in order to complete the project according to sound engineering principles, or would be of considerable importance to future maintenance or public safety.

Changes determined as necessary should be initiated immediately, but changes falling in the category of "nicety" must be carefully weighed in terms of added cost to the project and delays to the Contractor. Minor changes that do not require items to be added to the contract may be made in the field, but changes of a major nature or requiring new items must be documented by a *Change Order*.

For work that may result in a change to the contract, the Resident Engineer must present the problem and recommendations, including all back-up data, to the Regional Construction Engineer and Project Manager for concurrence prior to reaching a decision or directing the contractor.

2-120 CONTROL OF WORK

► References: *Section 105 Control of the Work* and *Subsection 105.01 Authority of the Engineer* of the Standard Specifications for Construction

2-120.10 General

The Resident Engineer must maintain control over their project at all times. This does not mean that they should try to control the Contractor's operations, but that they know what the Contractor is presently doing, what the Contractor's plans are for the immediate future, and at what stage of completion the project stands. The Resident Engineer plans the inspection, field work, and record keeping, staying in control of the situation.

To maintain this control, the Resident Engineer will accomplish the following:

1. Inspect the Contractor's equipment for proper operating condition and compliance with VTrans specifications. If discrepancies are found, they should immediately be pointed out to the Contractor.
2. Become thoroughly familiar with the plans, permits, and specifications before the work starts. This will aid in proper inspection of the work, and will allow proper interpretation of the job requirements for the Contractor, if this information is requested.
3. Require the Contractor to furnish proper supervision and proper layout for all operations.
4. Provide inspection of all items of work. The Contractor's operations should be given continuous inspection if possible, but if this is not possible, inspection must be arranged so that an Inspector will be present during the critical phases of all operations. Specific directions for Inspectors are included in *Subsection 2-100.30 Instructions to the Resident Engineer*.
5. Require the Contractor to make their requests for engineering work well in advance of the time the stakes or grades will actually be needed. The Resident Engineer should draw their attention to *Subsection 105.09 Construction Stakes* of the Standard Specifications for Construction to verify that the Contractor is provided with the appropriate amount of layout, as per the contract. This will allow the Resident Engineer time to give proper layout, and still have the work done at the time when it is needed by the Contractor.

   The Contractor should be realistic in their requests and not ask for engineering services that will not be used for a considerable time, as the stakes may be destroyed by intermediate operations.
6. Render instructions to the Contractor in a clear, concise, and timely fashion. Instructions which may cause a later disagreement, or which may affect a quantity or payment, must be in writing, by the use of a *Written Order*. The Contractor should also be informally kept abreast of any anticipated changes in the construction, possible trouble areas, or anything which might affect their progress schedule.
7. Issue a *Written Order* to the Contractor, after discussions with the Regional Construction Engineer, to establish the substantial completion date. This *Written Order* should list all weather days granted to determine applicable extensions of time.

8. Request the final inspection only after the project achieves substantial completion. Preliminary and informal final inspections are often held by the Regional Construction Engineer or the Resident Engineer prior to the formal final inspection. The Resident Engineer will arrange a meeting with the DTA so that they may view the project prior to final inspection.

   The same applies for Town Managers or Selectpersons where town highways or city streets are involved, to verify that all agreements have been carried through and that all reasonable requests have been addressed. The Regional Construction Engineer will set the date of the final inspection. This advance activity will ensure that no further work will be found to be necessary at final inspections.

The Resident Engineer has the authority to suspend work on any phase of the construction or on the whole project if necessary. This authority is covered in *Subsection 105.01 Authority of the Engineer* of the Standard Specifications for Construction. Alternatively, if the Contractor fails to carry out work ordered by the Resident Engineer, the Resident Engineer may decide to have the work done by another party, and have the cost deducted from money which may come due the Contractor under the contract.

Prior to any of the above actions, the Contractor should be given ample warning in the form of a *Written Order*, and if the action is going to be taken, the Regional Construction Engineer should be immediately notified.

2-130 PROSECUSION AND PROGRESS OF THE WORK

► Reference: *Section 108 Prosecution and Progress* of the Standard Specifications for Construction

2-130.10 Progress of the Work

After the award of the contract, the Contractor must submit a progress schedule to the Resident Engineer in accordance with the contract requirements. The progress schedule will indicate the intended completion dates for the various project items in order to complete the entire project by the specified completion date and/or interim completion date(s). This schedule will be useful to the Resident Engineer for determining whether the work is proceeding on or behind schedule.

Construction work must not begin on the project until this schedule has been approved by VTrans. Refer to *Subsection 108.03 Prosecution and Progress* of the Standard Specifications for Construction for the specifics regarding the *Critical Path Method* (CPM) Specifications.

The Resident Engineer will also present the Contractor with an *Emergency Contact & 511 Information Form* that the Contractor will complete and submit at the Preconstruction Conference.

2-130.20 Preconstruction Conference

After the contract has been executed, a Preconstruction Conference should be held as soon as possible. The purpose of this conference is to introduce the Contractor's and VTrans' personnel, and to discuss the Contractor's general plan of operation and any special requirements of the contract. Along with the progress schedule, the Contractor should be prepared to submit and discuss their *Erosion Prevention and Sediment Control* (EPSC) Plan (if required by Special Provision 652), any special methods or equipment they intend to use, and any questions they might have as to the intent of the plans, permits, or specifications.

VTrans representatives should discuss any special or complicated part of the project, explaining the requirements for sampling and certification of materials, and various labor and payroll requirements. The authority of the Resident Engineer should be explained to the Contractor, and the fact stressed that all matters pertaining to the project will be handled through the Resident Engineer. The Preconstruction Conference should be digitally recorded with the Regional Staff preparing and distributing these recorded meeting minutes to all parties in attendance. Refer to the Regional Process Manual for more information about preconstruction conferences.

2-130.30 Starting the Project

In accordance with the Standard Specifications for Construction, once the contract has been executed, the Regional Construction Engineer will issue an *Authorization To Proceed with Submittals* (Appendix B-5a). The Prime Contractor should begin preparing the necessary administrative submittals, including include the Progress Schedule, Erosion Control Plan, and Traffic Control Plan, and have them submitted to and accepted by the Agency prior to the start of any construction operations. Each construction contract has its own set of requirements and must be referenced accordingly. Once these submittals have been accepted, if the contract requires it, the Regional Construction Engineer will issue a *Notice to Proceed with Construction* (Appendix B-5b), authorizing the commencement of in-field activities.

2-130.40 Notification of Roadway Restrictions

The Resident Engineer should issue a *Notification of Roadway Restrictions* form (Appendix B-6) when implementing one-way detours or temporary reductions in lane widths which would hinder normal traffic flow and especially limit over-width traffic. The *Notification of Roadway Restrictions* form should be submitted at least two weeks prior to the implementation of the traffic restriction to the distribution list specified.

2-130.50 Speed Reduction Through Work Zones

The Project Manager, during the development of a project, should obtain a speed reduction of 10 MPH on all limited-access facilities and all highways with a posted speed limit of 50 MPH or greater. Projects that have sharp curves, steep grades, areas where stopping quickly may be an issue, and areas with limited sight distance, should also be considered for a speed reduction.

The Transportation Systems Management & Operations (TSMO) Unit should ensure that the temporary speed reduction remains in force for the project's duration and has the proper authorization for legal enforcement.

If, in the opinion of the Resident Engineer and Regional Construction Engineer, the speed of traffic through the work zone is still too fast for the safety of all involved, the Resident Engineer will submit a *Certified Statement Designating a Temporary Speed Limit* (Appendix B-7a) or a *Certified Statement Designating a Temporary Speed Limit with Multiple Sites* (Appendix B-7b) to the Traffic Operations Engineer for their review and for the Construction Engineer's approval.

The Resident Engineer may contact the TSMO Unit to confirm that the proper signage has been installed at the approaches to, and within, the work zone. The Resident Engineer should contact the Public Relations Officer if there are any changes to speed limits through the project work zone.

2-130.60 Completing the Project

As the project is nearing completion, the Resident Engineer, with the concurrence of the Regional Construction Engineer, will establish the substantial completion date by *Written Order* (Appendix A-3). There will be no liquidated damages charged after this date as per *Subsection 108.12 Failure to Complete Work on Time* of the Standard Specifications for Construction. The substantial completion date is defined in the Standard Specifications for Construction. VTrans further defines the substantial completion date as when all work is complete, all safety features are in place, including guardrail, and final pavement markings and traffic signs have been installed.

As the project is nearing completion, the Resident Engineer should also keep the Regional Construction Engineer informed so that the Regional Administrative Services Technician may schedule a final inspection of the project. Upon receipt of the notice of final inspection, the Materials Section will send an *Internal Project Status Memo* (IPSM) (Appendix B-8) to the Resident Engineer with a copy provided to the Regional Construction Engineer. The Resident Engineer should provide justification or additional documentation for any materials that failed or lacked certification to the Materials Section with a copy provided to the Regional Construction Engineer.

When the final inspection has been conducted, all certifications are in place, and all the project work is acknowledged to be complete, and the contractor has demobilized from and stabilized the site, the Regional Construction Engineer will issue a *Completion and Acceptance Memo with Final Inspection Held* (Appendix B-9a) or a *Completion and Acceptance Memo Requesting Final Inspection by Memo* (Appendix B-9b).

2-130.70 Extension Of Time

► Reference: *Subsection 108.11 Determination of Extension of Contract Time for Completion* of the Standard Specifications for Construction

For a variety of reasons a Contractor may not complete a project by the date set forth in the contract, or they may not meet the interim completion date as established in the contract. If the reasons for the delay are beyond their control, as listed in *Subsection 108.11 Determination of Extension of Contract Time for Completion* of the Standard Specifications for Construction, the Contractor may be granted extra working days by Change Order or the Chief Engineer. This extension of time means that the Contractor will not be assessed liquidated damages, as described in *Subsection 108.12 Failure to Complete Work on Time,* for the additional time granted by the Extension of Time process.

As the basis of the extension may be the number of days lost due to weather conditions or the conditions related to the job site, it is a duty of the Resident Engineer to carefully note in their diary and on the *Daily Work Report* the days when the Contractor actually did not work at all, or could not work certain operations, and the reasons therefore. Inclement weather days should be recorded as spelled out in *Section IX SiteManager*. A day of rain does not qualify for credit towards an extension of time if the Contractor actually carried on normal operations that day. Refer to *Inclement Weather Day Guidance* (Appendix B-10) for further information.

The Resident Engineer should make a specific recommendation on the *Daily Work Report* when they feel that a day should be allowed as the basis for a future extension of time. Weather days shall not be credited as partial days. It is the responsibility of the Contractor to request any desired extension of time. However, *Change Orders* are changes to the contract that are allowed regardless of whether the Contractor fills out a *Request for Extension of Time* (Appendix B-11) or not. Any extension should be checked for compliance with seasonal constraints of environmental permits.

2-130.60 Subcontractors

► References: *Subsection 108.01 Subletting or Assignment of Contract* of the Standard Specifications for Construction

The Prime Contractor will provide the names of any known Subcontractors that will be working on the project at the time of the Preconstruction Conference.

Each request to sublet (subcontract) must be approved by VTrans before the Subcontractor will be allowed to work on the project. It is the responsibility of the Prime Contractor to ensure that all required documentation is submitted for consideration of the request to sublet and that the company is in full compliance with any restrictions, as indicated on the *Subcontract Information & Check-Off Sheet* (Appendix B-12).

The Resident Engineer shall not make any payment for work performed under a subcontract until final approval has been processed for the request to sublet.

The Regional Construction office will notify the Resident Engineer by *Subcontractor Approval Letter* (Appendix B-13a) or by *Subcontractor's Approval Letter – Lower Tier* (Appendix B-13b), if applicable, and a *Subcontractor Approval Memo* (Appendix B-14) of the particular items that a Subcontractor has been approved to perform. Each Subcontractor must comply with the same labor requirements as the Prime Contractor, and on all Federal-aid work, must submit Contractor payrolls and required pay date sheet to the Resident Engineer to be logged and forwarded to the VAOT Civil Rights Labor Compliance Program Manager on a weekly basis.

The Resident Engineer should only process an *Interim Subcontractor Approval Form* (Appendix B-15) when the work to be performed by the subcontractor is deemed necessary prior to receiving formal approval and is in the best interest of the State. The *Interim Subcontractor Approval Form* provides temporary authorization for a Subcontractor to perform work on a VTrans project. The Subcontractor must be registered with the Secretary of State.

The *Interim Subcontractor Approval Form* cannot be used to circumvent the typical subcontractor approval process. All interim subcontractor approvals should be followed up with the formal Subcontractor approval process as specified. The Resident Engineer shall not make any payment for work performed under an *Interim Subcontractor Approval Form* until final approval of the subcontract has been processed.

The Prime Contractor remains responsible for the satisfactory completion of all Items, even though assigned to a Subcontractor. Inspectors may deal directly with the representative of the Subcontractor during normal inspection, but if a Subcontractor fails to do acceptable work, the matter should be brought to the attention of the Prime Contractor for resolution.

Payment of all quantities is made to the Prime Contractor through a *Bi-weekly Estimate*, and it is up to the Contractor to pay their Subcontractors, in conformance with the prompt pay provisions of the contract.

The Resident Engineer and/or their designees shall be aware of all subcontractors working on-site each day and shall ensure each is covered by an approved subcontract or, when appropriate, an interim subcontract prior to any work being performed.

A subcontract should be executed for the following circumstances:

1. When project material is supplied and installed by a firm other than the Prime Contractor

2. When personnel working on the project site are not carried on the Prime Contractor's payroll (including operators of rented equipment)

3. When a Subcontractor is working on the project but is not specified in a Design-Build contract

A subcontract should not be executed for the following circumstances:

1. When trucking equipment to or from the project site

2. When transporting material to or from the project site

3. When performing off-site engineering and design work

4. When a Subcontractor is working on the project and is specified in a Design-Build contract

No Subcontractor shall re-sublet, assign, sell, transfer, or otherwise dispose of any portion of the work they have been approved to perform without written consent by VTrans, via the formal subcontractor approval process as specified.

If a *Change Order* is processed that includes items to be added to the contract, or existing items where the quantity is being increased and work associated with those items will be done by a Subcontractor, the Resident Engineer shall not make any payment for work added by *Change Order* that is to be performed by a subcontractor until final approval has been processed for the request to sublet.

When items are added or quantities are increased by *Change Orders*, the 50% subcontractor limit should not be affected by this work as specified in *Subsection 108.01 Subletting or Assignment of Contract* of the Standard Specifications for Construction.

The cost of subletting or assignment of a contract may be deducted from the total contract price before computing the amount of work required to be performed by the Contractor's own organization. Specialty items will be designated in the contract specifications and may be performed by subcontract without affect to the 50% subcontractor limit.

The Resident Engineer will be responsible for completing a Subcontractor rating form once their work on the project is complete, as outlined in *Section VIII Evaluations*.

2-140 CONTROL OF MATERIALS

► References: *Section 106 Control of Materials* of the Standard Specifications for Construction and the Materials Sampling Manual

2-140.10 General

► Reference: *Section 4-120 Sampling and Testing of Materials*

One of the most important responsibilities of the Resident Engineer is to ensure that only acceptable materials are incorporated into the project. Nearly all materials used are tested for quality, but the time and location of testing varies for the different types of materials. Many materials are sampled and tested by project personnel on the job site while other materials are sampled by project personnel, and sent to the Materials Section for testing. Some items are sampled at the source, and still other materials are covered by the manufacturer's certification. In any event, all materials should be known to meet the specifications before they are incorporated into the work.

The Resident Engineer will find the current status of material testing results and certifications for their project by running the *Materials Sampling Checklist Report* (Appendix B-16). Refer to *Subsection 9-100.60 SiteManager Materials* for information regarding how to access the *Sampling Checklist Report.*

As the project nears completion, the Regional Administrative Services Technician will send the Regional Construction Engineer's notification to the Materials Section that the Finals Inspection will be conducted. The Materials Section will review all material testing results and product certifications to verify that the requirements have been met. Once the Materials Section has reviewed all of the material testing results and product certifications, they will complete an *Initial Project Status Memo* (IPSM) and send it to the Resident Engineer and Regional Construction Engineer.

The Resident Engineer may need to provide detailed explanations or justifications based on sound engineering principles or judgment for the incorporation of any materials that were used on the project that did not meet specifications, or for the use of any products that lacked proper certification or testing. Once the Materials Section has approved all of the material testing and product certifications, and resolved any issues with materials not meeting specifications or products lacking certification, the Materials Section will issue a *Materials Certification Memo* (Appendix F-4).

The Regional Construction Engineer will then issue a *Completion & Acceptance Memo*.

2-140.20 Materials Supplied In Overloaded Vehicles

► Reference: *Subsection 105.16 Load Restrictions* of the Standard Specifications for Construction

The Resident Engineer shall demand that the Contractor not use overweight vehicles or haul loads in excess of the legal load limit from outside the project limits. However, if a Contractor employs overloaded vehicles, deductions of treble the amount above the legal load from the pay quantity for the specific load should be made.

If an overweight vehicle problem persists and the Contractor/Subcontractor/Supplier does not take corrective action, the Regional Construction Engineer should be notified.

2-140.30 Use of Materials Found Within the Roadway

► Reference: *Subsection 104.06 Use of Materials Found in the Roadway; Authorization; Payment* of the Standard Specifications for Construction

Approval for the use of materials found within the roadway limits of the project shall be given by the Regional Construction Engineer after a written request by the Contractor in which the proposed use of the materials is indicated. Borrow pits may be allowed within the right-of-way by written permission from the Construction Engineer. Materials from state-owned pits cannot be utilized in construction unless so designated in the Contract.

2-140.40 Material Substitutes

► Reference: *Subsection 105.04 Conformity with Plans and Allowable Deviations* of the Standard Specifications for Construction

Occasionally a Contractor will propose the use of substitute material from that shown on the plans. If the Resident Engineer feels that the request is reasonable, it should be discussed with the Regional Construction Engineer. If it is agreed that the proposed material will meet the design requirements, the Resident Engineer must reach an agreement with the Contractor on the new material specification and price. A *Change Order* (Appendix A-1) must be processed for any material substitutions on the project.

2-140.50 Stockpiles

► Reference: *Subsection 106.09 Stockpiling of Materials* of the Standard Specifications for Construction

Stockpiling and payment for stockpiles must be carefully analyzed to ensure that the bid amount is not exceeded. The specification caps the stockpile payment at 75% of the total contract bid amount for the item. Stockpile payments should not be made for materials whose total bid prices are less than $25,000.00. For example, a stockpile payment may be granted on pipes, as long as all the similar pipe items total at least $25,000.00.

The Contractor should make the request for payment in writing and must supply the following items before any stockpile payments are made:

1. A list of materials to be stockpiled including:

    a. Pay item number

    b. Quantity to be stockpiled

2. An invoice of all materials, or a receipt of delivery. A paid invoice must be supplied within 28 calendar days of the stockpile payment estimate cutoff date. Failure of the Contractor to provide a paid invoice or cancelled check should result in the removal of the stockpile amount. If this occurs, the Regional Construction Technician must be informed about the removal.

3. A *Certification of Title* showing that the title to the materials, without encumbrances, is in the name of the Contractor and that title is warranted to VTrans.

4. Proper certifications and/or passing samples as specified for the specific items.

5. A statement that the material is clearly marked with permanent markings; to be easily identified as to which project the material will be incorporated and that the material is available for inspection by VTrans.

6. The locations where and conditions under which the material will be stockpiled.

The approval of the Chief Engineer shall be required for payment of any raw material stockpiles, and payments for raw material stockpiles should be handled in the same way as payments for regular stockpiles.

When structural steel is involved, the Structures Shop Inspector should support the recommendation of the payment via email, which should include the following items:

1. The Contractor's name
2. The structural steel Supplier's name
3. The Project name
4. The Project number
5. The dollar amount of stockpiled material
6. A statement from the Contractor acknowledging compliance with *Subsection 106.09 Stockpiling of Materials* of the Standard Specifications for Construction

A copy of this email should be sent to the Regional Construction Engineer. If the Chief Engineer approves the payment of the raw material stockpile, the approval shall be maintained with the project records.

2-150 RECORDS AND REPORTS

Project personnel will spend a significant amount of their time maintaining records and completing reports. Although the Resident Engineer may not do all the paper work themselves, they still maintain responsibility for this aspect of the work. They should see to it that the work is done neatly, completely, correctly, and on time. An Office Engineer will be assigned to the project; however, it is still the Resident Engineer's responsibility to ensure that the project documentation is completed according to the guidelines.

2-150.10 Project Diaries

The Resident Engineer should keep a diary of each project or combination of projects under their control. The Resident Engineer's diary need not repeat the detailed information required of the Inspector, but should contain general information about the project.

The Resident Engineer's diary, which can be a bound field book, should contain a day-by-day record of all the significant events relating to the project. Since it may become important evidence in the decision of claims or the establishment of responsibilities or liabilities, it is essential that the entries be complete and factual.

The Resident Engineer's project diary should contain, but not be limited to, the following items:

1. Weather
2. Orders given to the Contractor
3. Important discussions with the Contractor or their representatives
4. Official visitors and inspections including any pertinent orders or decisions
5. Work or materials rejected and the reasons
6. Time of shutting down or resuming work, with explanations
7. Work done by the Contractor's forces during the day
8. Account of any time spent by the Contractor's forces on disputable items or work
9. Length and cause of any delay
10. Arrival and departure of major equipment
11. Unusual conditions, such as high water, slides, etc.
12. Progress of stakeout work and surveying
13. Progress of the day-to-day work
14. Quality and quantity of Contractor's supervision
15. Any notes required to fill out the prime contractor evaluation as spelled out in the evaluation section
16. Accidents within the project limits

2-150.20 Inspector's Daily Report

An *Inspector's Daily Report* (Appendix B-3) shall be completed by each Inspector for each day the Contractor is on the project working. There may be multiple *Inspector's Daily Reports* on a particular day. Each *Inspector's Daily Report* will be entered into *SiteManager*, at which point they will cumulatively be referred to as a *Daily Work Report* (Appendix B-2). The main purpose of these reports is to keep track of the daily pay quantities, and to serve as the project daily diary.

These reports should be accurately and conscientiously filled out under the direct supervision of the Resident Engineer and/or Chief Inspector, as they may come to play an important role in determining the granting of an extension of time, as evidence in a court case, or it could be used to resolve a claim by the Contractor, Subcontractor, supplier, property owner, or anyone from the general public.

The *Inspector's Daily Report* shall contain, but not be limited to, the following items:

1. A daily account of what work the Contractor is doing, in what location they are working, and any unusual conditions that may occur. Conversations between the Inspector and the Contractor pertaining to matters affecting the project should be noted. Of particular importance are discussions or orders pertaining to extra work required and the payment of extra items of work.
2. A report of the disposition of all materials, including major excavation and borrow, so that the order of work can be determined at a later time, if it should become necessary. This means that when material is excavated, the stations of the fill in which the material is used should be noted as well as the stations of the excavation. When using borrow, indicate the name of the pit from which this borrow is being obtained, and the stations of the fills into which the material is deposited. Also report when excavation is being wasted; and indicate where the waste material is placed. These notes may be added on the bottom of the *Inspector's Daily Report*, using an additional form if more space is required.
3. A report of any loss of time by the Contractor due to weather conditions or other conditions related to the job site. The report should indicate if the Contractor did not work at all, or could not work certain operations. Any evidence of non-conformance by the Prime Contractor should be documented by the Inspector. Refer to *Inclement Weather Day Guidance* (Appendix B-10) for more information.

2-150.30 Daily Work Report

A *Daily Work Report* shall be completed for each day the Contractor is on the project working. The DWR consists of the cumulative IDRs that are entered into *SiteManager*, as well as information from the Resident Engineer's project diary discussed above in *Subsection 2-150.10 Project Diaries*. The main purpose of these reports is to electronically keep track of the daily pay quantities, and to serve as the project daily diary. Refer to *Daily Work Report – Guidance & Procedures* (Appendix B-17) for information on entering information into *SiteManager*.

2-150.30 Detail of Contract Estimate

The Regional Technician runs a series of reports for each *Bi-weekly Estimate*. These reports should include the *Estimate Summary to Contractor* (Appendix B-18), *Summary by Project* (Appendix B-19), *Contract Item Summary* (Appendix B-20), *Estimate Item Detail* (Appendix B-21), and *Materials Sampling Checklist Report.* Each report should provide various levels of detailed information that pertains to installments during the bi-weekly estimate period as well as project-to-date totals.

The *Estimate Item Detail* report specifically has the potential of reducing the number of discrepancies on various items in the finals stage, because it makes the Contractor aware of what is being paid per item on each *Bi-weekly Estimate*. The *Estimate Summary to Contractor* report should contain any payment adjustments due to lack of material certification or due to failing material samples that have not been resolved. The *Sampling Checklist Report* should contain the project items that require testing and certifications (including what type of certification).

2-150.40 Bi-weekly Estimate

The Resident Engineer should verify that all *Daily Work Reports* are entered into *SiteManager*, preferably on a daily basis, but at the very minimum on a weekly basis. Once a Resident Engineer authorizes a *Daily Work Report*, the quantities are accepted as payable on the next *Bi-weekly Estimate*. *Bi-weekly Estimates* should be run in conformance with *Subsection 109.08 Partial and Final Payments* of the Standard Specifications for Construction.

Once the Resident Engineer is satisfied that the *Daily Work Reports* for the estimate period are complete and that all of the *Daily Work Reports* have been authorized in the Project Diary, the Resident Engineer should contact the Regional Technician and provide them with the following items:

1. The Project name
2. The Estimate number
3. The Estimate end date
4. CES number
5. Any anomalies (for example, the number of Liquidated Damage Days)

When the *Bi-weekly Estimate* is produced by the Resident Engineer, notification should be sent to the Regional Technician by Friday noon. If this deadline cannot be met, for whatever reason, the Resident Engineer should inform the Regional Technician that the *Bi-weekly Estimate* is late and indicate when the *Bi-weekly Estimate* will be ready for processing.

The Resident Engineer may choose, prior to contacting the Regional Technician, to run an *Installed Work Report*. The *Installed Work Report* can be found in SiteManager under *Contractor Payments(+) / Reports (CP+).* This report will give the Resident Engineer an overview of what items and quantities will be paid for in the estimate and what the total value of those items will be. This report is also a good check to compare with any computation sheets and/or individual Inspector Reports to verify that values were entered correctly for the estimate period. The total value of the estimate period reflected in this *Installed Work Report* does not account for any stockpile payments, payments withheld due to lack of certifications, or other payment adjustments.

2-150.50 Field Books

There are two acceptable methods for establishing and maintaining a permanent record of material quantities used for a construction project: Hard-bound Field Books and Electronic Books.

Hard-bound Field Books: The number of hard-bound field books required for each project varies with the size of the project, from one for a small project to thirty or more books for a large and complex project.

Electronic Books: Electronic books are a digital replication of the hard-bound field book. The Finals Unit is responsible for training VTrans personnel in the use of Electronic Books. Information regarding the production of Electronic Books may also be found in the Electronic Books Manual.

Field books should contain item-by-item summaries of the quantities used, along with supporting measurements and computations. For items where the quantity computations are more easily done on special forms or sheets, the field book should contain references to the location of these supporting documents. Supporting calculations and other documents may be placed in a three-ring binder.

The importance of keeping field books up-to-date, accurate, and neat cannot be overemphasized. It is very important to completely index the books and to cross-reference items from page to page and book to book so that any person, even though not familiar with the project, can inspect the books and easily find all quantities and computations as necessary.

Over the years many methods have been employed for setting up the various field books and arranging their contents. *Section V Sample Field Book* illustrates the preferred system of numbering the various books that comprise the complete set, as well as the preferred method of setting up each item and maintaining the necessary information. This sample field book is based on the best of the methods observed in the field books over the past years, with the idea of finding the arrangement that will be easiest to set up and use in the field while still furnishing all the information required in a manner easy to check by a person unfamiliar with the particular project.

Field book entries should be made as soon as quantities are in place. All entries should be dated and initialed by the person making the entry, and corrections to entries should be dated and initialed by the person making the correction. All field entries should be made with a lead pencil, with a red pencil reserved for checking. Anyone who enters or initials quantities in the field books should appear in the engineering force list in the front of the summary books.

A complete, separate set of field books is required for each separately numbered project within each contract. Separate field books are also required for each bridge on the project.

Most importantly, field books should be retained in the locked fire-proof file cabinet supplied as part of the field office item when they are not in use.

2-150.60 Written Orders

The *Written Order* (Appendix A-3) is a form used on the project for correspondence between the Resident Engineer and Contractor. A *Written Order* is used when it is desired to make the subject material a matter of permanent record, and may be used under the conditions as follows, but may be used for the documentation of any other issues, as deemed necessary by the Resident Engineer or Regional Construction Engineer:

1. To order the Contractor to do work which is covered by the plans and specifications, but which the Contractor either refuses to do, or has failed to do properly.

2. To order the Contractor to do work not included in the contract (extra work) for which the method of payment will be specified.

3. To document any other order, quantity, or subject matter which should be made a matter of record for the future protection of either VTrans or the Contractor. Examples under this condition include:

    a. Undercutting of sub-grade or side slopes to remove unsuitable material. Indicate the depth and width ordered and the station-to-station length of the excavation. Also indicate the material to be used to backfill the excavation area.

    b. Cutting of solid rock slopes beyond the lines shown on the plans in order to meet field conditions.

    c. Clearing and grubbing to be paid in addition to the lump sum quantity.

    d. Flattening of fill slopes, even though waste material is used for this purpose.

    e. Changing the bottom elevation of structure excavation from that shown on the plans.

    f. To document any "deviation from the contract." Refer to *Subsection 105.05 Coordination of Contract Documents* of the Standard Specifications for Construction for more information.

4. To document when a pay item is eliminated from the contract.

5. To document the transfer from VTrans to the Contractor of digital files that pertain to the design and/or survey of the project.

6. To document inclement weather days as defined in *Subsection 108.11 Determination of Extension of Contract Time for Completion - Part (a)* of the Standard Specifications for Construction.

7. To document the achievement of interim completion date requirements, the achievement of incentive/disincentive requirements, and substantial completion of a project.
8. To document a specific change to the method of measurement or basis of payment as allowed in the Specification for specific pay items.
9. To document a change in the Resident Engineer, or to designate an acting Resident Engineer in the original Resident Engineer's absence.
10. To acknowledge receipt from the Contractor of a *Notice of Intent* to file a claim.
11. To document the work to be performed and the specific equipment that is to be used under *Section 608 Equipment Rental*.

A *Written Order* should be issued to document any other order, quantity, or subject matter which should be made a matter of record for the future protection of either VTrans or the Contractor, such as to substantiate *Change Orders*, *Stop Work Orders*, etc. A *Written Order* should state clearly the payment or lack of it for the activity indicated.

Written Orders shall be numbered sequentially, signed by the Resident Engineer or alternate, and dated with the date of issuance. Copies of the finalized version of the *Written Order* should be made for the following:

1. Project Files
2. Regional File via the Regional Construction Engineer
3. Construction Headquarters via the Finals Engineer

A *Written Order* may be requested by the Contractor if they feel that their interests will be protected by the order. Such a request should be honored.

2-150.70 Project Plans

► Reference: *Section 6-150.70 Final Disposition of Record Plans*

To facilitate the preparation of Record Plans, Resident Engineers should note in red all changes in the project plans on their half-sized or full-sized field prints. Upon project completion, these prints should be submitted to the Finals Unit with the rest of the project records to ensure that all field changes are properly recorded on the record plan originals.

Changes to the plans should be recorded as they are made. The Record Plans should not be postponed for preparation during the finals process, as this could lead to errors or omissions in the Record Plans since the material is not as familiar after the fact, and, in some instances, impossible to reproduce.

2-160 CONTRACT CHANGES

► References: *Subsection 104.02 Alteration of Plans or Character of Work, Subsection 104.03 Extra Work,* and *Subsection 109.06 Extra and Force Account Work* of the Standard Specifications for Construction

2-160.10 Changes In Design/Supplemental Agreements

Many projects will require work to be done which is not detailed or covered by the plans or contract documents. As stated in *Subsection 2-110.20 Changes Within and Outside the Scope of the Contract*, the Resident Engineer must be careful in making changes during construction. If it is determined that a change is necessary, the use of a *Change Order* (Appendix A-1) is necessary.

The proposed change must be discussed with the Regional Construction Engineer and Project Manager before making all but minor changes that do not require a *Change Order*. On all projects with full oversight by FHWA or where a *Change Order* is considered to be a major change as referred to under the *Independent Cost Analysis for Change Orders - Guidance and Procedures* (Appendix B-22), it is also necessary to discuss the proposed change with the FHWA representative, as this will give them a better understanding of the necessity for the change when the *Change Order* goes to FHWA for approval.

Changes to a contract may be addressed by answering the following questions:

1. Is the work eligible for Federal-aid?
2. What is the impact of the proposed contract change on the original "Scope of the work"?
3. What is the basis of payment and what cost analysis must be completed to support the negotiated prices that are part of the *Change Order*?

Changes of a minor nature may be made in the field without the use of a formal *Change Order* as long as the work is done under the appropriate bid items. Such changes include minor changes in the alignment or grade of culverts, and the undercutting of small sections of the sub-grade to remove unsuitable material. If work which starts out with the appearance of being minor later develops into a major change, a *Change Order* form should be initiated immediately to document the work and quantities.

This may occur, for example, when the amount of sub-grade undercutting gradually increases during the progress of the project, through the excavation of many small areas, until a large quantity of excavation is involved. In such a case, the Regional Construction Engineer, Project Manager, and the FHWA representative, if applicable, should be kept informed of the situation during the progress of the work.

In all cases where there is a question as to whether the change required is of a "major" or "minor" nature, the Regional Construction Engineer should be consulted. The Construction Environmental Engineer and the Environmental Unit should be consulted when the proposed work is outside of the project construction limits, as well as proposed changes to drainage features, impervious surface areas, or the discovery of illicit discharges. These situations may also require review by the Environmental Unit. Work outside of the project limits is described in *Section 11-110 Waste, Borrow, and Staging Areas*. Changes regarding drainage features are described in *Subsection 11-150.20 Operation Stormwater Permits*. The issue of illicit discharges is handled in *Subsection 11-150.30 Illicit Discharge Detection and Elimination*.

Refer to *Section IX SiteManager* for detailed instruction on approving a *Change Order*. Additional guidance on drafting *Change Orders* is found in *Drafting and Executing Change Orders - Guidance and Procedures* (Appendix B-23).

2-160.20 Prime Contractor Claims

In accordance with *Subsection 105.20 Claims for Adjustment* of the Standard Specifications for Construction, a Prime Contractor must file a written *Notice of Intent* to file a claim, prior to performing any of the disputed work. The Prime Contractor must file the claim, in writing, within 90 calendar days of the *Notice of Intent*, or within 90 days of acceptance, whichever occurs first.

The Resident Engineer must send a copy of the *Notice of Intent* to the Regional Construction Engineer, the Construction Engineer, and the Regional Administrative Services Technician.

The Resident Engineer will review and confirm that the *Notice of Intent* meets the requirements of *Subsection 105.20 Claims for Adjustment* in consultation with the Regional Construction Engineer and the Construction Engineer. The Resident Engineer will then prepare a *Written Order* (Appendix A-3) that acknowledges receipt of the *Notice of Intent* to file a claim or informing the Contractor that the *Notice of Intent* does not meet the requirements of the contract. The *Written Order* should not deny, accept, reject, or direct any other action relating to the claim; it is solely to acknowledge receipt of the *Notice of Intent.*

The Resident Engineer must track, in accordance with the Force Account procedures, the contested work, and on a daily basis, reach consensus with the superintendent on all labor, equipment, and materials involved with contentious work. The Resident Engineer will track the contested work using the *Force Account Summation Form* (Appendix B-24) that is also available through the Field Forms directory. Refer to *Subsection 2-170.30 Extra Work* for more information.

Once the actual claim is received by the Resident Engineer, they must send a copy of the claim immediately to the Construction Engineer, the Regional Construction Engineer, and the Regional Administrative Services Technician.

The Construction Engineer, in concert with the Regional Construction Engineer and Resident Engineer, may formulate an early opinion on the merits of the contested work. The Resident Engineer will prepare a briefing of the matter for discussion with the Regional Construction Engineer and the Construction Engineer. If the issue has merit, the Resident Engineer will be provided direction that may include negotiating the terms of a *Change Order* or proceeding on a Force Account basis. If this is a full oversight project, FHWA must be included in this decision.

All claim settlements will be memorialized through the execution of a *Change Order*. The Construction Engineer will provide a note to the project file outlining the terms of the settlement to be used in the development of the *Change Order*. The claim settlement *Change Order* will follow the *Change Order* process. Refer to *Drafting and Execution Change Orders – Guidance and Procedures* for more information.

2-160.30 Formal Contractor Meetings

As previously stated for the Preconstruction Conference, the Regional Construction Engineer should digitally record the meeting proceedings. The resulting digital file should be saved in the project correspondence files on the Construction Section network drive. If there is a decision being made about contract work as a result of the meeting, the meeting should have meeting minutes that are sent to the Contractor with a letter to indicate that any discrepancies in the meeting record should be brought to the attention of the Regional Construction Engineer within ten working days. Failure to respond shall indicate acceptance of the meeting minutes.

Any meeting that involves a discussion of contract changes should be formally documented as well, along with any agreement between VTrans and the Contractor. Digital recordings, letters, email, or *Written Orders* are acceptable forms for contract change meeting documentation. If the decision does result in a contract change, the change must be worked into a *Change Order*. It is also important that Resident Engineers record the project meetings in their *Daily Work Reports*.

2-170 MEASUREMENT, DOCUMENTATION, AND PAYMENT

► Reference: *Section 109 Measurement and Payment* of the Standard Specifications for Construction

2-170.10 General

The general basis for payment to the Contractor for work performed and materials furnished is covered in *Section 109 Measurement and Payment* of the Standard Specifications for Construction. More explicit directions for the measurement and payment of contract items are found under each item specification in *Subsection 109.01 Measurement of Quantities* of the Standard Specifications for Construction.

In addition, *Section IV Construction and Inspection Details* contain more specific guides for the measurement of work items based on VTrans policy and experience.

It is the practice of the Construction Section to pay only once for work performed at any one location. For example, if an excavated pipe trench should slump or be washed in before the pipe could be laid, the Contractor should not be paid for bringing the trench to flow-line grade the second time.

The Contractor should be fairly paid for all work performed. Measurements should be made accurately, and enough measurements taken, to establish the true quantity involved. The Contractor should be invited to have one of their representatives participate in the measurement of quantities, as this will eliminate some duplication and assure an early agreement between the Contractor and the Resident Engineer as to the quantities to be paid.

When estimating the payment of items such as common excavation or solid rock excavation, the Resident Engineer should cap the payment for the specific item at the contract quantity until final sections are taken, plotted, and the quantities calculated.

Load count, or truck measurement, should only be acceptable as the method of measurement for quantities when authorized in the contract provisions, or as approved in writing by the Resident Engineer in the case of small quantities where other methods of measurement are impractical. Quantities paid on any *Bi-weekly Estimate* must be substantiated so that the Contractor will only be paid for work performed. This substantiation, which is a form of documentation, must be clear enough to be checked by persons not familiar with the project. Such evidence may take the form of scale tickets, diary entries, material receipts, etc.

For example, earthwork quantities might be supported by load count entries in the *Inspector's Daily Report* or by limiting stations and quantity balances. Pipe lengths may be initialed entries in the field book or the *Inspector's Daily Report*. A positive method of referencing each quantity on the *Bi-weekly Estimate* to its supporting measurements should be initiated on each project, but the method may vary with the complexity of the project. Measurements should be kept up-to-date, and work should be paid for on the first *Bi-weekly Estimate* following the performance of acceptable work.

2-170.20 Documentation

An important part of measurement and payment is the documenting of quantity records. This means that all measurements and computations appearing in the Field books or computation sheets should be initialed and dated by the person doing the work. Again, it is imperative that as soon as someone works on a project that they should enter their name and initials into the engineering force record in the summary book.

All weight slips or delivery slips to be used as the basis for payment for specific items should bear the project name and number and should also be initialed and dated by the person receiving the slip, and their initials should be taken to mean that they certify that the material was actually incorporated into the project. A person having occasion to initial slips should sign their full name on the first slip they receive each day, but subsequent slips should require only their initials.

If any deductions are to be made from the quantity shown on the slips, the computations or other basis for this determination should be shown on the particular slip in question. The paving foreman should also sign the slip, indicating their agreement with the pay quantity for that specific slip. Items for which the quantity is determined by computations based on typical sections for plan dimensions should be checked in the field to ensure that the completed work actually does substantially conform to these typical sections or plans.

Documentation for the last category may consist of a log in a field book showing the sections checked and approved, the date, and the signature of the person doing the inspection, or may be recorded in the *Inspector's Daily Report* or by any other means that will ensure that all areas are adequately checked. Examples of items requiring this type of documentation are fine grading, the various subbase courses, and concrete pours.

If survey notes become a part of the documentation, these notes should always bear the project name and number, the date, and the names of the people working on the survey party. Refer to *Section IV Construction and Inspection Details* for specific requirements for all items.

2-170.30 Extra Work

► References: *Subsection 101.02 Definitions and Terms*, *Subsection 104.03 Extra Work*, and *Subsection 109.06 Extra and Force Account Work* of the Standard Specifications for Construction

Extra work is defined as work to be performed or labor and/or materials to be furnished by the Contractor in order to complete the project in an acceptable manner, but for which there is no applicable basis of payment provided in the contract. There are three methods of paying for extra work, and they are listed in the preferred order as follows:

1. **Unit price basis**: Prices are established by a *Change Order* (Appendix A-1) to show necessity for additional work.

    a) A unit price basis payment should never be combined with the payment of contract items for extra work, since contract items should already account for overhead, labor, equipment, and incidentals necessary to do the work.

b) Extra work which can be done by using items found in the Standard Specifications for Construction should be done by the unit price basis. Under this procedure, the necessary Items should be added to the contract by *Change Order* and the work should be paid for in the normal way. Preferably, the *Change Order* should be executed before the start of work.

2. **Lump sum basis:** The total price is established by a *Change Order* to show necessity for additional work.

   a) Extra work, for which there are no appropriate items, may be paid for on the lump sum basis. In this case, the Contractor agrees to complete the work by furnishing all the required labor, equipment, and materials for a specified total price.

   b) The extent of the work and the price is established by a *Change Order* executed before the start of work. When a *Change Order* cannot be executed prior to the start of the work, a *Written Order* shall be issued to document the agreement. The Resident Engineer is responsible for keeping documentation that will support the lump sum unit price.

3. **Force account basis (cost plus):** Extra work for which there are no appropriate items, or for which the Contractor and VTrans cannot agree upon a lump sum price, can be done on a force account basis. Under this method, the Contractor is paid the actual cost for labor and materials, plus various percentages for overhead and profit. Detailed instructions for the Resident Engineer in the performance of extra work on a force account basis may be found in *Subsection 109.06 Extra and Force Account Work* of the Standard Specifications for Construction and in *Force Account - Extra Work – Guidance* (Appendix B-25).

   a. Extra work should be documented by a *Written Order*. All daily work activities, including days worked and any other information directly related to the extra work should be documented within the *Daily Work Reports*. All changes to the contract should be formalized by a *Change Order.*

b. The Resident Engineer will keep accurate daily reports of the work as it is done using the *Force Account Summation Form* which is also available through the Field Forms directory. The daily record of extra work should be signed by the Resident Engineer and the Contractor's representative to show that they are in agreement as to the amount of labor, materials, and equipment used that day. Copies of the record should be distributed to the Contractor, the field office, and Regional Construction Engineer.

c. The Finals Engineer may serve as a reference to the Resident Engineer in compiling the *Force Account Summation Form.* The Resident Engineer should then pay for the extra work in its entirety on the next *Bi-weekly Estimate*, following the formal approval of the *Change Order*.

d. If Summary Books are used, an *Extra Work Record* should be created with a title ("*Extra Work*" #), followed by a brief description of the work. The Summary should show the following:

Original	**Final**	
0	1	(unit)

If Electronic Books are used, the item will be captured via the *Change Order*, and nothing further needs to be tabulated.

2-180 LEGAL RELATIONS AND RESPONSIBILITIES

► Reference: *Section 107 Legal Relations and Responsibility to the Public* of the Standard Specifications for Construction

2-180.10 Integrity

Absolute integrity on the part of all VTrans personnel is essential for maintaining public confidence in VTrans. Integrity embraces everything that affects a person's ability to do their job, including resourcefulness, decisiveness, adaptability, stability, professional action, and ethical behavior.

Project personnel shall be prohibited from doing engineering work for the Contractor, and receiving compensation. No one at VTrans whose job involves negotiating, approving, or administering any contract or transaction on behalf of VTrans should have any financial or personal interest, direct or indirect, in the case. If any VTrans employee has any interest in real property to be acquired for highway purposes, they should fully document the facts and circumstances of their interest and make them immediately known to their supervisor.

VTrans employees shall not use VTrans equipment for personal business. VTrans employees shall not seek to acquire VTrans property which is offered for sale without express written approval of the Chief Engineer. The solicitation or acceptance of a cash loan by a VTrans employee from any Contractor doing business with the VTrans, or from any of the Contractor's representatives, is another example of serious conflict of interest. Any case of dishonesty or serious conflict of interest will result in the immediate dismissal of the person or persons involved.

2-180.20 Hatch Act

By virtue of the use of Federal-aid funds for highway construction by VTrans, employees are subject to the provisions of the Hatch Act, a Federal Law concerning political activity. A portion of the *Hatch Act, Title 5 § 118K* is quoted here as follows:

A. *No officer or employee of any State or local agency whose principal employment is in connection with any activity which is financed in whole or in part by loans or grants made by the United States or by any Federal agency should:*

   1. *Use his official authority or influence for the purpose of interfering with an election or a nomination for office, or affecting the result thereof, or;*

   2. *Directly or indirectly coerce, attempt to coerce, command, or advise any other such office or employee to pay, lend, or contribute any part of his salary or compensation or anything else of value to any party, committee, organization, agency, or person for political purposes. No such official or employee should take any active part in political management or in political campaigns. All such persons should retain the right to vote as they may choose and to express their opinions on all political subjects and candidates.*

2-180.30 Labor Compliance

As a part of the contract, it is required that all regulations with regard to labor compliance be properly followed. Requirements of the Contractor and VTrans regarding the contract labor provisions are covered in the proposal and the referenced regulations. A working knowledge of these regulations is expected of the VTrans personnel involved to assure compliance by the Contractor.

Labor compliance guidance is available from the VTrans Civil Rights and Labor Compliance website at the following URL:

http://vtranscivilrights.vermont.gov/doing-business/contractors-center/davis-bacon

More information about labor compliance guidance is also available by contacting staff in the VTrans Office of Civil Rights and Labor Compliance at the following URL:

http://vtranscivilrights.vermont.gov/about-us/contact-us

A. Required Notices and Posters - Federal-aid Projects

In order to properly fulfill the contract, the Contractor must conform to all labor compliance requirements of the contract and of *FHWA-1273 Required Contract Provisions – Federal-aid Construction Contracts* included therein. The Resident Engineer is responsibility for ensuring that all requirements regarding labor compliance requirements are properly carried out, including the display of all required posters.

The Office of Civil Rights and Labor Compliance provides the poster package at or before the pre-construction conference. The Resident Engineer must ensure that the following posters are properly displayed before work commences and throughout the duration of the project:

Required posters for projects *with* Davis-Bacon wage rates are as follows:

- Fraud Poster (Form PR-1022)
- Equal Opportunity is the Law Poster
- Notice to All Employees - WH Publication 1321 Poster
- Labor Wage Rate Schedule (Wage rates)
- Notice Employee Polygraph Protection Act - WH Publication 1462 Poster
- Your Rights Under the Family and Medical Leave Act Poster

- Your Rights Under the USERRA: The Uniformed Services Employment & Reemployment Rights Act Poster
- Emergency Phone Numbers
- CA-101 – VT Minimum Labor & Truck Rates
    - English
    - Metric
- Safety and Health Protection of the Job Poster
- Summary of the Equal Employment Opportunity Program

Required posters for projects *without* Davis-Bacon wage rates are as follows:

- Equal Employment Opportunity is the Law
- Notice Employee Polygraph Protection Act - WH Publication 1462 Poster
- Fraud Poster (Form PR-1022)
- Notice to All Employees - WH Publication 1321 Poster
- Your Rights Under the Family Medical Leave Act
- Your Rights Under the USERRA: The Uniformed Services Employment & Reemployment Rights Act Poster
- Safety and Health Protection of the Job
- The Equal Opportunity Program Summary
- Emergency Phone Numbers
- CA-101 – VT Minimum Labor & Truck Rates
    - English
    - Metric
- Federal Minimum Wage Rate Poster

B. Interviews

The Compliance Officer from the VTrans Office of Civil Rights and Labor Compliance may, in conjunction with the Resident Engineer, conduct random on-the-job interviews with employees of the Contractor and Sub-Contractors to determine the actual wages being paid and whether the employee is properly classified in the work being performed. Any wage discrepancies should be noted on the *Resident Engineer Verification Form* (Appendix B-26) and brought to the attention of the Contractor without delay.

C. Payrolls

On all Federal-aid contracts, the Contractor shall submit all Prime Contractor and Subcontractor payrolls to the Office of Civil Rights and Labor Compliance through the CORE FTP site, for each week in which any contract work is performed. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor, the Subcontractor, or their authorized agent who pays or supervises the payment of the persons employed under the contract.

- Payroll Check: The Resident Engineer should check the payroll(s) to ensure compliance with the wage provisions of the contract. The following is a detailed list to use in determination of compliance:

    1. The employees name, and 4 digit ID (for example, the last 4 digits of their SS#)
    2. Worker classification
    3. Regular hourly rate of pay, including rates of contributions or costs anticipated for fringe benefits or their cash equivalents
    4. Overtime rate
    5. Daily and weekly numbers of hours worked
    6. Deductions
    7. Detailed information regarding various fringe benefits paid, if applicable
    8. Detailed information regarding approved apprenticeship or trainee programs, if applicable

- Resident Engineer Verification**:** The Resident Engineer will randomly sample the payrolls for accuracy and submit the *Resident Engineer Verification Form* weekly to the Civil Right Program Manager in the VTrans Office of Civil Rights and Labor Compliance. Any discrepancies should be noted on the *Resident Engineer Verification Form*.

The Resident Engineer should use the *Resident Engineer Verification Form* to ensure compliance with the following:

1. Whether the wages being paid to laborers and mechanics are not less than required in the Contract.
2. If the work being performed by any specific class of employees, including helpers or apprentices, conforms to the classification set forth in the contract for the wage they are being paid.
3. Whether the wage classification is correct or if there appears to be a disproportionate number of lower paid help (laborers, helpers, or apprentices) indicating avoidance of minimum wage rules.

D. Violations

The Labor Compliance Officer should be promptly notified of any complaints of Davis-Bacon act or other violations of the labor standards. The Labor Compliance Officer will investigate all complaints in a timely manner and share the report with the Construction Engineer. The VTrans Office of Civil Rights and Labor Compliance will work in close collaboration with the Construction Section to promptly address all payroll violations and to ensure prompt restitution by the Contractor or Subcontractor. Deliberate violation of the labor compliance requirements regarding wages is a serious matter and will not be tolerated.

Form PR-1273 for all Federal-aid projects is a part of the contract proposal and describes the required labor regulations. The form appears as the first colored sheet in the proposal. The requirement above is supplemented by information given in the contract proposal titled *Outline of Federal Requirements Applicable to Labor for projects involving the Expenditure of Federal-aid Funds other than Inter-State*.

Any questions the Resident Engineer has in regard to labor should be referred to the Labor Compliance Officer in the VTrans Office of Civil Rights and Labor Compliance.

2-180.40 Entry on Private Lands for Survey Purposes

Before entering on private property to do surveying work, the Resident Engineer shall contact the property owner and get permission to do so. The work shall be done with the minimum damage to the land and disturbance to the owners. Once the surveying work is complete, all stakes and any other related surveying materials should be removed.

If the property owner declines to give such permission for this work and all reasonable means of seeking this permission to do so fail, the Regional Construction Engineer and the Assistant Attorney General's office for the Agency should be consulted.

2-180.50 Improvement Release

During the course of construction it may be necessary or desirable to perform work outside the limits of the State's purchased right-of-way or construction easements. The Resident Engineer should consult with the Environmental Construction Engineer and the Environmental Unit to confirm that there will be no impact to environmental resources or the need to amend environmental permits prior to making any agreement. Such work will often be of benefit to the property owner, as well as to VTrans, and usually will be of a minor, temporary, or one-time nature. Examples of such work include the flattening of slopes, construction of drives, and removal of brush or trees. Such work should not require future maintenance or access off the right-of-way.

Even if the property owner verbally agrees to the proposed construction on their land, they must sign a *Property Owner's Release* (Appendix B-27) to limit the liability of the State. The *Property Owner's Release* should be distributed as noted on the form. If the property owner refuses to sign the release, the work must not be performed. No monetary payment will be made with the use of a *Property Owner's Release*.

The Right-of-Way Section is responsible for reviewing situations that involve securing easements from the property owner for permanent rights, such as drainage rights, the right to install and maintain culverts, and ditch and slope rights that require future maintenance. The Right-of-Way Section is also responsible for agreements and payment for temporary rights upon which the property owner may insist.

2-180.60 Responsibilities of the Resident Engineer Regarding Equal Employment Opportunity

The following are specific responsibilities of the Resident Engineer regarding equal employment opportunity:

1. Knowledge of the identity and location of the Contractor's Equal Employment Opportunity (EEO) Officer.
2. Verification that all required notices and posters for the project are properly displayed per *Subsection 2-180.30 Labor Compliance*.
3. Understanding the Contractor's EEO policies and the procedures to implement such policies, particularly within the area of employment of women, minorities, and the disabled.
4. Understanding the VTrans On-the-Job Training (OJT) Program.
5. Knowledge of the working definition of a "disadvantaged person" and the reasons that VTrans uses the classification.
6. Knowledge of the Contractor's work force organization and the number of minority, non-minority, and disadvantaged employees currently engaged in each work classification that appears on the Contractor's annual *PF 1391* Report.
7. Awareness of any deficiencies in the Contractor's EEO Program so that this information can be brought to the attention of the VTrans Office of Civil Rights and Labor Compliance.
8. Attending any Compliance Review made on their project by the VTrans Office of Civil rights and Labor Compliance to verify that all of the Contractor's EEO responsibilities have been fulfilled.
9. Knowledge of the *Training Special Provisions* (CA 114), specifically Item *634.10 Employee Traineeship*, and the Special Provision entitled *Specific Equal Employment Opportunity Responsibility*, the *Supplemental Specifications*, *DBE Policy Contract Requirements*, and *the Commercially Useful Function (CUF*) portion of the *Resident Engineer Verification Form.*
10. Monitoring and confirmation through the use of the *Resident Engineer Verification Form* (Appendix B-27) that the DBE is performing a Commercially Useful Function (CUF). Refer to *VTrans DBE Policy* (CA 110-Rev March 2011) for more information on evaluating the performance of a CUF.

The DBE program was established to provide opportunities for DBE contractors to grow successful businesses; the CUF is one way to help protect against fraud and abuse by confirming that the DBE contractor is performing a CUF.

To ensure that payments made to DBE contractors be counted toward DBE goals, the DBE contractors must be deemed able to perform a CUF. The Resident Engineer should determine if the DBE is properly executing the specified contract work and is carrying out its responsibilities by actually performing, managing, and supervising the work involved, consistent with standard industry practices.

The directive *HPM 6-4-1-2 Equal Employment Opportunity on Federal and Federal-aid Highway Construction Contracts*; *Including Supportive Services* consolidates VTrans' Equal Employment Opportunity requirements in one document, and supersedes several previous Instructional Memoranda, FHWA Notices, and FHWA Orders.

In order for VTrans to avail itself of all eligible Federal-aid funds, VTrans should provide its assurance that employment in connection with all proposed projects will be provided without regard to race, color, religion, ancestry, national origin, sex, sexual orientation, gender identity, place of birth, age, or disability.

This is mandated in Vermont Statutes (*Title 21, Labor, Part 495*), which includes the 2013 amendments. A link to this statute may be found at the following URL:

http://legislature.vermont.gov/statutes/section/21/005/00495

The only significant changes, not mandated by other authorities who are included in this directive, are as follows:

- Prior to commencing construction, the Contractor should submit to the VTrans OJT Program Manager in the Office of Civil Rights and Labor Compliance, for approval, the number of trainees to be trained in each selected classification and training program to be used. Furthermore, the Contractor should specify the starting time for training in each of the classifications and the starting rate of pay.
- Training in a particular laborer classification may be permitted on condition that significant and meaningful training is provided and approved by the Division Office. Specific approvals on a project-by-project basis are not required. VTrans maintains approved specific training programs that Contractors may utilize.
- The Contractor must obtain the approval of the VTrans OJT Program Manager before a proposed trainee can commence work that will count towards the training hours requirement.

- All training provided under these provisions should be reimbursed at the unit bid price per hour of training for the duration of the approved training period regardless of length.
- No payments should be made to the Contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyman, is caused by the Contractor and the Contractor evidences a lack of good faith in meeting the requirements of this Training Special Provision.
- The Contractor should furnish each trainee a copy of the program they will be following in providing the training.

2-180.70 Civil Rights

► Reference: *Section 0500-0550* VTrans Policy and Procedures Manual

VTrans Equal Employment Opportunity (EEO) Policy states that no person should, on grounds of race, color, religion, ancestry, national origin, sex, sexual orientation, gender identity, place of birth, age, or disability be subjected to discrimination in any program or activity. This also means that harassment of employees because of race, color, religion, ancestry, national origin, sex, sexual orientation, gender identity, place of birth, age, or disability will not be tolerated. All contractors, subcontractors, vendors, or consultants utilized by VTrans must also support this policy in accord with all applicable Federal/State Affirmative Action (AA) and EEO laws and regulations on all projects.

A link to VTrans' EEO/AA Policy may be found at the following URL:

http://vtranscivilrights.vermont.gov/sites/aot_compliance/files/documents/eeo/VTransEEOPolicyStatement.pdf

The Resident Engineer has the primary responsibility for monitoring contract compliance with respect to civil rights requirements. The Resident Engineer must promptly notify the VTrans Office of Civil Rights and Labor Compliance concerning any potential violations of civil rights and contractor compliance requirements, or in the event that complaints are made by any employees concerning any of these matters.

2-180.80 Contractor's Responsibility For Work

► Reference: *Subsection 107.18 Contractor's Responsibility for Work* of the Standard Specifications for Construction

On occasion, before a project is accepted, damage may occur to constructed elements of the project. In these instances, the Resident Engineer must make a determination if the damage is in any way the fault of the Contractor. If the damage is not the fault of the Contractor, the Agency will reimburse the Contractor the cost to rebuild, repair, or restore the work. When making a determination of the Contractor's responsibility, the Resident Engineer should refer to *Contractor's Responsibility for Work – Guidance and Process* (Appendix B-28).

2-180.90 Buy America Provisions

► References: *Subsection 107.22 Buy America Provisions* of the Standard Specifications for Construction and *Buy America Provisions – Guidance* (Appendix B-29)

All steel and iron products incorporated into projects that receive Federal-aid shall be subject to the Buy America Provisions. Areas of emphasis for the Regional Construction Engineer and Resident Engineer in enforcing this regulation include the following conditions:

1. The Buy America requirements shall be discussed at preconstruction conferences.

2. All steel and iron materials shall be inspected for compliance when delivered to the project and noted on inspection reports.

3. All steel and iron materials certifications shall be received and approved before the material is incorporated into the project. There may occasionally be extenuating circumstances where steel or iron materials may be incorporated into the project before a materials certification is received; in these cases, the Resident Engineer should obtain advanced written approval from the Regional Construction Engineer to do this.

2-190 UTILITY RELOCATION AND ADJUSTMENT

2-190.10 General

When the facilities of utility companies are in conflict with the construction or improvement of a highway, the affected utility companies should be obligated to move, relocate, or protect such portions or sections, of their facilities. In some instances, the utility facilities may qualify for reimbursement by VTrans for the cost of such adjustments. In other instances, the cost of such work should be borne by the involved utility. The determination of cost responsibility should be made well ahead of project construction by the Development Review & Permitting Services Section.

The physical construction of the utility adjustments is usually accomplished by a utility with its own forces, or by a Contractor employed by the utility. However, in some instances the work may be done via bid items in the project contract. Work being done as part of the construction contract is not usually prompted by reimbursement eligibility, but rather by being the most expeditious method of getting the work done.

In instances involving the transfer of funds; VTrans should reimburse the utility for eligible adjustments, or where the utility is to reimburse VTrans for non-eligible utility work being done by the Contractor. The Development Review & Permitting Services Section should process a *Utility Agreement* between VTrans and the involved utility. This agreement should include plans prepared by, or for, the utility showing the proposed adjustment, as well as an estimate of costs. The estimate should include a breakdown indicating the costs to be borne by VTrans and by the utility.

The Resident Engineer should be aware of changes requested by a utility, and that a required *Change Order* should be prepared and signed by the individual authorizing the change for the utility. This will assist the Development Review & Permitting Services Section in recouping costs for the utility work in the final billing of the specific utility.

Details of any *Utility Agreement* as well as details and locations of the utility adjustments should be in accordance with *CFR Title 23, Highways, Chapter 1, Subchapter G, Part 645 – Utilities.*

This regulation may be found at the following URL:

http://www.ecfr.gov/cgi-bin/text-idx?SID=378798a022062c216946ad9234374faa&node=pt23.1.645&rgn=div5

In all projects funded to any extent with Federal monies, Federal requirements stipulate that VTrans and the Utility agree in writing on their separate responsibilities. In the remaining instances where no transfer of funds is involved, the Development Review & Permitting Services Section should process an *Occupancy Permit*. This *Occupancy Permit* should include plans prepared by, or for, the utility showing the proposed adjustment.

In all instances, the arrangements with the utilities should be made well in advance of project construction by the Development Review & Permitting Services Section, with minimal or no involvement of Construction Section personnel.

An *Occupancy Permit* satisfies the Federal requirement for a written agreement between VTrans and the utility. Conversely, the processing of a *Utility Agreement* satisfies the VTrans requirement for an occupancy permit where the utility occupies a State highway right-of-way.

Resident Engineers should be aware that the standard contract language includes a provision that the Contractor will work with the Utilities doing the relocation, but the Contractor cannot seek any additional compensation for these efforts. However, Resident Engineers should document the facts relating to any delays associated to such work in their *Daily Work Reports.*

2-190.20 Definitions

AUTHORIZATION: shall mean authorization by the State to the Utility to proceed with any phase of a project.

CONSTRUCTION: shall mean the actual building and all related work including utility relocation or adjustments.

COSTS OF RIGHT-OF-WAY: shall mean the costs of land required for the relocation of the utility facility.

PRELIMINARY ENGINEERING: shall mean and include locating, making of surveys, and the preparation of plans and estimates prior to the execution of an agreement.

REIMBURSE: shall mean that State or Federal funds may be used to pay back the utility to the extent provided by law.

SALVAGE VALUE: shall mean the amount received for utility property removed, if sold, or if retained for re-use, the amount at which the material recovered is charged to the materials and supplies account.

STATE: shall mean VTrans.

UTILITY: shall mean and include all privately, publicly, or cooperatively-owned facilities consisting of telephone, electrical energy, oil, gas, and water including sewer, steam, and other pipe lines. Dependent upon the meaning intended, the term "Utility" may also mean the utility company, inclusive of any wholly-owned subsidiary.

2-190.30 Preconstruction Conference

Following the award of execution of the contract, representatives of the utility companies and other affected and interested parties should attend a preconstruction conference as described in *Section 2-130 Prosecution and Progress of the Work.*

2-190.40 Progress of Work

The *Notice to Proceed with Construction* with regards to the inspection and relocation of utilities is the responsibility of the Utilities Engineer. If the Development Review & Permitting Services Section has insufficient manpower to do this, they should request that either the Construction Engineer or the District Transportation Administrator assign an Inspector to the project. The Resident Engineer should assume inspection responsibility when they arrive on the project.

2-190.50 Inspection of Work

The Resident Engineer should conduct an initial review of the proposed utility adjustments to verify that the facilities are being placed outside the limits of the planned highway improvements, or as otherwise set forth on the highway plans or in the Utility Special Provisions. The utility forces and the project personnel should use the same references when staking the utility relocation. The establishment of all installations should be coordinated between the Resident Engineer and the utilities representative.

The details and extent of on-going job inspection will depend primarily on whether there is any transfer of monies. If VTrans is reimbursing a utility, the reimbursement should be based on accountability of time and materials. Conversely, if a utility is to be billed for work done on its behalf, VTrans should be in a position to support the billing.

In instances where a utility is relocating at its own expense, inspection may involve ensuring that facilities are relocated as planned utilizing proper construction techniques without undue inconvenience to the Contractor or the utility. The only recordkeeping required in this case would be such notes that are advisable in the project diary.

2-190.60 Contract Records

General: Detailed daily construction records should be necessary only in situations involving the transfer of money, that is, when there is a *Utility Agreement*. This is to ascertain that the proposed utility work is accomplished in accordance with the agreement and to provide data necessary to document and substantiate billing to, or from, a utility company.

Force Account Agreements: The Inspector should keep a daily record of the number and classification of employees, material, major equipment used, and other such information needed to verify billing charges. A record should be made of all materials recovered from removed existing facilities. The purpose of inspecting recovered materials is to prevent the junking or scrapping of same without ensuring that proper allowance is made for salvaged materials. The Development Review & Permitting Services Section should be notified of the time and place where recovered materials will be available for inspection. Since the Development Review & Permitting Services Section reviews all billing prior to authorizing payment, it is imperative that they should be familiar with the recovered materials and their values.

Lump Sum Agreements: When a utility relocation is performed by a utility company under a lump sum agreement, daily records are not required of man-hours, material items, or equipment time. However, the Inspector should ensure that the work is accomplished in accordance with the requirements of the agreement. Sufficient records of the work performed should be maintained to enable certification that the work has been accomplished in the manner prescribed in the agreement.

Unit Price Basis (General Roadway Contract): When the utility relocation is performed by the general contractor or their agents, a daily record should also be made of work operations by stations, the bid items used, and the quantities completed. This should be included in the Inspector's diary for each day work is performed, as well as in the field books.

Changes in the Approved Work: Utility companies may be authorized to do work involving changes in quantities or items not included in the approved estimate that may be necessary to accomplish the intent of the approved Utility Agreement. However, the Development Review & Permitting Services Section should be apprised of such changes as they are responsible for determining the need for and the administration of, Utility Supplementary Agreements, in these instances, a *Change Order* should be completed as outlined previously.

2-190.70 Utility Adjustment Report

The *Utility Adjustment Report* form is needed only where a utility is performing reimbursable Force Account work. This form should be completed weekly by the utility company and forwarded to the Resident Engineer. The Resident Engineer should initial the form to signify that the entries are correct, based on their inspections, and should forward the completed *Utility Adjustment Report* to Construction Headquarters.

2-200 RIGHT-OF-WAY

2-200.10 General

► Reference: *Subsection 2-110.10 Project Control Documents*

The Resident Engineer should make a study of the various right-of-way plans prior to the start of construction, and during staking operations, to ensure that the roadway is clear for the start of the Contractor's operations. If certain work is to be done by other parties, the Resident Engineer should see that this work is accomplished on such a schedule as to not interfere with the Contractor. A check of the right-of-way plans will also disclose any work to be done for the property owners and this information can be passed on to the Contractor.

During construction, the Resident Engineer should watch for encroachments back onto the VTrans project right-of-way by adjoining property owners. This could occur, for example, in the form of fences, barns, houses, gas pumps, or signs. If such an encroachment occurs, the Resident Engineer should immediately contact the Right-of-Way Section, which is responsible for contacting the property owner and ensuring that the encroachment(s) be removed from the project right-of-way.

2-200.20 Instructions For Completion Of "Permit" Form TA210

A completed *"Permit" Form TA210* is required for any changes or driveway construction on State Highways. These types of changes may include a new driveway location (if the change is significant), a change in driveway width, or a change in driveway use (from residential to commercial, for example). The permit, along with a signed *Property Owner Release Form*, where applicable, is the responsibility of the Development Review & Permitting Services Section and/or the Right-of-Way & Utilities & Survey Section, if applicable, and should be completely administered by either Section for all designed driveways. No work should be done on a driveway until a copy of *"Permit" Form TA210* has been signed and returned to the Resident Engineer.

The following information should be included on a completed a *"Permit" Form TA210*:

- The name of the property owner requesting a new drive or change from the original permit
- The town, highway route number, and location of the drive by project station, mileage marker, and position right or left of the roadway centerline
- A description of the drive work to be done, including the designated use of the drive (commercial, residential, industrial, or agricultural), the proposed width of the drive, and the proposed surface of the drive
- The permit status
- The date work is to begin
- The property owner's signature(s) and date

The bottom portion of the *"Permit" Form TA210* is reserved for a description of the conditions specified for the drive by the Chief Engineer.

STATE OF VERMONT

AGENCY OF TRANSPORTATION

CONSTRUCTION SECTION

2015

ENGLISH/METRIC

CONSTRUCTION MANUAL

SECTION III

ENGINEERING AND CONSTRUCTION SURVEYING

3-100 GENERAL

► Reference: *Section 105.09 Construction Stakes* of the Standard Specifications for Construction

This section of the Construction Manual outlines methods for accomplishing the field work necessary to provide the Contractor with the project layout and elevations. The methods described have proven efficient for many Resident Engineers, but it is recognized that other methods and procedures may work well for other individuals.

It is one of the duties of the Resident Engineer to see that the Contractor is furnished with the initial layout and engineering at the time that it is needed. The work includes surveying for line and grades, engineering work for drainage, and the design of special features.

The accuracy of surveying and engineering work must be consistent with its intended use. The centerline control points should be carefully and accurately tied in so that the centerline can later be easily and accurately reproduced. Usually, during the original stake-out, the work is performed in the woods over rough terrain. The resulting accuracy of the work will not be exceptionally good, but must be adequate for determining the location of the offset stakes from which the Contractor will start operations. Later, when the line and grades are produced at the sub-grade level, a greater accuracy is desirable and easily obtainable.

It must be kept in mind that incorrect methods and/or procedures at the time of staking a project will normally result in less accuracy being obtained and in the end will result in an increased amount of time being required to accomplish acceptable work. Time spent, whether short or long, is no guarantee of quality stake-out work; correct method and procedure used to accomplish the work will give the best results. Advice on proper operation of survey equipment follows, but is far from being all inclusive.

1. Keep the total station, data collector, GPS receiver, and transit in good working order. It is recommended that you frequently check these instruments by verifying the following items to ensure that they are still in proper adjustment:

    - Alignment – (1) Double center; (2) Turn direct angles
    - Levels – Keep backsights and foresights even, and peg level as needed (this procedure is outlined later in this section)

2. Except when slope taping, the measuring tape should be kept horizontal and a plumb bob should be used for the vertical transfer of measurement.

3. Check the level rod with a tie tape to verify that it is marked correctly. Sections may have been inadvertently interchanged with other rods or, through wear, the joints may have worn together. Both incidences will result in incorrect level elevations.

It is assumed in the following discussions in this section of this manual that personnel are familiar with the use of the total station, data collector, transit, level, tape, and other related surveying equipment.

3-110 ENGINEERING REQUIREMENTS

► Reference: *Subsection 105.09 Construction Stakes* of the Standard Specifications for Construction

VTrans' obligations to the Contractor on all projects are described under *Subsection 105.09 Construction Stakes* of the Standard Specifications for Construction. These standard initial obligations on the part of VTrans include:

- Initial layout including the alignment and elevation, horizontal and vertical control
- Layout of subgrade (rerun centerline alignment and finished grades)
- Layout permanent pavement markings

This section describes any construction layout that is to be performed by VTrans project personnel to support the Contractor's operation. The initial layout will generally establish the location and elevations of the various work items, with any additional layout work being the responsibility of the Contractor. Standard initial obligations on the part of the Contractor include:

- Preservation of all survey stakes set by VTrans
- Replacement of any and all stakes or grades disturbed by their operations

3-120 DEFINITIONS

The following definitions should be referred to by VTrans' and Contractor's personnel to ensure accuracy and proper usage of terms.

Alignment: A series of tangents and curves identifying a centerline for an existing or proposed highway.

Azimuth: The direction of one point or object, with respect to another, where the direction of the line is expressed as the clockwise angle from 0º to 360º.

Bar-code Level: A level instrument designed to electronically read a special leveling rod with a bar-code face. Readings are automatically recorded on an electronic data recorder.

Bench Mark: A relatively permanent material object, bearing a marked point whose elevation above or below an adopted datum is known.

Central Angle: The angle at the center of radius of a circular arc included between the radii that pass through the beginning point (P.C.) and the ending point (P.T.) of the arc. This is also known as the delta angle.

Coordinate System: A reference system for defining points in space or on a particular surface by means of distances or angles, or both, with relation to designated axes, planes, or surfaces.

Corner, Quarter Section: A corner midway between the controlling section corners, depending on location within the township.

Corner, Section: A corner established at the junction of surveyed section lines established by the United States Public Land System (USPLS).

Cross-Section: The elevations of the surface of the ground measured along a line perpendicular to the centerline or base line at any given station on the alignment.

Datum: A reference system whereby the position of one point can be directly related to another.

Deflection Angle: The horizontal angle measured from the prolongation of the preceding tangent line, right or left, to the following tangent line.

Digital Terrain Model (DTM): A model of the existing terrain that is developed from elevation data collected with reference to a coordinate system.

Easement: A non-possessing interest held by one person or agency in land of another whereby the first person is accorded partial use of such land for a specific purpose. Easements fall into three broad categories: surface; subsurface; and overhead.

EDMI: An Electronic Distance Measuring Instrument used to measure distances between points by using phase differences between transmitted and returned electromagnetic waves of known frequency and speed.

GPS: The Global Positioning System. The navigational and positioning system that provides location of a position on or above the Earth by a special receiver that interprets signals received simultaneously from several of a constellation of satellites.

Level Circuit: The systematic measurement of elevations commencing on a known elevation point and ending on a known elevation point.

Leveling Rod: A straight rod or bar with a flat face graduated in linear units with zero at the bottom, used in measuring the vertical distance between a point on the ground and the horizontal line of sight of a leveling instrument.

NAD83: The North American Datum of 1983. It is an adjustment of the horizontal coordinate system.

NGS: The National Geodetic Survey is a United States federal agency that defines and manages the national coordinate system.

Trigonometric Leveling: The determination of differences in elevation using trigonometric procedures with observed vertical angles and measured or computed horizontal or inclined distances.

USGS: The United States Geological Survey is a scientific agency of the United States government that studies our landscape, natural resources, and natural hazards.

USPLS: The United States Public Land System consists of a set of rules by which boundaries and subdivisions of public lands have been established in the United States. The USPLS is often used for designating the location of a parcel of land.

3-130 CARE OF EQUIPMENT

Construction Headquarters is responsible for maintaining an inventory of all construction equipment. Examples of this equipment include the following items:

- Total stations
- Data collectors
- Transits
- GPS receivers
- Levels and level rods
- Instrument tripods
- Planimeters
- Digital cameras
- Turbidity meters
- Fall Protection Lanyards
- Harnesses
- Torque wrenches
- Portable signs

A description of each piece of equipment and the name of the employee responsible for it is entered into the inventory database through the use of the *Equipment Assignment Record Form* (Appendix C-1). Cell phone and pager inventory, assignment, and maintenance are conducted through the Highway Business Office. Refer to *Equipment Assignment Record Form – Example* (Appendix C-2) for a sample of this form.

3-130.10 Assignment and Transfer

Equipment will be assigned to employees as required by the job on which they are or will be working. Regional Construction Engineers may sign for and retain spare equipment. In this case, the Regional Construction Engineer will be held responsible for the equipment.

The *Equipment Assignment Record Form* should be obtained from the Administrative Services Technician in Construction Headquarters. Once the employee receives the assigned equipment, the employee should sign the *Equipment Assignment Record Form* and send the original of this form to Headquarters for recordkeeping and updating of the inventory database.

When transferring equipment, it is the responsibility of the individual who is currently assigned the equipment to notify the Administrative Services Technician by telephone or e-mail of the equipment transfer. Include the following items when reporting equipment to be transferred:

- Employee name and number (receiving the transferred equipment)
- Equipment type, make, and model
- Equipment serial number
- Equipment AOT tag number
- Transferred equipment's assigned project
- Transferred equipment's assigned region

If equipment is transferred without proper notice to the Administrative Services Technician and is subsequently reported to be missing, the employee who was originally assigned the equipment will be held responsible for its disappearance and may be liable for its replacement.

3-130.20 Maintenance and Reassignment

The Construction Section has yearly maintenance contracts with various vendors, requiring equipment to be turned in to Construction Headquarters annually during the winter months. Equipment is sent out for cleaning, calibration, and any repairs needed at that time. When bringing equipment in for maintenance, verify that all items are returned; including legs, batteries, cords, manuals, cases, etc., in case reassignment of the equipment is necessary. Once the maintenance has been completed, equipment will be reassigned and redistributed by the Regional Construction Engineer based on need and availability.

Steel tapes that are to be stored for any length of time should be cleaned and lightly oiled. Transit legs and range rods should be repainted, if needed. Level rods which are damaged, or hard to read, should be exchanged for new or reconditioned ones at Construction Headquarters. Axes and sledge hammers should be painted orange or red to expedite locating them if left lying on the ground. Transits should be kept clean on the external surfaces, but should not be taken apart to clean or repair. Minor adjustments for accuracy, as described in any good surveying book, may be made in the field. Notify your immediate supervisor for assistance if major repairs or adjustments are necessary.

3-130.30 Repairs/Adjustments

Resident Engineers should make a habit of verifying the accuracy of the equipment being assigned to them. In the event that a piece of equipment is subject to shock or vibration, the accuracy should be verified. If it is not operating precisely, the Administrative Services Technician should be contacted to have the piece of equipment adjusted.

3-130.40 Care of Equipment

The Resident Engineer should inspect all equipment at the start of the day for its physical condition and cleanliness. The exterior of all pieces of equipment should be cleaned frequently. Each piece of equipment should be kept in its original case, which contains padding to prevent damage from shock and vibration. If the original equipment case becomes damaged or lost, a suitable replacement will be provided by Construction Headquarters.

All instruments should only be handled by the designated grip points. Failure to properly handle instruments will lead to premature wear and eventual breakage, causing them to be out of service for repair. Contact the Administrative Services Technician at Construction Headquarters if your instrument is in need of repair; unless you are authorized to do so, don’t attempt to repair an instrument yourself.

Take the instrument off of its tripod while moving it to a new setup or location. Damage to the instrument can result if this practice is not followed.

Do not leave your instrument unattended. This is especially important during windy conditions caused by storms or high-speed traffic adjacent to the instrument. Any sudden gust of wind can throw an instrument off level or topple it causing severe damage.

Never use an instrument in rainy or snowy weather. If circumstances require the operation of the instrument in either dusty or moderately damp conditions, place a plastic bag over the instrument while not in use. This will minimize the possibility of dust and moisture contaminating the instrument.

If any equipment or instrument is exposed to moderately damp conditions, they should be dried thoroughly and left in a well-ventilated area, outside of their case, to ensure that any moisture residing inside the instrument can evaporate. Failure to do this will lead to corrosion and eventual failure of critical electronic components inside the instrument.

All prisms should be checked daily to ensure that they are clean, not cracked, and that they are assembled correctly.

Verify that all batteries, such as Ni-Cad units, are completely discharged before attempting to recharge them. Failure to do this will result in diminished battery life due to the "memory" developed by the battery. Newer nickel metal hydride or lithium-ion batteries are not as prone to this phenomenon.

3-130.50 Tips for Proper Instrument Setup

Survey party members should follow these guidelines when setting up their instruments to ensure proper operation and data collection.

Push the tripod leg shoes or "feet" firmly into the ground. Do not stomp on the feet of the tripod legs, as this may damage them. Even pressure, applied parallel to the tripod leg, should be used on each tripod foot.

Place the tripod legs in a position that will result in a minimal amount of walking around the setup. The tripod should be set at a height that enables the eye piece of the instrument to be at a comfortable position for the operator. Avoid having to hunch over or stand on the tip of your toes to operate the instrument. Other members of the survey party may also need to use your instrument setup, so try to find a happy medium regarding tripod height.

When setting up an instrument in windy conditions, be sure to set one leg of the tripod downwind to gain additional stability. This will minimize the potential for the instrument to topple over.

When setting up an instrument on frozen ground, place flat boards under the tips of the tripod legs. If possible, place snow around the bottom of the legs to minimize any potential shifting or settling of the setup.

When setting up an instrument in hot weather on bituminous concrete pavement, place flat boards under the tips of the tripod legs to prevent the setup from settling into the hot asphalt. In any case, endeavor to establish a stable setup for the instrument that won't shift position regardless of the surface upon which it is placed.

3-130.60 Adjustment for Line of Sight or "Peg Test"

A "Peg Test" is a simple procedure that surveyors use to adjust their instruments so that the axis of sight is perpendicular to the vertical axis and thus parallel to the axis of the level bubble. This results in the verification that the instrument's line of sight is perfectly horizontal.

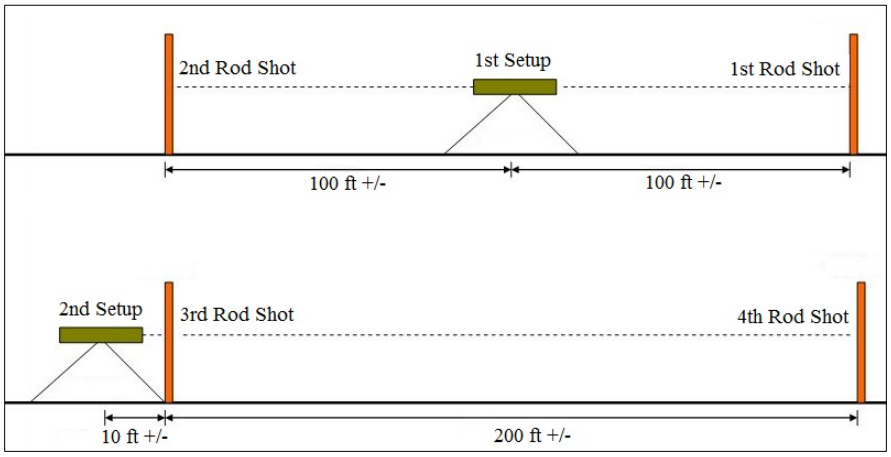


Figure 3-1: Setups for a Level Peg Test

Setup #1: Determine the difference between two line of sight shots that are opposite of each other.

Example:

First height of rod shot = **3.50 ft**

Second height of rod shot = **4.25 ft**

The difference between first and second rod shots is equal to the first height of rod shot minus the second height of rod shot.

Difference between first and second rod shots = 4.25 ft **–** 3.50 ft = **0.75 ft**

Setup #2: Required to determine the theoretical height of rod. Verify that the tripod legs are repositioned and the instrument is leveled again before taking rod shots at Setup #2.

Example:

Third height of rod shot = **2.55 ft**

Fourth height of rod shot = **1.70 ft**

Theoretical height of rod is equal to the third height of rod shot minus the difference between first and second rod shots

Theoretical height of rod **=** 2.55 ft **–** 0.75 ft = **1.80 ft**

If the axis of sight is parallel to the axis of the level bubble (that is, horizontal), the fourth height of rod shot should be equal to the theoretical height of rod shot. The difference, if any, between the computed and actual readings is the error to be corrected by adjustment. In the case of our example, we have the following:

Example:

E_A = Adjustment Error = The theoretical height of rod minus the fourth height of rod shot

E_A = 1.70 ft **–** 1.80 ft = **– 0.10 ft**

Therefore, the instrument is out of level with an adjustment error of – 0.10 ft. Regardless of whether the error is positive or negative, any error greater than 0.02 ft requires adjustment.

To adjust the level, sight the fourth shot of 1.70 ft again as shown under Setup #2. Using the instrument's crosshairs adjustment screw (refer to figure 3-2, below), adjust the crosshairs of the level so that they now read the theoretical height of rod of 1.80 ft.

Figure 3-2: Detail of Crosshair Adjustment Screw

Once the crosshairs are adjusted, perform the setups shown in Setups #1 and #2 again to check the adjustment of the level. Perform the calculations again to determine whether or not the level is still out of adjustment. If the theoretical height of rod and actual height of rod are within the tolerance limit of 0.02 ft (+ or –), the level is in adjustment and further adjustment is not required.

If the difference is outside the tolerance limit, that is, greater than 0.02 ft (+ or –), continue to perform this test until the level falls within the tolerance limit.

3-140 FIELD NOTES

Field notes are the written record of pertinent information, layout, measurements, and observations of the project. They should be kept according to uniform practices and conform, as a minimum, to the following general requirements:

Neatness: Use a sharp pencil of at least 3-H hardness. Avoid crowding the information and keep the book as clean as possible.

Legibility: Use standard symbols and abbreviations to keep notes compact. Use plain lettering to avoid confusion.

Clarity: Plan work ahead of time so that data can be clearly indicated. Do not make ambiguous statements. Line up descriptions and make sketches for clarity. Record data in a consistent way. Assume that the person who will use your notes has no familiarity with the work

Completeness: Show all pertinent measurements and observations. Use a degree of accuracy consistent with the operation. If in doubt about the need for the data, record it. Review data before leaving the field. All entries must include:

- The date and weather conditions
- Task Title
- Names of all persons in the survey crew and their assignments

The title page must be completed as the book or project is started. The VTrans return address must be noted on the title page in case the book is lost. The book must be adequately indexed, pages numbered and cross-referenced to contents.

Permanence: All entries should be made directly into bound books. At the completion of the project, the books should be filed as part of the permanent record in keeping with Finals Unit policies.

Accuracy: Record exactly what was done at the time it was done, rather than depending on memory at a later time. Never erase entries in a field book. If an item is incorrectly entered, draw a line through the item and insert the corrected value immediately above. When it is necessary to add data to notes previously prepared, the additional item should be dated and initialed. Always enter notes directly into the record.

Self-checking: Notes should be kept so that the work can be checked without returning to the field. Any person familiar with the project should be able to verify the accuracy of the work from the information contained in the notes.

3-150 COOPERATION WITH THE CONTRACTOR AND PROPERTY OWNERS

Property owners should be contacted before any construction surveying is done on land bought from them. Introduce yourself to the property owners and tell them what your function will be in connection with the project and answer any questions that they may have. This takes time, but makes for a better relationship between VTrans, the Contractor, and the property owner.

Inform the property owner how to contact you during the normal working day. This can be done simply by handing them your VTrans business card. Record in your diary the date and any part of the conversation that is vital to the project.

Care must be taken to avoid damage to private property. Bench marks, ties, and stakes must be placed within the right-of-way (ROW) when possible. Nailing and cutting must not be done on private structures, trees, or bushes. Use only non-destructive, temporary marking, such as flagging and stakes driven in the ground. Information may be written on the flagging. Avoid painting any surface which will be visible after construction is completed.

Prior to the beginning of any construction activity, the Resident Engineer should have a meeting with the Contractor or the Contractor's representatives to go over the procedures that will be used to stake out the project. This should include all phases of the construction engineering. In addition, the Resident Engineer should address the following:

1. How control points are established for alignment centerlines, bridges, drainage, etc. and the importance of this procedure and the Contractor's cooperation in preserving all stakes encountered in the field.
2. Arrange for help from the Contractor in the form of personnel to assist in taking original cross-sections, borrow pit cross-sections, final cross-sections, structure cross-sections, etc. If both the Contractor and VTrans are represented in this work, this will help prevent any future claims against the project.

3. Explain to the Contractor that they should verify that there are no mistakes or errors in the plans before working on the various items. If errors are found, the Contractor is to give the Resident Engineer ample time to make the necessary corrections. The Resident Engineer should inform the Contractor that no claims will be brought against VTrans or the project if the Contractor is negligent in this respect.

3-160 ALIGNMENT

3-160.10 Running Centerline

The original survey line, as run for design purposes, is very often the only line that will have been run before the project is turned over to the Construction Section. This line is the one that will be used initially as the basis for all construction surveying.

Often portions of the original line have been revised during the design phase of the project and have never been run in the field. The original line, with any revisions, will normally be reproduced by the stake-out party, using the following procedure. For the most part, this procedure will also be followed while running the centerline throughout the duration of the project.

Transfer of Curve Data: Enter all curve data given on the plans into a hardbound Field Book; specifically in Field Book# 4 or a handheld data collector. Check the given curve data and compute the required deflection angles. Check for line revisions. Refer to *Subsection 5-130.25 Field Book #4 – Control* for other information to be entered in Field Book #4. The handheld data collector software will automatically calculate deflection angles for you. Should any problems be encountered when entering information into the data collector, contact either Construction Headquarters or the Route Survey Unit.

Locate Control Points: Locate the original control point ties and re-establish the control points; PIs, PCs, PTs, POTs, and POCs. Refer to *Subsection 3-160.30 Control Point Ties* for re-tying control points.

Run the Line: Using standard surveying methods, run the line, including curves, tangents, and sub-tangents as necessary. Running the line by way of the coordinate stakeout method is also an acceptable approach and will be defined in a subsequent edition of this manual.

Mark the centerline at 20 m (50 ft) intervals, using sixteen penny spikes. Use a piece of flagging on the head of the spike to improve its visibility. To mark a line on a bituminous concrete surface, use a short roofing nail, or a masonry nail.

Note the error of closure when coming into each original control point, both as to distance and deflection. If the error is greater than that acceptable for the type of survey being done, it may be necessary to re-measure the deflection angle at the PI or to re-tape the sub-tangent. As a last resort on a long curve that will not close, it may be necessary to run the curve from the PC and the PT towards the middle of the curve, in order to distribute the error.

While running the centerline, establish any new control points, which may be necessary for future line location or for the running of parallel offset lines. When the transit is set up over a control point, hubs may be put out at right angles to the centerline for use as centerline ties or as offset line control points. Refer to *Subsection 3-160.30 Control Point Ties* and to *Subsection 3-160.20 Parallel Offset Lines* to assist with these operations.

3-160.20 Parallel Offset Lines

It is often advantageous to run a line which is parallel to the survey centerline. This line may be used as an aid for the original staking of the project or as an aid in determining right angles for the taking of cross-sections.

Determine Offset Distance: Study the plans and cross-sections to determine the distance to offset the parallel line. The line should fall outside the limits of construction but inside the Project Demarcation Fence (PDF), and be close enough to the top of cut or toe of fill to be useful. The offset distance will vary for different sections of the project, depending on the depth of the cut or fill.

Set Out Control Points: Using the transit at the control points on the centerline, (PCs, PTs, POCs, POTs) set out points at right angles to the centerline, at a distance equal to the offset of the proposed offset line. If a hub with a nail in the top is used for this point, it may also serve as a control point tie for the centerline (Refer to *Subsection 3-160.30 Control Point Ties*). In hilly terrain, the procedure of slope taping is useful. (Refer to *Subsection 3-200.10 Slope Taping*). The coordinate stakeout method may also be used.

With the transit over the offset control point, either sight the centerline control point and turn 90°, or sight on the next offset control point, if visible. Proceed to run a line to the next offset control point, marking the line at full, half, and odd stations with spikes as necessary.

To run a parallel offset curve, the same deflections are used as are used when running the centerline curve. However, the chord length must be corrected, being longer on the outside of the curve and shorter on the inside of the curve.

The chord distance is proportional to the offset distance and is computed by the following formula:

$C_O = C_{CL} \times (R_{CL} + D_O) / R_{CL}$

where:

C_O = Length of the chord on the offset line

C_{CL} = Length of the chord on the centerline

R_{CL} = Radius of the centerline curve

D_O = Offset distance

<u>Example:</u>

Compute the length of the chord (C_O) on the offset line between 20 m stations on a line which is offset –30 m on the inside of a 582.125 m radius curve.

$C_O = C_{CL} \times (R_{CL} + D_O) / R_{CL}$

C_O = 20.00 m × (582.125 m – 30.00 m) / 582.125 m

C_O = **18.969 m**

Therefore, the length of the chord on the offset line is 18.969 m.

3-160.30 Control Point Ties

Control points are those points that are used to define the survey line and include PIs, PCs, PTs, POTs and POSTs. Control point ties are measurements used to relocate these control points once the original points have been removed during the construction operations. The original control point ties are normally within the construction limits, so new ties must be established which fall outside the construction limits and which will survive throughout the duration of the project.

The preferred control points to be tied are those mentioned above, but often ties to these points will be difficult to use after excavation has been performed because the points fall in deep cuts or high fill sections. Therefore it may be necessary to establish supplementary control points on the survey centerline that can be more easily tied and used, such as points that occur in shallow cuts and fills or at the transition between a cut and a fill. The best time to establish these supplementary control points is at the time the centerline is rerun prior to the staking operation, as this will save a transit set up during the process of tying the control points.

Control points may be tied in several ways with the method chosen, depending on the terrain and the width of the construction area. In narrow construction areas, where tie distances of less than 30 m (100 ft) may be used and the tape can be properly plumbed, control points may be tied by measurements to fixed objects such as ledges, trees, buildings, or wood hubs driven into the ground.

Where the construction area is wider than 30 m (100 ft) and especially where a parallel offset line is to be run, the control points are normally tied by a line of hubs placed at right angles to the centerline, with distances measured from the hubs to the control point. These hubs must be set by the use of a transit and the distances must be carefully measured.

The use of slope taping is often helpful in steep terrain. When a parallel offset line is to be run, it is normal to place one of the tie hubs at the offset line distance, so that the hub then becomes a control point on the offset line. A third method of tying which may be used is to set up two lines of sight intersecting at the control point. This method is normally used only where taping is impossible or impractical. Refer to *Subsection 3-200.10 Slope Taping* for more information.

Regardless of the method used to establish a specific control point, enough reference points should be set to provide assurance that the control point can always be reestablished. Because the Contractor's operations invariably destroy some of the reference points, enough points should be located so that the control point can be replaced even though one or two of the reference points have been destroyed. For this reason and to serve as a check on the field work, a minimum of three reference points should be established for tying each control point.

Hubs used as a tie point should have a small nail in the top to be used as the actual reference point and these hubs should be witnessed with two tall witness stakes to aid in their location. The station of the control point and the tie distance should be written on the witness stakes.

The following figures illustrate some of the methods used to tie control points:

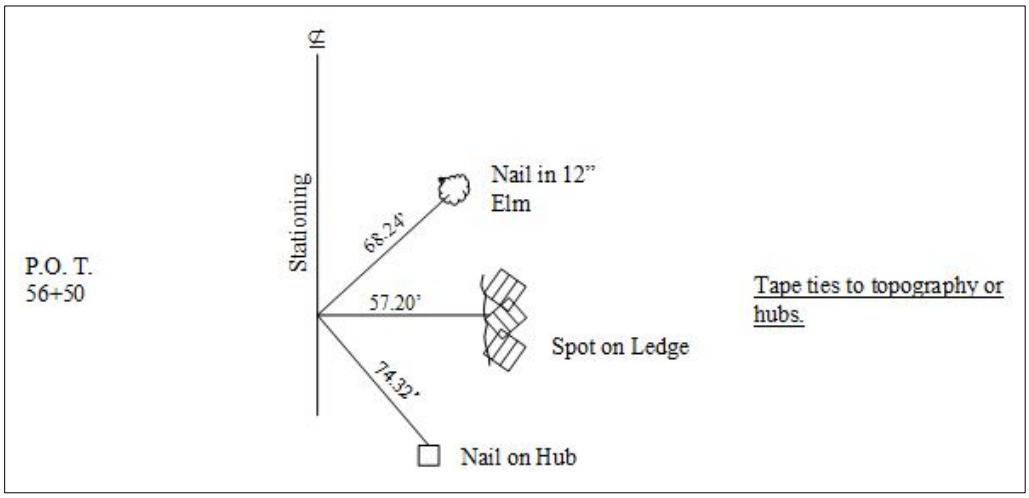


Figure 3-3: Sketch showing Control Point Ties (Tape ties to topography or hubs)

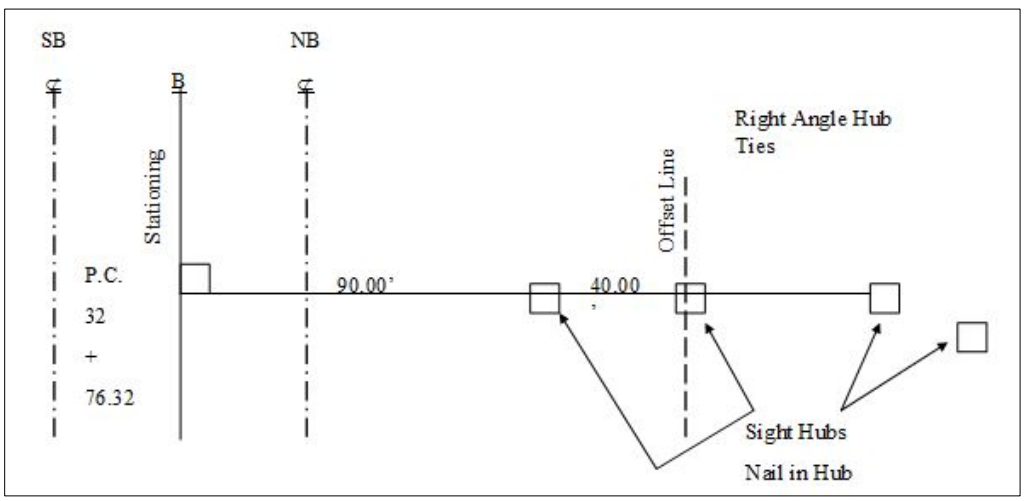


Figure 3-4: Sketch showing Control Point Ties (Right angle hub ties)

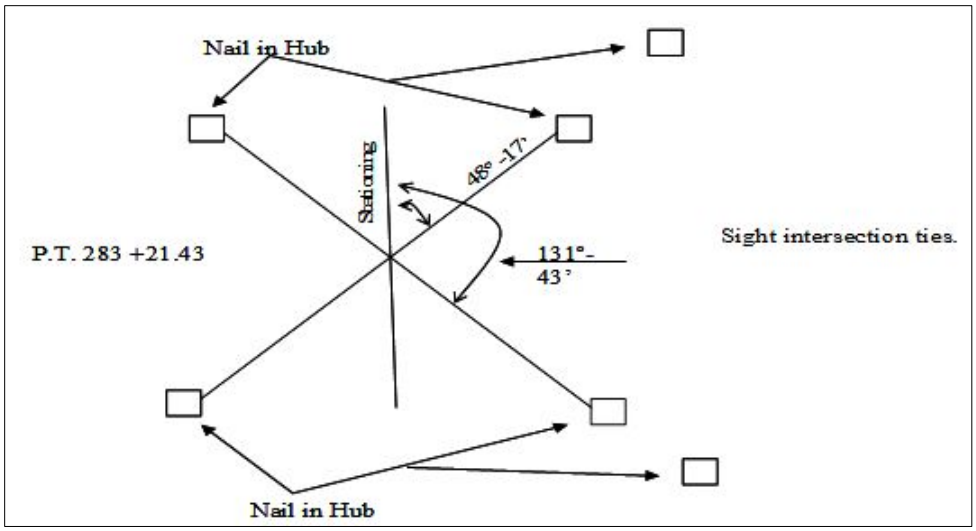


Figure 3-5: Sketch showing Control Point Ties (Sight intersection ties)

3-160.40 Offset Staking of Centerline

When sufficient control has been established to ensure the reproduction of the original alignment, generally before construction, the centerline must be referenced to construction stakes. Construction stakes are placed at right angles on the left and right on each 20 m (50 ft) station and on stations where an equation exists.

The usual methods for offset staking of a centerline are as follows:

1. **Right Angle Prism**: On tangents alignment, sighting ahead or back, holding the prism over the centerline point, and establishing a line which will be at right angles to the centerline of the roadway.
2. **Transit:** The transit is used to obtain right angles when setting stakes; however, this accuracy is time consuming and is not usually warranted for offset staking of a centerline.

After determining the right angle line, a stake is driven at an offset outside the limits of clearing and grubbing. If a parallel offset line has been run (Refer to *Subsection 3-160.20 Parallel Offset Lines*), this line may be used to aid in the staking. The stake is driven approximately 150 mm (6 in) beyond the nail, which marks the station on the offset line, and the distance from the nail to the front of the stake is measured. From this measurement and the known offset distance of the parallel line, the stake offset distance from the survey centerline is computed.

It is common practice to mark the stake elevations on the back of each stake. This gives you many benches that may be used for sectioning and drainage where a high degree of accuracy is unnecessary. After construction is complete and the final sections have been taken, all stakes should be pulled and destroyed.

The following examples show how to mark offsets, stations, and cuts and fills on construction stakes with required information. Offset distances are measured and marked to the nearest 10 mm/1 cm (½ in) and the cuts and fills are computed and marked to the nearest 50 mm (2 in).

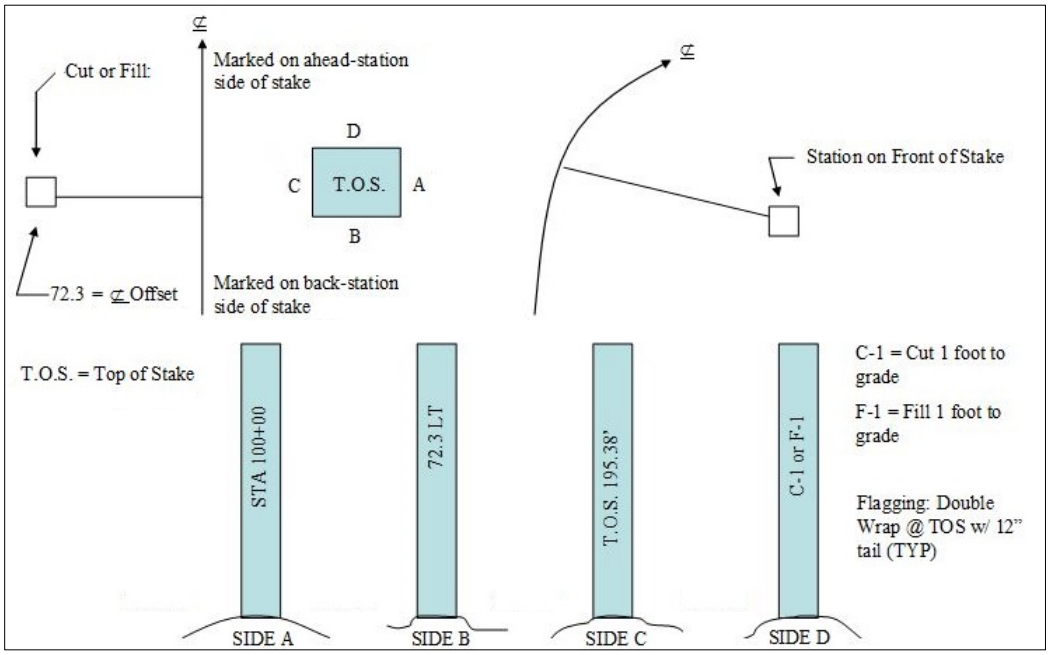


Figure 3-6: Offset stake markings

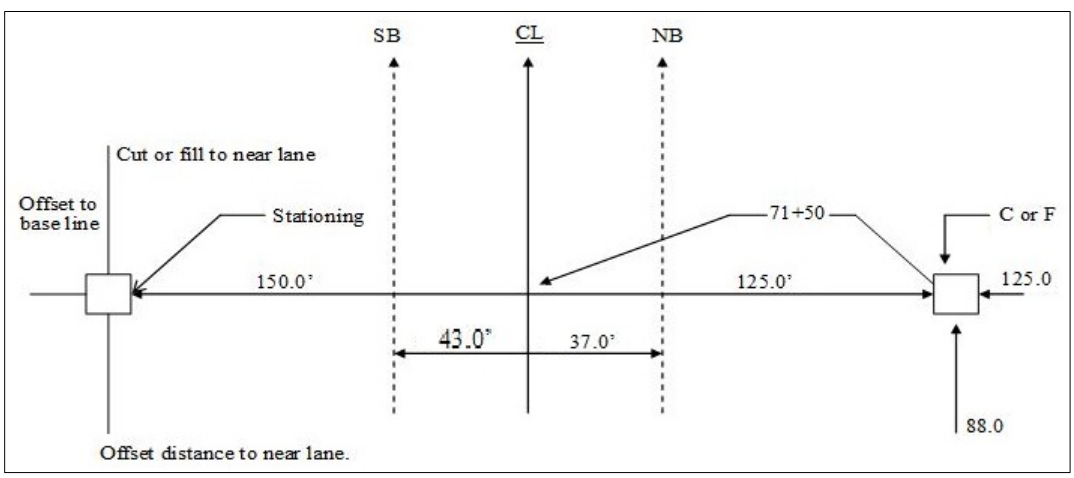


Figure 3-7: Cut and fill stake markings

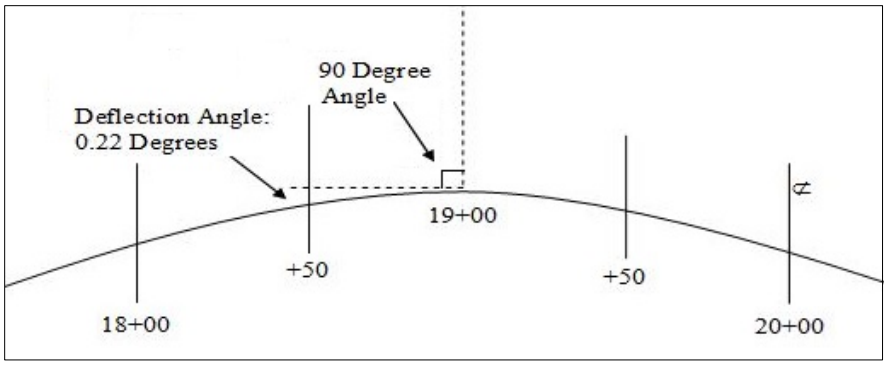


Figure 3-8: Offset stake markings for a curve

3-170 VERTICAL CONTROL

3-170.10 Bench Lines and Bench Mark Transfers

Surveying crews should observe the following rules when working with benches, bench lines, and bench mark transfers:

- Retain original benches that are located outside construction limits, but are within working distances.
- Pick locations for bench marks, keeping in mind that the bench mark will be used for leveling the offset stakes, as well as other requirements that exist during construction.
- Establish a bench mark approximately every 150 m (500 ft) in addition to those that should be placed for reference when layout work of a structure or large pipe will be required.
- Transfer the elevation of the original bench mark to the new location. Run separate levels both ways to ensure the accuracy of the new bench mark.
- Bench marks must be recorded in a permanent field book. Benches which have been destroyed must be crossed out of the book and the list kept current in Field Book #4.
- To reference bench marks, use a flat stake with the bench mark number and elevation on it and nail it to a tree or other suitable location. Never establish bench marks outside the right-of-way unless you have obtained permission from the property owner.
- The original bench line is a balanced line, but the original benches may have been disturbed in one way or another and may not check between bench marks. After bench marks have been transferred and before the project is too far along, all original and transferred benches must be balanced and then used throughout the project.

The following method may be used when transferring bench marks:

1. The elevations are computed from bench mark to bench mark.
2. To check your computations, add the backsights and foresights columns.
3. The net difference added to or subtracted from the previous bench mark should prove the new elevation.

Example:

	B.S.	HI	F.S.	Elevation
BM #1				**30.48 m**
	1.524 m	**32.004 m**		
T.P.			**-0.914 m**	**31.09 m**
	3.353 m	**34.442 m**		
BM #2			**-0.610 m**	**33.833 m**

Compute the elevation of BM #2:

Backsight total = **1.524 + 3.353 = 4.877**

Foresight total = **–0.914 + –0.610 = –1.524**

Combined total = **4.877 + –1.524 = 3.353**

BM #2 elevation = BM #1 elevation + Combined total

BM #2 elevation = **30.48 + 3.353**

BM #2 elevation = **33.833**

Therefore, the elevation of BM #2 is **33.833 m**.

3-170.20 Offset Stake Leveling

Construction stakes require leveling before they can be used by the Contractor for grading work. Notes may be taken on either loose leaf paper or in a bound book. Loose leaf paper is more practical when a project is leveled in sections, or where only one side of the road can be leveled at a time. The level notes must be kept for the duration of the project.

The Resident Engineer must give some thought to the leveling process before it is started. Usually, it is just as well to hold off until the clearing and grubbing is complete, then replace the missing stakes and decide on a course to follow. On larger projects, it is just as well to go up one side of the road or line of stakes at a time; making sure that the notes are set up according to the example shown. The shots are read to the nearest 10 mm/1 cm (½ in) and the distance (cut or fill) to the finished grade is written on the stake to the nearest 10 mm/1 cm (½ in).

Once the levels have been taken on a line of stakes, the elevation of the stakes can be figured and from that, the cut or fill to the finish grade of the roadway may be computed. The results of these computations must be checked before being put on the stakes. The Resident Engineer must spot check the stakes to ensure that the information pertaining to a particular stake is put on the correct one. Refer to *Subsection 3-160.40 Offset Staking of Centerline* for the prescribed method of marking stakes.

To check for large errors in either the stake levels or the original cross-sections, the stake levels should be plotted on the cross-sections at the proper offset. If both the stake elevation and the cross-sections are accurate, the stake elevation plot will be 750 mm to 900 mm (30 in to 35 in) above the plotted ground surface.

3-170.30 Subgrade Stake Leveling

When it is time for the Contractor to fine grade the sub-grade, the Resident Engineer must re-run the centerline, from which the Contractor can offset the working stakes. It is the Contractor's responsibility to check the location, alignment, and elevations to verify that they are correct.

To re-run the centerline, the Contractor will set out working stakes and mark the station and offset on these stakes. They will spot check these stakes for conformity to the typical section and then establish finish grades on the sub-grade stakes, using the elevation as taken from the Plan Grade sheets.

If the actual finish grade cannot be placed on the stake, then the procedure is to reference the cut or fill distance to the actual finish grade. Care should be taken to balance foresights and backsights and shots should be kept within a distance of 60 m (200 ft) of the transit or level. Before grades are run from each change of height of instrument (HI), the calculations should be checked to ensure that the proper grades are matched to the proper stake.

After changing your HI, you should check back onto a stake on which you set a grade with your last set up. Stakes should be firmly set and generally are offset 0.3 m to 0.6 meters (1 ft to 2 ft) from the computed toe of the subgrade. In this way, the stakes will remain in position with a minimum of replacement throughout the sub-base operations. It is very important to use the same reference to grade the stakes throughout the operation.

If the actual finish grade cannot be placed on the stake, then the procedure is to reference the cut or fill distance to the actual finish grade. Care should be taken to balance foresights and backsights and shots should be kept within a distance of 60 m (200 ft) of the transit or level. Before grades are run from each change of height of instrument (HI), the calculations should be checked to ensure that the proper grades are matched to the proper stake.

After changing your HI, you should check back onto a stake on which you set a grade with your last set up. Stakes should be firmly set and generally are offset 0.3 m to 0.6 m (1 ft to 2 ft) from the computed toe of the subgrade. In this way, the stakes will remain in position with a minimum of replacement throughout the sub-base operations. It is very important to use the same reference to grade the stakes throughout the operation. As you come to a bench mark, levels should be checked and a variance of greater than 10 mm (½ in) should not be tolerated between bench marks that are known from previous work to be accurate.

3-180 CROSS-SECTIONING

3-180.10 General

Revised original, final, and borrow pit sections may be taken on conventional field level note paper. An example of cross-sectioning with this type of note paper can be found by referring to *Section 3-180.90 Borrow Pit Sections*. Sections for special ditches, undercutting subgrade, slope stabilization, channel and structure excavation, and culverts, will normally be recorded in the proper Field Book (Field Book #2 - Drainage; Field Book #3 - Bridge; Field Book #6 - Excavation; Field Book #7 – Miscellaneous).

Roadway cross-sections should be taken at 20 m (50 ft) intervals along the centerline of the project on all full and half stations. A cross-section survey party should consist of a chief, who is usually the note keeper, a transit person, and two or three rod persons, depending upon terrain and conditions. Accuracy should be stressed at all times because an improperly read or recorded offset can cause problems at a later date.

Cross-sections should be taken at 90° to all stations on the tangent between the PT and the PC and radial to the curve at all stations between the PC and PT on the curve. Right and left of base line or centerline is determined by standing on the line and facing forward in the direction of increasing stations. A rod reading an offset should be recorded for each break or change in terrain both right and left of centerline for a sufficient distance to ensure covering the area to be worked. On level terrain, the maximum distance between shots should be held to 10 m (30 ft).

Survey cross-section notes should be recorded by one of the following two methods:

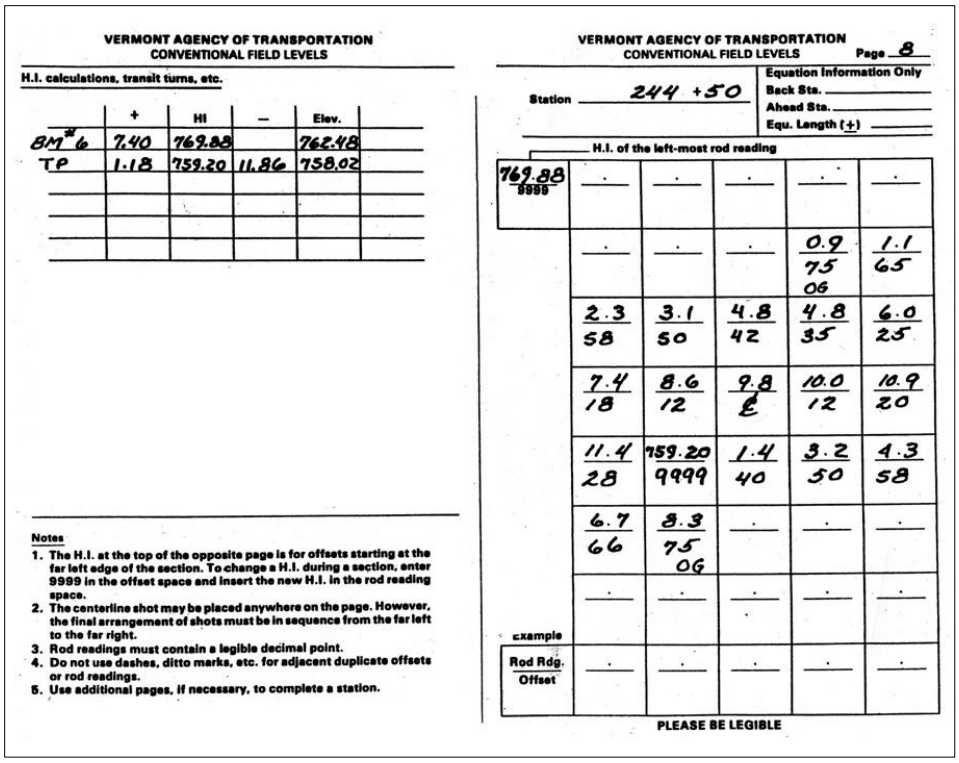
1. As a fraction with the rod reading recorded as the numerator and the offset recorded as the denominator, with succeeding shots written across the page; this method is usually used in a Drainage Book.
2. In columns, with the offset and rod reading in separate columns and additional reading recorded down the page.

<u>Example:</u>

(1)	**0.975**	**1.400**		**1.585**		**2.710**
	∠	**3.1**		**6.1**		**7.6**
(2)		∠		**0.975**		
		Rt. 3.1		**1.400**		
			6.1		**1.585**	
		7.6		**2.710**		

When the sectioning of a revised line is necessary, then the final sections must be taken at these same stations. When taking sections, check HIs, right angles, and exercise care in taping and in the use of the hand level.

Make proper notations such as edge of stone-fill (ESF), old ground (OG) or anything that should be noted which would help clarify the situation to someone not familiar with the job. All survey notes must show the project name, number, personnel doing the work, and the date.



VERMONT AGENCY OF TRANSPORTATION
CONVENTIONAL FIELD LEVELS

H.I. calculations, transit turns, etc.

	+	HI	–	Elev.	
BM #6	7.40	769.88		762.48	
TP	1.18	759.20	11.86	758.02	

Notes
1. The H.I. at the top of the opposite page is for offsets starting at the far left edge of the section. To change a H.I. during a section, enter 9999 in the offset space and insert the new H.I. in the rod reading space.
2. The centerline shot may be placed anywhere on the page. However, the final arrangement of shots must be in sequence from the far left to the far right.
3. Rod readings must contain a legible decimal point.
4. Do not use dashes, ditto marks, etc. for adjacent duplicate offsets or rod readings.
5. Use additional pages, if necessary, to complete a station.

VERMONT AGENCY OF TRANSPORTATION
CONVENTIONAL FIELD LEVELS
Page 8

Station 244 +50

Equation Information Only
Back Sta.
Ahead Sta.
Equ. Length (+)

H.I. of the left-most rod reading

769.88 / 9999	.	.	.	.	.
	.	.	.	0.9 / 75 / OG	1.1 / 65
	2.3 / 58	3.1 / 50	4.8 / 42	4.8 / 35	6.0 / 25
	7.4 / 18	8.6 / 12	9.8 / ℄	10.0 / 12	10.9 / 20
	11.4 / 28	759.20 / 9999	1.4 / 40	3.2 / 50	4.3 / 58
	6.7 / 66	8.3 / 75 / OG	.	.	.
	.	.	.	.	.
example Rod Rdg. / Offset	.	.	.	.	.

PLEASE BE LEGIBLE

Figure 3-9: Conventional Field Level Notes

3-180.20 Preconstruction Centerline Cross-Sections

Any area of the project that has a revised centerline and shows equated stations on the cross-sections may require new original cross-sections before construction begins. Sections should be taken as explained in *Subsection 3-180.10 General*. Additional cross-sections may be necessary to adequately compute excavation in cut-to-fill transitions.

3-180.30 Cross-Section Extensions

It will be necessary to extend all original survey cross-sections that do not extend beyond the limits of construction. This is delineated by dashed lines shown on the cross-sections by the designers.

3-180.40 Stripped Ledge Cross-Sections

In all cases, ledge sections are required to verify the sub-surface ledge line shown on the plans and for computation of the final quantity of rock excavation and for the assignment of the rock over-breakage quantity. Additional cross-sections may be required when there are major changes in the ledge profile. In this case, the sections will be plotted on separate sheets, with the proper template, and the quantity of rock excavation computed.

When taking a stripped ledge section, all shots should be taken on the ledge. "Ledge under" shots serve no purpose and can lead to mistakes being made if they are indicated as ledge on the plot.

3-180.50 Drainage Pipe Cross-Sections

For each drainage pipe up to 1200 mm (48 in) in diameter, a cross-section should be taken before work commences along the proposed centerline of the pipe. This section should be recorded, as it is taken, in the Drainage Book in the particular section of the book set up for the pipe. This section will then be plotted, templated, and used to compute the quantity of the trench excavation. It will also be used to determine the correct location of the inlet and outlet, both horizontally and vertically. From this information the correct length of pipe can be determined. Refer to *Subsection 3-180.70 Structure Sections* for sections covering pipes greater than 1200 mm (48 in) in diameter.

3-180.60 Channel Sections

Channel sections should be taken according to standard survey procedure from a base line set up for the particular channel or, if parallel to the roadway, may be covered by an extension of roadway sections. Baselines for channel excavation should be tied to the roadway baseline. Channel excavation, when used in connection with a structure, will be for the inlet and outlet of the structure or a pipe greater than 1200 mm (48 in) in span or diameter. The channel excavation should begin 300 mm (12 in) beyond each end of the structure or pipe. It is recommended that new preliminary channel sections be taken at the time of construction staking and that final channel sections be taken as soon as work is completed on each channel location.

3-180.70 Structure Sections

For each drainage pipe or structure greater than 1200 mm (48 in) in diameter, cross-sections should be taken at 90° to the centerline of the pipe and to a distance of one-half of the pipe diameter plus 3 m (10 ft) each side of the centerline. The station interval of the sections will be 10 m (30 ft) or less as required to cover the conditions. For bridges, the sections should have separate baselines for each pier and each abutment, with the baselines being parallel to the centerline of bearing at each location sectioned.

Structure sections should be taken at all changes in direction of the structure excavation limits as shown in the following sketch:

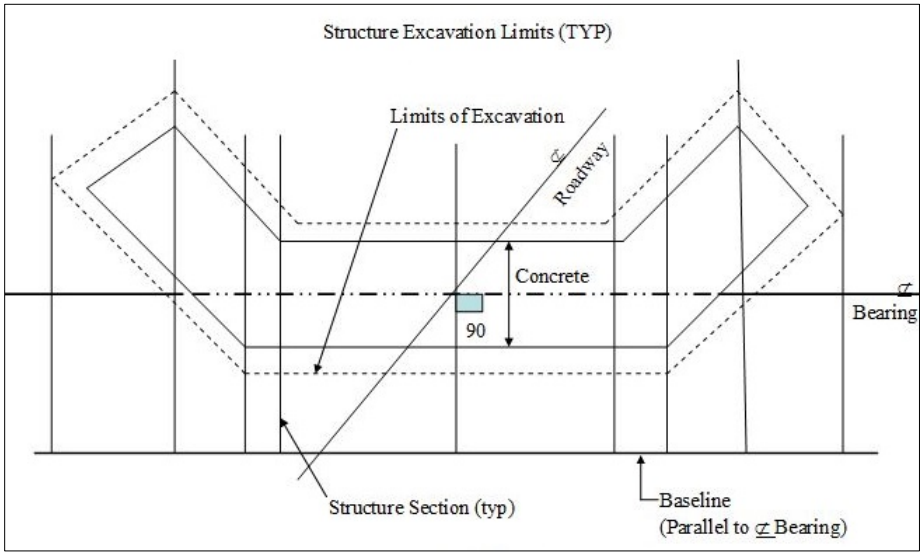


Figure 3-10: Typical Structural Excavation Limits

3-180.80 Gravel Pit Stripping Sections

► Reference: *Subsection 203.13 Method of Measurement, Part (b) Borrow* of the Standard Specifications for Construction

For each gravel pit for which sections are to be taken, set up and tie in a baseline. Careful attention needs to be given to the setting up of this baseline so that it can either be preserved for the duration of the project or adequately tied in so that it can be reproduced at any time. It is also good practice to record a transit bearing for the baseline. Preliminary and final sections of the stripped area are necessary, as well as to put on the limits of the pit used, to satisfy the requirements of *Subsection 203.13 Method of Measurement, Part (b) Borrow*.

3-180.90 Borrow Pit Sections

The amount of earth, gravel, rock, or other material excavated or filled on a construction project may be determined by borrow pit leveling.

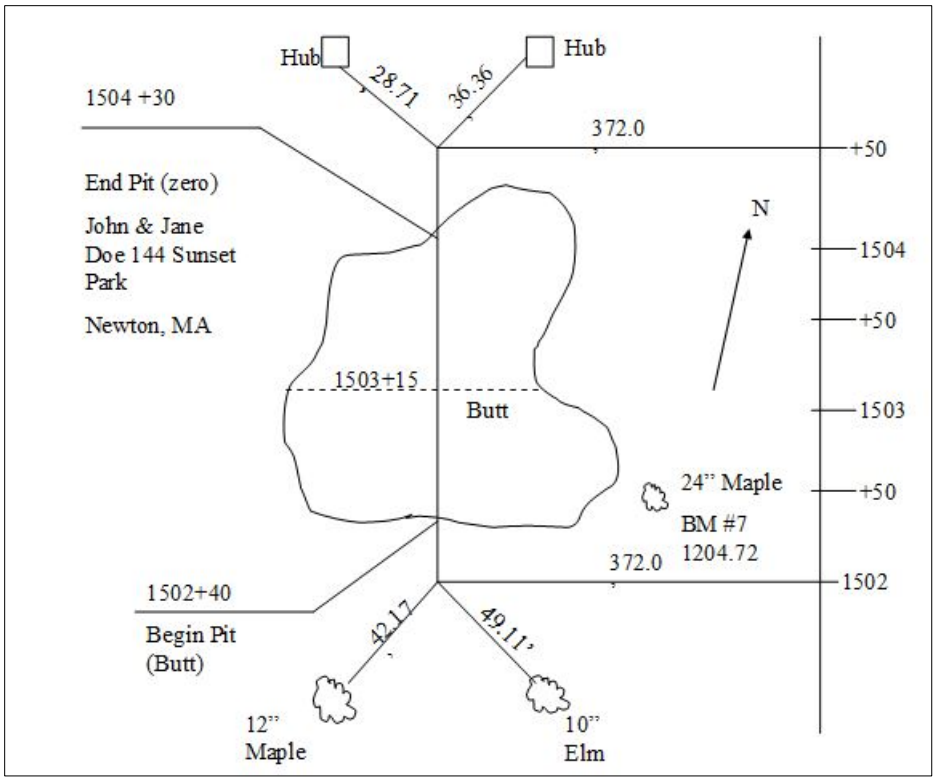


Figure 3-11: Sketch of Borrow Pit Cross-sections

The following steps should be followed in the field work for the layout of a borrow pit:

1. The borrow pit baseline should be one tangent and may be placed anywhere in the area. Both ends of the baseline must be securely tied in, well outside the construction limits. Pits that are located within 150 m (500 ft) of the project's roadway centerline should be further tied to the roadway centerline.
2. The borrow pit baseline may be completely to the left or right of the pit or it may go through the pit. Therefore, it is possible and acceptable to have all offsets to the left or right of the borrow pit baseline.
3. When the borrow pit is adjacent to the project roadway, the centerline tangent/sub tangent may be used as the baseline with stations extended to include the borrow pit area.
4. Make a sketch of the borrow pit on a blank sheet of field paper and place it after the cover sheet. The cover sheet should show the name and location of the borrow pit, weather conditions, the names of the individuals on the survey crew and which instruments they were responsible for. The sketch should show all ties, approximate boundaries, beginning and ending stations, names and addresses of all owners, and an approximate north arrow.

5. Rather than starting the borrow pit stationing at 0+000, start the stationing at 10+000 or 20+000 to avoid possibly negative station values if the beginning needs to be extended.
6. If possible, borrow pit elevations should be referenced to the established roadway bench line. Borrow pits outside the project area may have an assumed bench line. A minimum of two bench marks is required.
7. Original pit sections are normally taken at 10 m (30 ft) station intervals (i.e., 10+000, 10+020, 10+040, etc.). However, in the case where the terrain is relatively flat and uniform, 20 m (50 ft) station intervals are permitted.
8. Original odd stations may be taken, but it must be a full width section. Partial odd stations should not be taken.
9. A final section must be taken for every original section within the excavation area, unless the Resident Engineer deletes an original section. It is possible to have extraneous original sections at the beginning or ending of the pit, but this is acceptable because they are outside of the excavation area.
10. Original sections should not be taken until the pit is stripped. If, for some reason, original sections were taken before the pit is stripped, fill end areas will result. These fill end areas usually will be subtracted from the cut end areas to obtain the final payment area. This should be avoided, as the deducted area will not usually equal the original stripped area.
11. When dealing with steep embankments or other conditions, the Resident Engineer may take slope levels instead of the conventional rod reading/offset levels.
12. The Resident Engineer may take original sections via conventional rod reading/offsets and final sections via slope levels or vice versa.
13. Slope levels should not be mixed with conventional levels for the same station. If deemed necessary, they will be accepted, but it is preferred that mixed levels for the same station be avoided. Different paper should be used for each method. Conventional levels can be taken on slope level paper by using a vertical angle of 0°.
14. If the original section needs to be extended, use the same original sheets for the station involved. If the extension is to the left of baseline, take care in indicating the new height of instrument (HI). The HI at the top of the page is for the "left-most rod reading." Extensions to the right of baseline cause no problem since the new HI is placed in the next available box.
15. The stationing must be in ascending sequence.

16. Cross-sections must be perpendicular (90°) to the baseline and not skewed. If a pit is wide enough, run parallel offset lines left and/or right of the baseline outside the anticipated excavation area. Set witnesses on each station along the offset line, flagging every other witness. Another way to do this is to set up the transit on every baseline station, then turn 90°, thus giving the rod-person exact direction.

17. Original and final sections may be taken using 3-D survey methods and then sections can be generated from the data.

The following rules should be followed in the field work for the taking of field levels:

1. Notes should be taken on conventional level paper contained in either a loose-leaf or bound field book. This paper, commonly referred to as "engineer's field book paper," can be obtained from Construction Headquarters.

2. All field book entries should be legible.

3. All rod reading should contain a legible decimal point, even if it happens to be a whole number. For example, 5.0 must be the recorded rod reading of "5."

4. Offsets should be taken to the nearest 10 mm/1 cm (½ in).

5. Ditto marks (") or dashes (-) should not be used when an offset or rod reading is the same as the previous shot.

6. Enter a rod reading of 0 (zero) as 0.0; do not leave a blank or use a dash instead.

7. If it is necessary to change the HI within a station, enter the value "9999" in the space allocated for the offset and the proper HI in the space allocated for the rod reading.

   Example:

   531.720
   9999

8. When dealing with HI changes to the left of baseline, the surveyor should be aware that the HI at the top of the page is for the "left-most rod reading" and take care to make proper entries.

9. The baseline shot may be placed anywhere on the page. However, the final arrangement of shots must be in sequence, from the far left to the far right. If the baseline splits the pit, the usual procedure is as follows:

    - Place the baseline shot somewhere in the middle of the page
    - Take all the shots to the right
    - Come back to the baseline and take all the shots to the left

10. Distances between offsets should not exceed 10 m (30 ft) except in flat areas, but they may be any distance from the baseline (i.e., 12, 19, 29, 33, 40.8, etc.).

11. On final sections, indicate the edge of the excavated pit (EP) and old ground (OG) shots. For best results, do not take old ground shots beyond the excavation limits because this causes slight slivers of cut or fill. However, if the original sections were taken before the pit was stripped, shots must be taken to the old undisturbed ground because the pit strippings must be deducted from the cut areas.

12. HI calculations, transit turns, etc., may be recorded on the left-hand page.

13. The beginning and ending final stations must be denoted as zero section or butt section. If the Resident Engineer desires a zero area to be used, it must be denoted as a zero section. If an actual end area is desired, a final section must be taken and properly denoted as a butt section. Obviously, an end area cannot be calculated unless there is an original and final section.

14. Butt sections in the middle of the pit are acceptable, but be sure to denote these very carefully. The butt may be within the original sections and/or the final section.

15. Estimated offsets and rod readings are not acceptable practice. Typical field note entries that must be determined are the following:

    - Level for another 20 m (50 ft)
    - Continued up (or down) the same slope for 30 m (100 ft)
    - Out 6 m (20 ft), up 2 m (6 ft)

16. Normally, the original cross-section for a given station will extend beyond the final section. If so, a perpendicular line is assumed from the extreme final shot to the original ground line. If the final section extends beyond the original section, a straight line is assumed from the furthest original shot to the furthest final shot. Therefore, it is important not to take extraneous final shots outside the excavated pit unless absolutely necessary.
17. Do not prefix "non-plus" rod readings with a minus sign, since a rod reading is assumed to be negative unless prefixed by a plus (+) sign. This avoids the inadvertent "adding together" of two negative numbers when entering survey data.
18. Topo descriptions should be limited to 10 characters and must be written legibly.
19. There should not be a different topo description at the same offset for both original and final sections; however, there may be two descriptions at the same offset for the same terrain type.

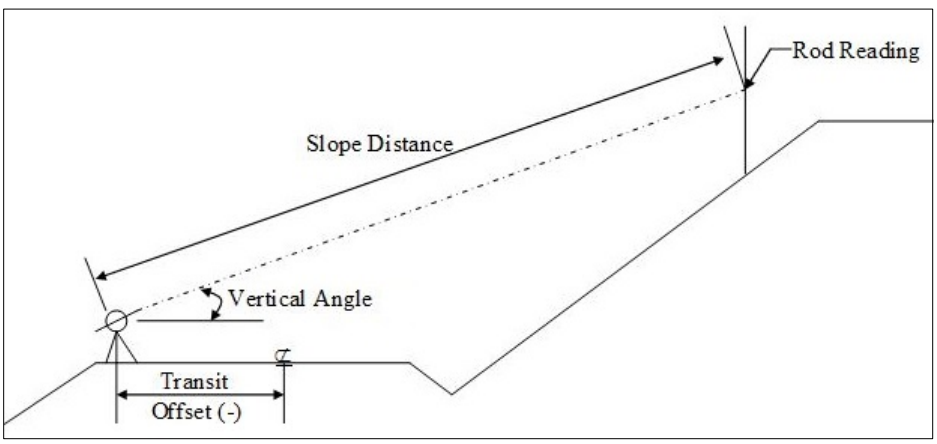


Figure 3-12: Sketch of a Typical Transit Setup

3-190 STRUCTURE, STAKE-OUT, AND CONTROL

3-190.10 Culverts

When laying out the alignment for a culvert, the Resident Engineer should first locate, in the field, the inlet and outlet stations, and offsets, as shown on the plans, to determine whether the culvert meets field conditions. Minor adjustments may be needed in culvert stationing and/or skew angle. Grade stakes are usually placed at proposed inlets and outlets.

If, in the opinion of the Resident Engineer, the culvert should be moved a considerable distance or a new culvert should be added, they should present this information with drawings to their supervisor. Modifications in drainage systems may require changes in drainage rights, or new rights to be acquired, and possible amendments to the project's Storm Water Discharge Permit (Refer to the contract).

After the culvert location has been tentatively determined, stakes should be placed beyond inlets and outlets along the proposed centerline of the culvert. Where inlets and outlets fall with Drop Inlets, the centerline of the Drop Inlet should be staked parallel with the centerline of the road. Good judgment should be used in the placement of stakes so that they are not disturbed during the placement of the culvert.

The original cross-section along the proposed centerline of the culvert should be taken and offset stakes should be leveled (Refer to *Subsection 3-190.40 Retaining Walls*.). Levels should appear in the Drainage Book (Refer to *Section V Sample Field Book*.). This cross-section, the roadway template, and the culvert cross-section along the proposed centerline of the culvert should then be plotted on cross-section paper. Refer to figure 3-12 for the correct method for determining the side slope ratio. This method should only be used on tangent alignments. Where severe road grades occur in horizontal curves, a graphic solution should be used.

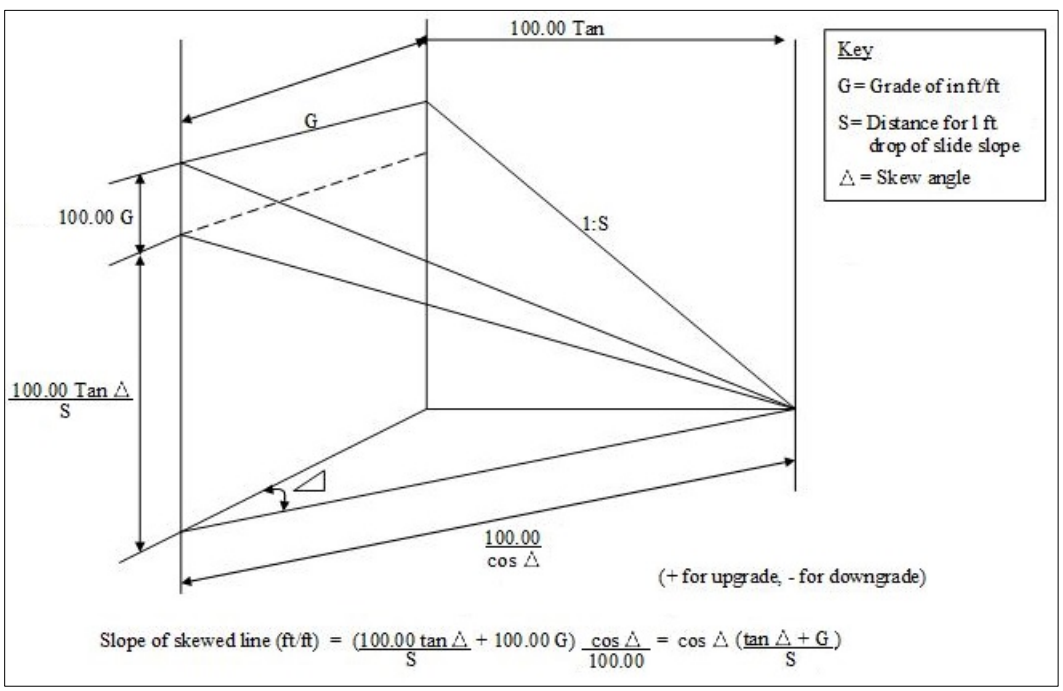


Figure 3-13: Computation for Side Slope on a Skewed Section

Once the correct culvert length and elevation have been determined, the stake is ready to be marked. The front face of the stake should show the station, diameter, length, and type of pipe and whether the stake refers to the inlet or outlet of the pipe or the centerline of the drop inlet. One side of the stake should show the centerline or baseline offset and the distance to the end of the pipe. The opposite side should show the percent of grade of the pipe. It is advisable to discuss stake markings with the Contractor's Pipe Foreman and/or Drainage Foreman to establish a policy for marking stakes throughout the project.

3-190.20 Underdrains

Underdrains are normally staked at 20 m (50 ft) intervals and at the beginning, ending, change of directions, and outlet points. It is advisable to confer with the Contractor on where to place the offset line to protect stakes during the construction process.

3-190.30 Drop Inlets and Catch Basins

Drop inlets and catch basins should be accurately laid out with proper elevations given. Offsets should be taken from the roadway centerline. Stakes should be set in line with the back inside edge of drop inlets and back edge of grates for catch basins when curbing directs the water into drop inlets or catch basins. For typical pipe stakeout methods, refer to the following figures:

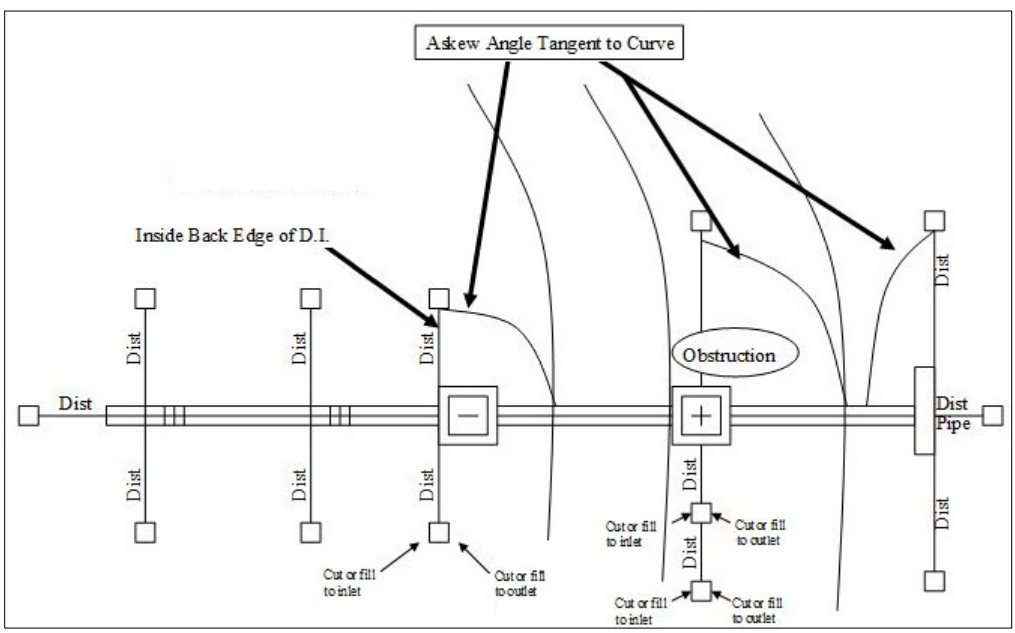


Figure 3-14: Sketch Showing a Typical Pipe Stakeout (Plan View)

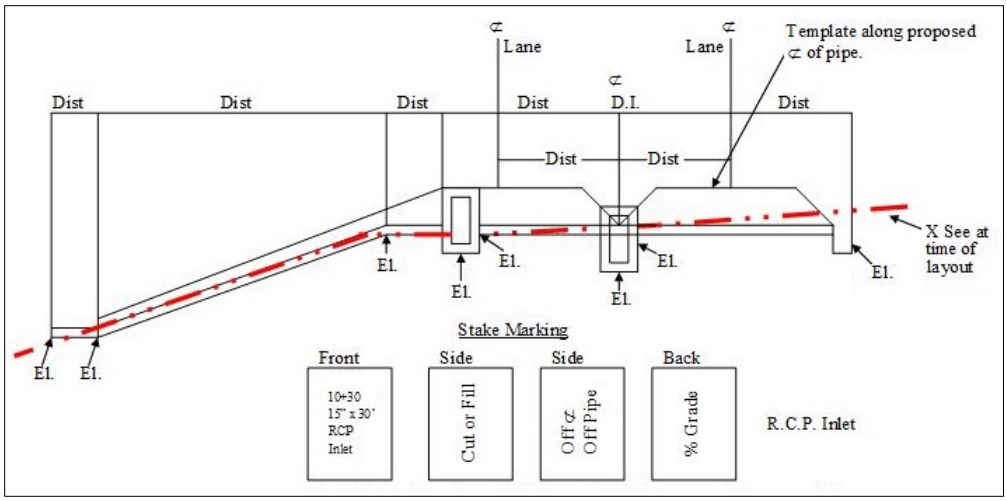


Figure 3-15: Sketch Showing a Typical Pipe Stakeout (Section View)

3-190.40 Retaining Walls

Retaining walls are usually placed in the outside ditch line of a roadway cut section. Control for the offset line should be placed so that the line may be easily reproduced. Offset stakes are usually placed on the shoulder slope at 20 m (50 ft) intervals and at the beginning and ending points of the retaining wall. If the retaining wall occurs in vertical and/or horizontal curves, it may be more practical to use 10 m (30 ft) intervals. Stakes should be marked with the station, offset, and cut. The plans normally locate the retaining wall from the centerline and the elevation from finish grade of the road.

3-190.50 Bridges

Bridges must be very carefully staked out and referenced. More than the minimum number of control points should be provided so that, if one or several control points are destroyed during construction, the bridge can still be quickly and accurately located and re-staked. On some bridge sites, it will not be possible to provide completely accurate reference stakes until the Contractor has performed some initial work, such as providing a working area in a river for a pier. In such a case, sufficient layout must be performed to allow the Contractor to build the working area; then when the point can be occupied, a more accurate layout should be performed. Throughout the construction, the reference stakes should be maintained and their accuracy improved whenever possible.

The layout of a bridge must start with a complete study of the plans and cross-sections to determine how the work will be performed. A separate book should be used to record the layout information and quantities for each bridge. For bridges with spans greater than 30 m (100 ft) in length, a total station should be used. Total stations are assigned to Resident Engineers based on the complexity of a project. The VTrans Route Survey Section can also be contacted for bridge layout using their total station.

In the sketches that follow, several different methods of bridge layout are shown. These methods are merely one of several that might be used depending on the terrain around the structure and the complexity of the bridge.

1. Bridge Layout on a Tangent
2. Bridge Layout on a Curve
3. Bridge Layout for a River Crossing
4. Determination of an Inaccessible Distance
5. Triangulation

The accuracy of the more difficult layouts should be checked by using VTrans total station equipment, or through the VTrans Route Survey Section.

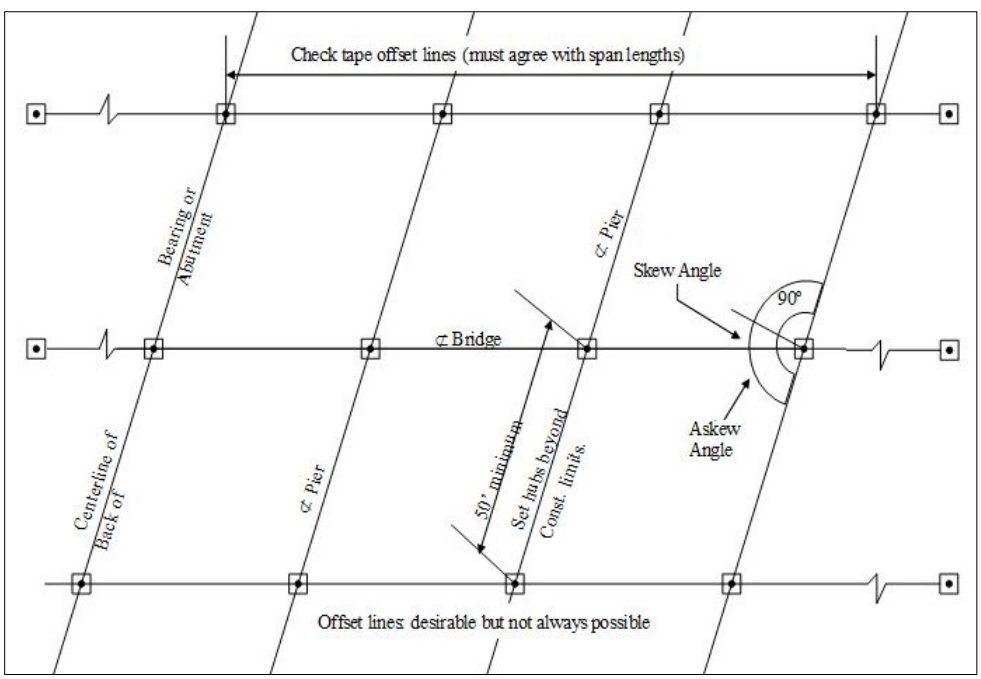


Figure 3-16: Sketch Showing a Typical Bridge Layout on a Tangent

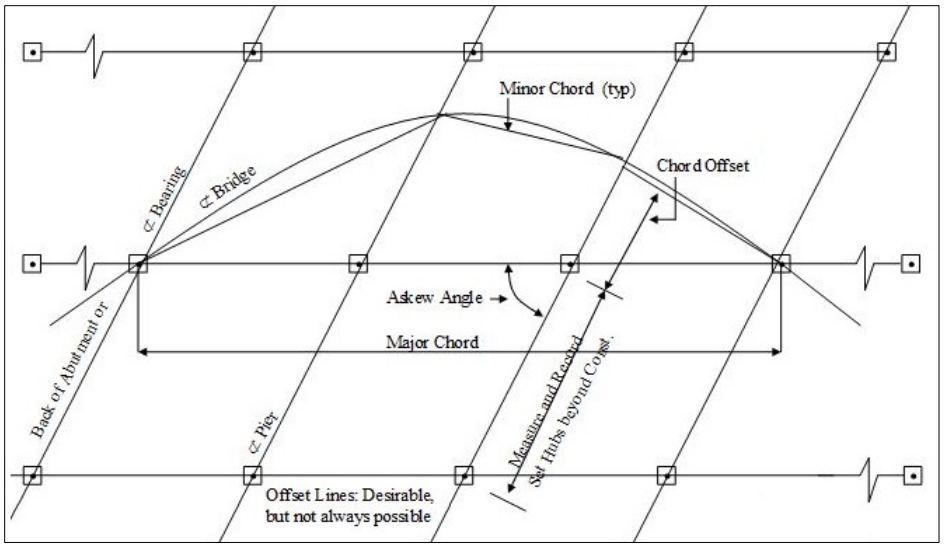


Figure 3-17: Sketch Showing a Typical Bridge Layout on a Curve

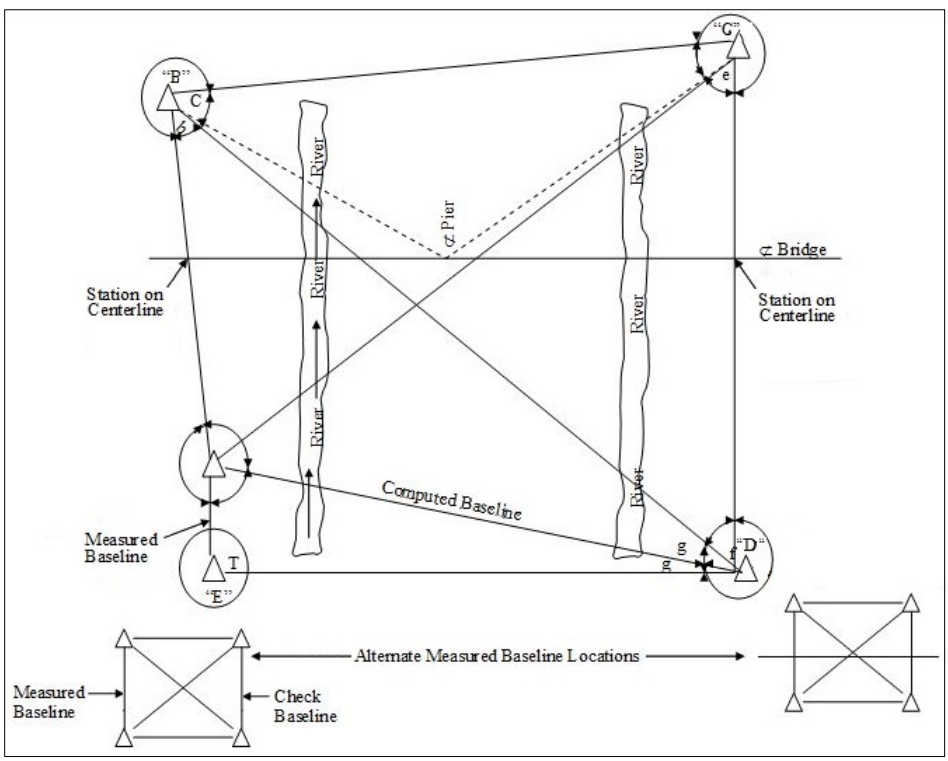


Figure 3-18: Sketch Showing a Typical Bridge Layout for a River Crossing

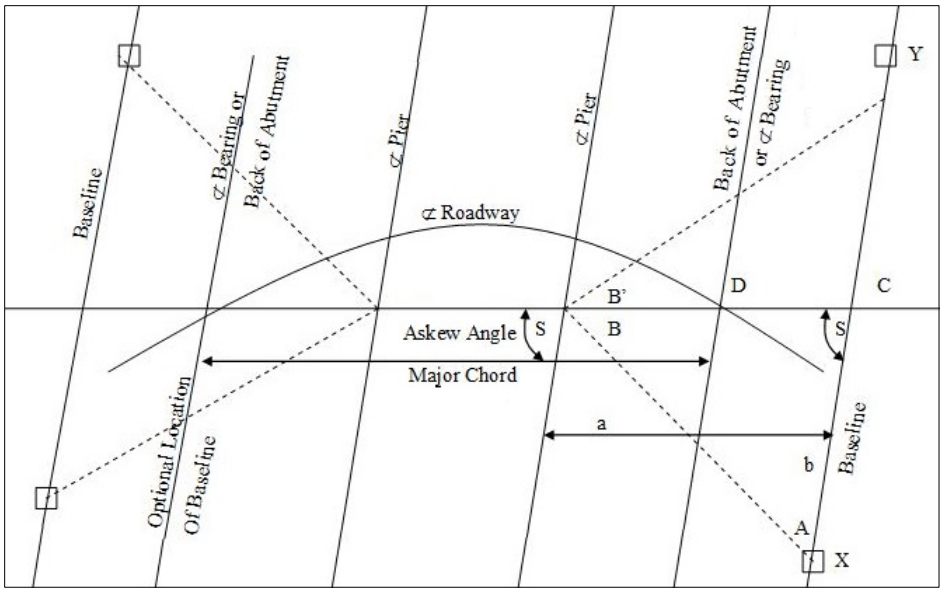


Figure 3-19: Sketch Showing a Typical Bridge Location Using Triangulation

3-190.60 Concrete Box Culvert

The Resident Engineer may choose to perform the initial layout of a concrete box culvert using either an elaborate setup or a simpler centerline control method. The centerline control method provides basic information at the onset of the project for the Contractor, with additional layout performed when the Contractor has reached a point where they may need additional control for further work. Each method has its advantages.

By initially making a complete layout with line and grade control, the Resident Engineer has fulfilled the obligation of line and grade. However, much of this will be wasted effort as it is often impossible to improve the area without a subsequent loss of control. To ensure that everything is built as intended, the Resident Engineer must do additional stake out as construction progresses. In most cases, it is more logical to do the minimum for initial layout and provide the control as it is required by construction.

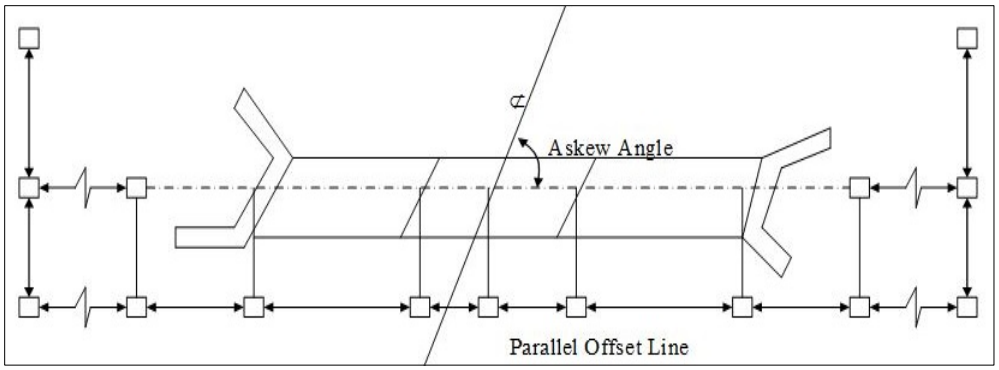


Figure 3-20: Sketch Showing the Stakeout of a Box Culvert

3-190.70 Bridge Beam Profiles

It is necessary to profile the top of erected bridge steel beams to ensure a good riding finished road surface. Any irregularities in bridge seats, camber of beams, or dead load deflection will be addressed by this process.

Field Book entries should be made with the project name, project number, contract number, station, and structure name or number. A sketch of the beam layout should be made on the project plans or structural steel plans, identifying the beam numbers, abutments and piers, direction of stations, stream flow, etc.

The Project Manager in the Structures Section can provide a beam profile spreadsheet to assist in determining the proper depth of concrete over the beams. The finish grades at 1.5 m (5 ft) intervals (or other intervals shown on the beam profile spreadsheet) over the beams should be determined before taking the beam profiles. The profiles should be taken at the same intervals as shown on the beam profile spreadsheet.

The following procedure should be followed to minimize the work involved:

For Simple Span Bridges: Label the centerline of bearing of Beam #1 (the beam on the left in the direction of stationing), Span #1 as 0+000. Take rod readings at intervals of 1.5 m (5 ft), or other specified intervals as necessary. Distances are to be recorded as 0+000, 0+001.5, 0+003, 0+004.5, etc., to the centerline of bearing at the opposite end of beam. Repeat this procedure for all beams and all spans, always starting at 0+000 on each beam.

For Continuous Span Bridges: Use the same procedure for Continuous Span Bridges as for Simple Span Bridges, except start at the centerline of bearing at the beginning of the span and continue the rod readings at the intervals shown on the beam profile spreadsheet to the centerline of bearing at the end of each continuous run of steel girder.

If a beam has a top cover plate, note the locations where the rod is set on top of this cover plate. Take all measurements along the top of the steel beams with a steel tape.

The following table shows sample notes for determining top beam elevations:

HI 156.283	**Rod**	**Elevation of Top Beam**
Beam #1		
0+000 = ℄ of Bearing	**0.341**	**155.942**
0+001.5	**0.357**	**155.926**
0+003	**0.396**	**155.887**
0+004.5	**0.418**	**155.865**
0+006, etc.	**0.433**	**155.850**
0+018	**0.524**	**155.759**
0+018.54 = ℄ of Bearing	**0.530**	**155.753**
Beam #2		
0+000 = ℄ of Bearing	**0.533**	**155.750**
+001.5	**0.549**	**155.734**
0+003	**0.573**	**155.710**
0+004.5	**0.606**	**155.677**
0+018.54 = ℄ of Bearing	**0.710**	**155.573**
Beam #3		
0+000 = ℄ of Bearing	0.713	155.570
0+001.5	**0.722**	**155.561**
0+003	**0.738**	**155.545**
0+004.5	**0.765**	**155.518**
0+018	**0.829**	**155.454**
0+018.54 = ℄ of Bearing	**0.835**	**155.448**

Compute the depth of concrete required at each profile point using the following rules:

- In all cases, the field computation should involve only the subtraction of the elevation of the beam from the theoretical screed elevation. The screed elevations should be furnished on the beam profile spreadsheets to the Resident Engineer by the Structures Section Project Manager.
- Take the beam profiles as indicated above. Reduce the notes and list the elevations on the beam profile spreadsheets where indicated, then complete the computations.
- The notes on the beam profile spreadsheet specify the minimum depth of concrete required over the beam. Where the field computations indicate that any concrete depth is less than the minimum, all the computed depths should be increased by the amount necessary to bring the depth up to the specified minimum and the finished grade of the bridge should be raised accordingly.
- Where there are any questions as to the method or results of the computations, the information should be forwarded to the Structures Section for clarification and verification.

3-190.80 Bridge and Underpass Clearance

Bridge clearances should be a matter of public record as soon as any change occurs. In order to ensure this practice is performed and standardize, the methods used in recording, the measurements must be taken according to diagrams shown further on in this Section.

Upon completion of any new structure, the Resident Engineer will measure and confirm that the proper underpass clearances have been maintained and report these findings to the VTrans Bridge Management & Inspection Engineer as final clearances in lieu of the original ones sent when the restriction first occurred.

In the case of paving project under an existing structure vertical clearance measurements will be taken before and after paving is completed.

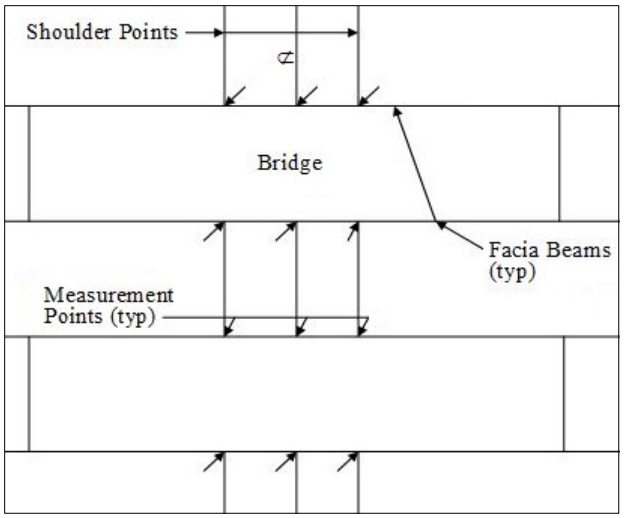


Figure 3-21: Sketch Showing Bridge Underpass Measurements for Projects Under an Existing Structure

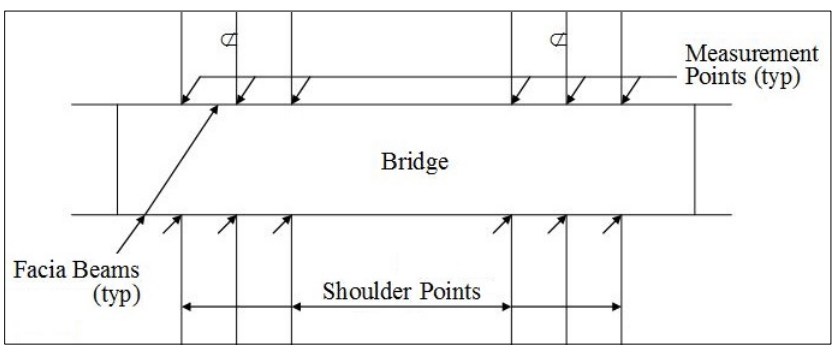


Figure 3-22: Sketch Showing Bridge Underpass Measurements for Projects Over an Existing Roadway

3-200 MISCELLANEOUS

3-200.10 Slope Taping

The Slope Taping method is used on steep slopes to obtain a horizontal measurement. When slope taping is used and executed with care, the results can be accurate and save time. Use the following procedure when slope taping:

1. Occupy the first point with the transit.
2. Establish the point to which the distance is needed.

3. Hold the zero end of the tape at the telescope axis. Using the middle cross-hair, sight on the point to which you are measuring. If this point cannot be seen, then sight on the point of the tape which is plumb over the offset point (use a plumb bob). Read the vertical angle on which the scope is positioned and measure the slope distance from the transit to the point.
4. The cosine of this angle multiplied by the slope distance will result in the horizontal distance (D_H) between the two points in the ground, as shown in the following formula:

$$D_H = \cos(\text{angle A}) \times \text{Slope Distance}$$

<u>Example:</u>

Find the horizontal distance using slope taping with the following parameters:

Horizontal Distance = D_H

Angle A = A_A = **15°**

Slope Distance = D_S = **150 m**

$D_H = \cos(A_A) \times D_S$

$D_H = \cos(15°) \times 150$

$D_H = 0.9659258 \times 150$

D_H = **144.89 m**

Therefore, the horizontal distance in this example is **144.89 m**.

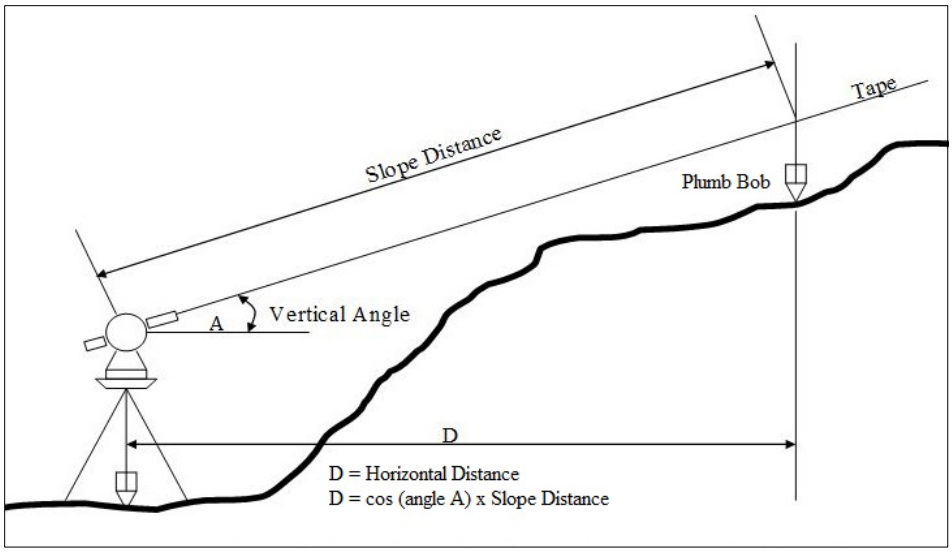


Figure 3-23: Sketch Showing the Use of Slope Taping and a Plumb Bob to Determine Distance

3-200.20 Slope Stakes

To guide the Contractor in making final excavations and embankment, slope stakes are driven at the intersection of the ground and each side slope, or offset a short distance. The cut and fill at each location is then marked on each slope stake.

The following procedures should be used to set slope stakes and check for their accuracy:

Checking Grade Stakes in Cuts & Fills: Offset stakes are referenced to the center line. The following information should be written on each stake:

- The station the stake represents
- The offset distance from the stake to the center line
- The vertical difference in elevation from the top of the stake to the centerline finished grade. This value should be expressed as either cut or fill to a tolerance of 5 mm (¼ in).
- The offset distance from the stake to a baseline, if one exists.

Refer to the following figure 3-24 that shows a sketch of slope staking. In this example, computations for slope staking in cut areas are based on the distance from the top of cut A, where the side slope intersects original ground, to a point parallel to the edge of subgrade on the neat line B or to the back of ditch C.

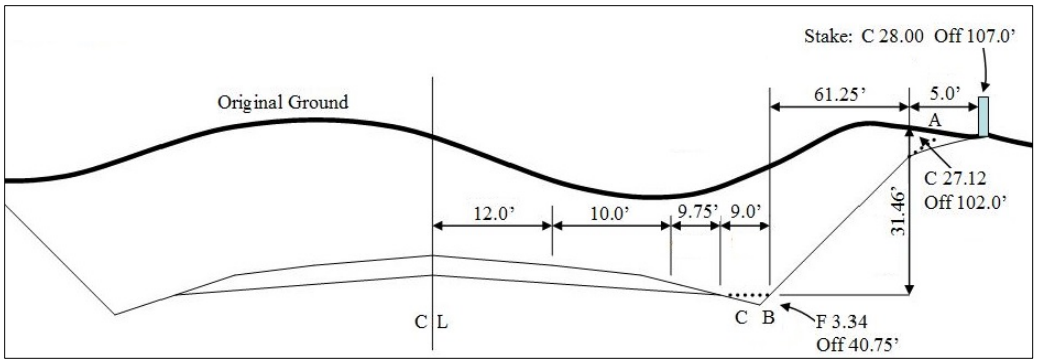


Figure 3-24: Sketch Showing the Checking of Grade Stake Locations

To exemplify this procedure we will use points A and B. The exact offset for the top of cut A is found by trial and error. For the first trial the distance is scaled from the stake to the top of cut from the cross-sections, which is 5.0 ft. Using a hand level and a six-foot rule, the Original Ground (OG) elevation is found to be 0.88 ft below the top of the stake. Point A now has an offset value of 102.00 ft and cut value of 27.12 ft.

The edge of subgrade is 3.34 ft below the centerline elevation. To the subgrade point offset, we add 9.0 ft. An 18 in ditch requires 6 ft on a 1-4 slope and an additional 3 ft on a 1-2 slope to obtain a point at the same elevation with the edge of subgrade. Point B now has a fill value of 3.34 ft and an offset value of 40.75 ft (31.75 ft + 9.00 ft).

If point A was chosen correctly, the horizontal distance between points A and B should be twice the vertical difference between the same two points, which is the rate of closure for a 1:2 slope.

The following formulae are used to determine these values:

Point A Offset Value – Point B Offset Value= Horizontal Distance

102.00 ft – 40.75 ft = **61.25** ft

and,

Point A Cut Value + Point B Fill Value = 2 × Vertical Distance

27.12 ft + 3.34 ft = **30.46** ft

30.46 ft × 2 = **60.92** ft

Finally, compare the two values:

Horizontal Distance - 2 × Vertical Distance = Staking Tolerance Difference

61.25 ft – 60.92 ft = **0.33 ft**

Therefore, the difference of 0.33 ft falls within the tolerance allowed for this type of measurement. For all practical purposes, point A has been staked accurately enough.

Earth Fills: The same procedure for establishing the top of cut is followed when establishing the toe of fill.

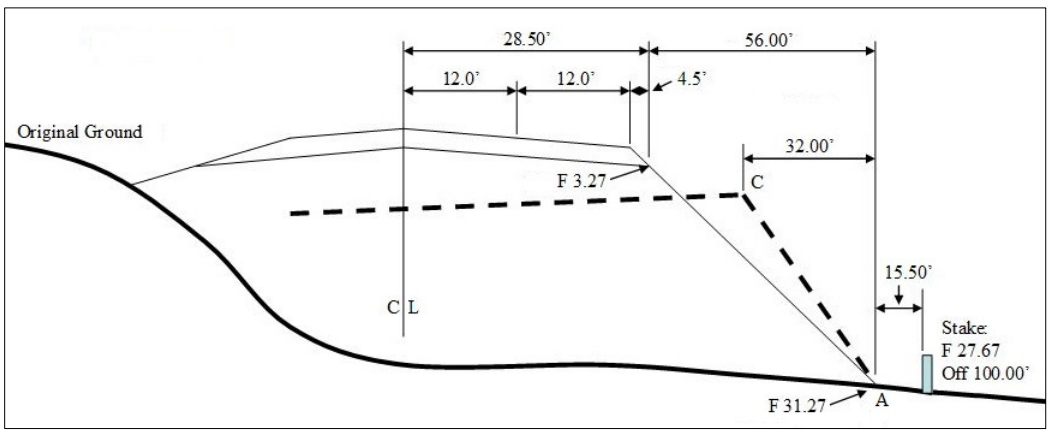


Figure 3-25: Sketch Showing the Checking of Grade Stake Locations in a Fill Condition

In this example, an initial estimate placed Point A, from the cross-sections, at 15.50 ft on the inside of the hub. Using a hand level and a six-foot rule, it is found that point A is 3.60 ft below the hub, resulting in a fill at point A of 31.27 ft.

During the construction of the embankment it may be necessary to spot check the accuracy of the slope stakes. In this example, point C represents such a spot check. Again using a hand level and a six foot rule and starting at point A, it is determined that the difference in elevation between point A and point C is 21.00 ft. If point C is correct, the horizontal distance should be 42.00 ft. The measured distance between points A to C is found to be 32.00 ft. This means that the embankment slope must be flattened in such a way that point C is moved horizontally a distance of 10.00 ft closer to the centerline.

The following formulae are used to determine these values:

½ Pavement Width + Point A Offset Value – Stake Offset Value = Horizontal Distance

28.50 ft + 15.50 ft – 100.00 ft = **–56.00** ft

and,

Point A Fill Value – Top of Slope Fill Value + Point A Elevation = Rise in Elevation

27.67 ft – 3.27 ft + 3.60 ft = **28.00** ft

Therefore, the location of point A is correct, since a horizontal distance of **56.00 ft** on a 1:2 slope requires a **28.00 ft** rise in elevation.

3-200.30 Location of Water Pipe Sleeve and/or Water Line

Water pipe sleeves and water lines that pertain to the project should be referenced to the roadway centerline and surrounding trees or structures. The sketches of water pipes and sleeves should include the following information:

1. Vermont Agency of Transportation (VTrans)
2. Project name and number
3. Full name of property owner(s) and complete mailing address(es)
4. North arrow
5. Type of material and size of sleeve pipe and/or water pipe
6. Centerline and stationing on road
7. Arrows indicating nearest town
8. Ties at each end of sleeve
9. Name on buildings or structures, such as: barn, porch, house, or bridge abutments
10. Name of trees, such as: elm, ash, maple
11. Type of culvert
12. Drawing scale
13. Name of Resident Engineer, date and initials of plotter
14. Any additional information which would assist the land owner(s) in locating these sleeves

Separate sketches should be drawn for each installation. The sketch should be submitted with the project records to the Finals Engineer who will send copies to the property owners, District Transportation Administrator, Town Clerk, and one copy will be retained with the permanent project records and/or record plans.

The following figure is an example of a sketch showing the location of water pipe sleeves and the required annotation.

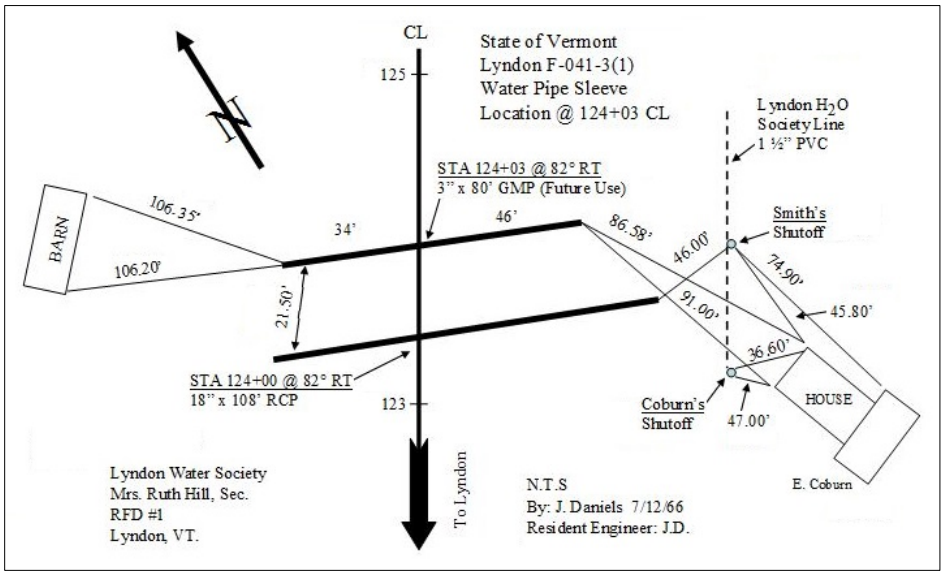


Figure 3-26: Sketch Showing the Location of Water Pipe Sleeves

3-210 CURVE INFORMATION

3-210.10 Horizontal Curves

Calculations for Simple Curves**:** A simple curve is a circular arc connecting two tangents. The radius of a simple curve may be used to define a curve in lieu of the degree of curve definition to describe horizontal curves.

For projects designed or constructed using English units, the arc definition of degree of curve is primarily used. The arc definition is defined as the change of direction of the central angle per an arc length of 30 m (100 ft).

The relationship between the degree of curve and the radius in meters (feet) is stated by the following equation:

$$R = \frac{5729.58}{D}$$

where:

R = Curve radius in meters (feet)

D = Degree of curvature

Some of the various definitions and relationships of a simple curve are as follows:

Δ = Deflection Angle

Tangent distance (T) = R (tan $\Delta/2$)

External distance (E) = R (sec $\Delta/2 - 1$) = R (exsec $\Delta/2$) = T (sin $\Delta/2$) – M

Middle Ordinate (M) = R (1 – cos $\Delta/2$) = R (vers $\Delta/2$) = R – R (cos $\Delta/2$)

Long Chord (L.C.) = 2R (sin $\Delta/2$) = 2T (cos $\Delta/2$)

Length of Curve (L) = $\frac{\Delta\, 100}{D} = \frac{\Delta\, 2°R}{360°} = \frac{\Delta\, R}{57.2958}$

The deflection angle (Δ) is measured in decimal degrees. For English units, the degree of curvature (D) is measured in decimal degrees and curve radius (R) is in feet.

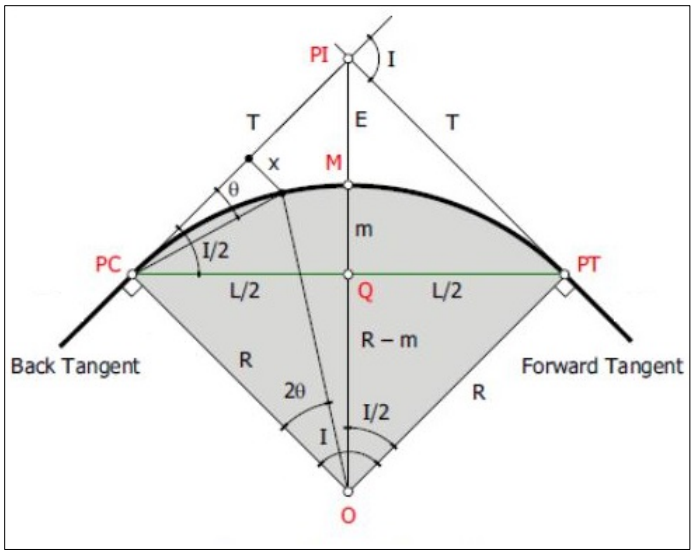


Figure 3-27: Elements of a Simple Circular Curve

<u>Calculations for a Horizontal Circular Curve:</u> The following examples show how to calculate the various elements of a horizontal circular curve:

Given:

P.I. Sta. = **107+67.90**

Δ = **11° 00' 00"**

D = **2° 30' 00"**

Calculate the Radius:

$$R = \frac{5729.58}{D}$$

$$R = \frac{5729.58}{2^\circ\ 30'\ 00''}$$

R = **2291.83 ft**

Calculate the Tangent Distance:

T = R (tan Δ/2)

T = 2291.83 (tan 11° 00' 00"/2)

T = **220.68 ft**

Calculate the Length of Curve:

$L = 100\ (\Delta/D)$

$L = 100\ (11° 00' 00''/2° 30' 00'')$

$L =$ **440.00 ft**

Calculate the External Distance:

$E = T\ (\tan \Delta/4)$

$E = 220.68\ (\tan 11° 00' 00''/4)$

$E =$ **10.60 ft**

Calculate the P.C. Station:

P.C. = P.I. Station – Tangent Distance

P.C. = 107+67.90 – 220.68

P.C. = **105+47.22**

Calculate the P.T. Station:

P.T. = P.C. Station + Tangent Distance

P.T. = 105+47.22 + 440.00

P.T. = **109+87.22**

Calculate Deflection Angles for various Arc Lengths:

Deflection Angle for 100 ft of Arc:

$\Delta_{100\ ft\ Arc} = D/2$

$\Delta_{100\ ft\ Arc} = 2° 30' 00''/2$

$\Delta_{100\ ft\ Arc} =$ **1° 15' 00"**

Deflection Angle for 50 ft of Arc:

$\Delta_{50\ ft\ Arc}$ = D/4

$\Delta_{50\ ft\ Arc}$ = 2° 30' 00"/4

$\Delta_{50\ ft\ Arc}$ = **0° 37' 30"**

Deflection Angle for 25 ft of Arc:

$\Delta_{25\ ft\ Arc}$ = D/8

$\Delta_{25\ ft\ Arc}$ = 2° 30' 00"/8

$\Delta_{25\ ft\ Arc}$ = **0° 18' 45"**

Deflection Angle for 1 ft of Arc:

$\Delta_{1\ ft\ Arc}$ = D/200

$\Delta_{1\ ft\ Arc}$ = 2° 30' 00"/200

$\Delta_{1\ ft\ Arc}$ = **0° 00' 45"**

Calculate Chord Lengths for various Arc Lengths:

Chord Length for 100 ft of Arc:

$\Delta_{100\ ft\ Arc}$ = 1°15' 00"

$CL_{100\ ft\ Arc}$ = 2R (sin Δ)

$CL_{100\ ft\ Arc}$ = 2 (2291.83) (sin 1° 15' 00")

$CL_{100\ ft\ Arc}$ = **99.99 ft**

Chord Length for 50 ft of Arc:

$\Delta_{50\ ft\ Arc}$ = 0° 37' 30"

$CL_{50\ ft\ Arc}$ = 2R (sin Δ)

$CL_{50\ ft\ Arc}$ = 2 (2291.83) (sin 0° 37' 30")

$CL_{50\ ft\ Arc}$ = **50.00 ft**

Calculate the deflection for the first station from the P.C. or any odd station along the curve:

1. Take the distance from the last point with a known deflection to the station to be calculated.

2. Multiply this distance by the deflection of a 1 ft Arc (D/200) to calculate the deflection between these two points.

<u>Example:</u>

Calculate the deflection angle ($\Delta_{Station}$) for Station 108.55.

Current Station Value – P.C. Station Value = Distance between Stations

108+55 – 105+47.22 = **307.78 ft**

Distance between Stations × $\Delta_{1\ ft\ Arc}$ = $\Delta_{Station}$

307.78 (0° 00' 45") = **3° 50' 50"**

Therefore, the Deflection Angle for Station 108.55 is **3°50' 50"**.

The following tables show an example of a field book setup for a horizontal curve:

Deflections for Curve #1					
Station	Distance	Chord Distance	Deflection Angle	Total Deflection	
105+00					
+47.22	0	0	0	0	P.C.
+50	2.78 ft	2.78 ft	0° 02' 05"	0° 02' 05"	
106+00	50.00 ft	50.00 ft	0 °37' 30"	0° 39' 35"	
+50	50.00 ft	50.00 ft	0° 37' 30"	1° 17' 05"	
107+00	50.00 ft	50.00 ft	0° 37' 30"	1° 54' 35"	
+50	50.00 ft	50.00 ft	0° 37' 30"	2° 32' 05"	
108+00	50.00 ft	50.00 ft	0° 37' 30"	3° 09' 35"	
+50	50.00 ft	50.00 ft	0° 37' 30"	3° 47' 05"	
108+00	50.00 ft	50.00 ft	0° 37' 30"	4° 24' 35"	
+50	50.00 ft	50.00 ft	0° 37' 30"	5° 02' 05"	
+87.22	37.22 ft	37.22 ft	0° 27' 55"	5° 30' 00"	P.T.
Checked by: ABC / Jan. 1, 2015					
Δ = 11° 00' 00", D = 2° 30' 00"					
P.C. Marked by P.K. Nail					

Deflections for Curve #1	
Deflection Angles	Chord Lengths
$\Delta_{100\ ft\ Arc}$ = D/2 $\Delta_{100\ ft\ Arc}$ = 2° 30' 00"/2 $\Delta_{100\ ft\ Arc}$ = **1° 15' 00"** $\Delta_{50\ ft\ Arc}$ = D/4 $\Delta_{50\ ft\ Arc}$ = 2° 30' 00"/4 $\Delta_{50\ ft\ Arc}$ = **0° 37' 30"** $\Delta_{1\ ft\ Arc}$ = D/200 $\Delta_{1\ ft\ Arc}$ = 2° 30' 00"/200 $\Delta_{1\ ft\ Arc}$ = **0° 00' 45"**	$CL_{100\ ft\ Arc}$ = 2R (sin $\Delta_{100\ ft\ Arc}$) $CL_{100\ ft\ Arc}$ = 2 (2291.83) (sin 1° 15' 00") $CL_{100\ ft\ Arc}$ = **99.99 ft** $CL_{50\ ft\ Arc}$ = 2R (sin $\Delta_{50\ ft\ Arc}$) $CL_{50\ ft\ Arc}$ = 2 (2291.83) (sin 0° 37' 30") $CL_{50\ ft\ Arc}$ = **50.00 ft**
P.T. (Note: Total Deflection should equal Δ/2)	

<u>Other Types of Horizontal Curves:</u> In addition to simple curves; compound curves, reverse curves, and vertical curves are also used in highway work.

Compound curves are a combination of two or more simple curves and their use should be avoided where a simple curve can be used. However, due to either right-of-way problems or topographic considerations, a compound curve may occasionally be necessary. The curve must not be compounded at a ratio greater than 2:1. If the adjacent curves differ by more than 2º 00' 00", a transition curve should be used.

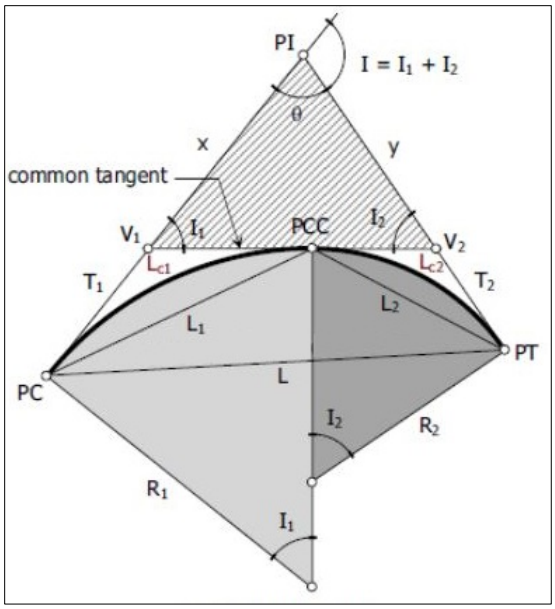


Figure 3-28: Elements of a Compound Curve

A reverse curve is a combination of two simple curves of opposite curvature with a common tangent. A tangent adequate in length to provide the super elevation transition required by the Design Policies should be provided between the curves. If the reverse curves do not contain any super elevations, a tangent between the curves is not required.

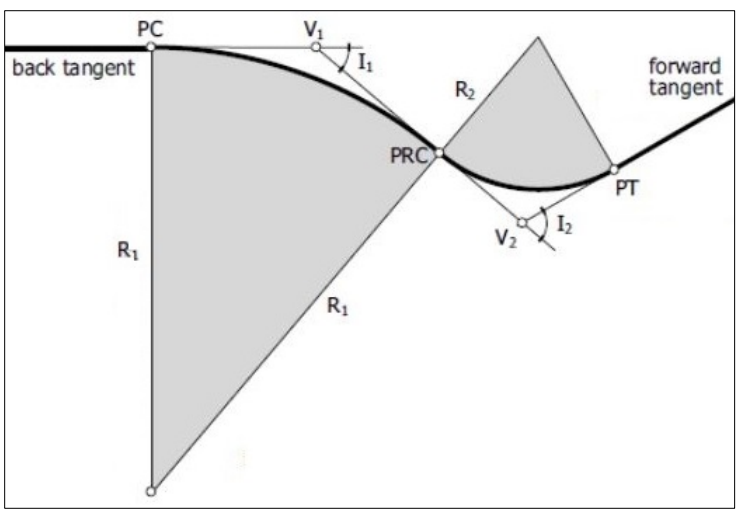


Figure 3-29: Elements of a Reverse Curve

A “broken-back” curve is a term used to denote two curves in the same direction separated by a short tangent or by a flat curve whose radius is greater than twice the radius of either of the two initial curves. This layout is particularly objectionable on highways and should be avoided by using one simple curve or a compound curve if necessary.

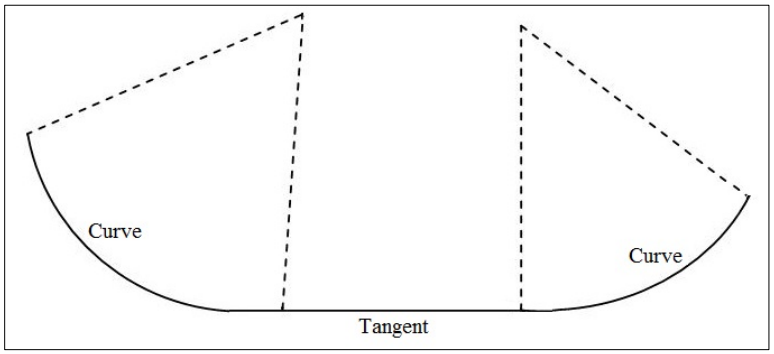


Figure 3-30: Elements of a Broken Back Curve

In the past, there was a period when transition or spiral curves were extensively used in connection with pavement widening along curves. As the curves became flatter and the pavement wider, it became unnecessary to widen at curves in this manner. It remains, however, that vehicular paths entering and leaving circular curves follow a spiral curve. For this reason, or for the reason of “fitting” an alignment into a problem area, transition curves may occasionally be used.

3-210.20 Vertical Curves

Parabolic curves are normally used to provide a smooth transition between grade lines in the vertical plane on highways and railroads.

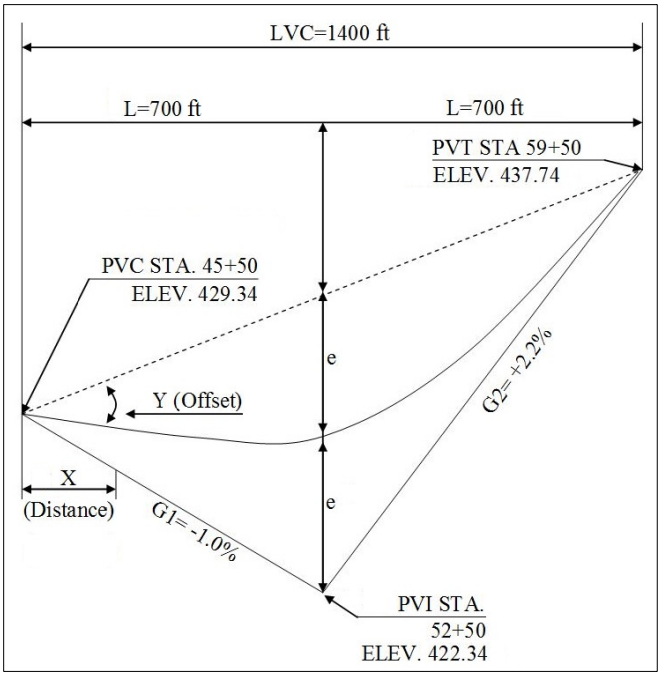


Figure 3-31: Sketch showing the elements of a vertical curve

Listed below are several definitions of the elements of a vertical curve and a set of sample field notes that have been prepared for field use to stake out a vertical curve.

- **PVC:** Point of Vertical Curve: Station on centerline at the vertical curve start point.
- **PVI:** Point of Vertical Intersection: Station at which the two tangent grade lines intersect.
- **PVT:** Point of Vertical Tangency: Station on centerline at the vertical curve endpoint.
- **LVC:** Length of Vertical Curve.
- **OFFSET:** The vertical distance from the tangent grade line to the vertical curve. A mathematical_constant whose value is determined by the grades of the two intersecting tangents and the length of the vertical curve.

Equation:

Offset = Grade #2 (%) – Grade #1 (%) x (LVC) (Stations) / 8 (Constant)

Offset = (G2 – G1) (LVC/100) / 8

- **CL ELEV:** Centerline Elevation.

Equations:

$Elev_{CL}$ = Tangent Elevation $\pm$ offset.

High point / Low point locations.

Distance from PVC = G1 x (Stations) / G2 – G1

The following table shows an example of field notes used for the layout of a vertical curve:

Tangent Station	(X) Distance	Elevation	(Y) Offset	Elevation on Curve
45+50				429.34
46+00	50.00	428.84	0.03	428.87
47+00	150.00	427.84	0.26	428.10
48+00	250.00	426.84	0.71	427.55
49+00	350.00	425.84	1.40	427.24
49+50	400.00	425.34	1.83	427.17
50+00	450.00	424.84	2.31	427.15
50+50	500.00	424.34	2.86	427.20
51+00	550.00	423.84	3.46	427.30
52+00	650.00	422.84	4.83	427.67
52+50	700.00	422.34	5.60	427.94
53+00	650.00	423.44	4.83	428.27
54+00	550.00	425.64	3.46	429.10
55+00	450.00	427.84	2.31	430.15
56+00	350.00	430.04	1.40	431.44
57+00	250.00	432.24	0.71	432.95
58+00	150.00	434.44	0.26	434.70
59+00	50.00	436.64	0.03	436.67
59+50		437.74		437.74

Next, the vertical distance to the tangent grade, e, is calculated.

e = Vertical Offset at the VPI

e = (G2 – G1) LVC / 8 = (2.2 – (–1.0)) 14 / 8 = 3.2 (14) / 8

e = **5.60 ft**

Y-Offset@ =		
46+00 & 59+00	= (50 / 700) 2 (5.60) = 0.03	
47+00 & 58+00	= (150 / 700) 2 *5.60) = 0.26	
48+00 & 57+00	= (250 / 700) 2 (5.60) = 0.71	Y = e (X / L) 2
49+00 & 56+00	= (350 / 700) 2 (5.60) = 1.40	
49+50	= (400 / 700) 2 (5.60) = 1.83	
50+00 & 55+00	= (450 / 700) 2 (5.60) = 2.31	
50+50	= (500 / 700) 2 (5.60) = 2.86	
51+00 & 54+00	= (550 / 700) 2 (5.60) = 3.46	
52+00 & 53+00	= (650 / 700) 2 (5.60) = 4.83	
52.50	= (700/ 700) 2 (5.60) = 5.60	

When using this method, the elevation difference is calculated from both the tangent gradients at specified distances from the PVC and PVT and then applied to the tangent elevations determined for the two gradients. The value of (e) is the offset at the VPI and each individual station's offset value is determined as a percentage of the external at the VPI. The vertical offsets from a tangent to a parabola are proportional to the squares of the distances from the point of tangency.

STATION AND ELEVATION OF LOW POINT OF VERTICAL CURVE

X (In Station from VPC) = $G_1L / (G_2 - G_1)$

X (In Station from VPC) = 1.0 (14) / (2.2 - (-1.0))

X (In Station from VPC) = 1.0 (14) / 3.2

X (In Station from VPC) = **4.375 Sta.** or **437.50 ft**

Station of Low Point = 45+50 + (4+37.5)

Station of Low Point = **49+87.50**

X-Distance = 437.50 Tangent Elev.

X-Distance = 429.34 – 437.50 (0.01)

X-Distance = **424.96 ft**

Y-Offset = (437.50/700)2(5.60)

Y-Offset = **2.19 ft**

Elevation of Low Point = 424.96 + 2.19

Elevation of Low Point = **427.15 ft**

ALTERNATE METHOD OF CALCULATING CURVE ELEVATIONS

An alternative method of calculating the elevations of a vertical curve is to calculate the value of A, the algebraic difference in gradients, using the following procedure. First, the tangent elevations are computed using the elevation of the PVC and the slope of the forward tangent. An elevation is computed for each station needed. Then the offsets are computed from the forward tangent to the curve. The offset equals 2A. Apply the offset values to the tangent elevation to obtain the curve elevation.

A = 100 (G2 – G1) / 2L

A = 100 (2.2 – (–1.0)) / 2 × 1400

A = 320 / 2800

A = **0.114**,

and,

Offset = 2A = **0.228**

Station	Tangent Elevation	Offsets from 1st Diff. 2nd Diff.	$AV=aX_2$	Curve.	Check	$El.=G_1X$
45+50	429.34			429.34		
46+00	428.84	$114*0.50_2 = 0.03$		428.87		
47+00	427.84	$114*1.5_2 = 0.26$		428.10	0.77	
48+00	426.84	$114*2.5_2 = 0.71$		427.55	0.55	0.22
49+00	425.84	$114*3.5_2 = 1.40$		427.24	0.31	0.24
49+50	425.34	$114*4.0_2 = 1.83$		427.17		
50+00	424.84	$114*4.5_2 = 2.31$		427.15	0.09	0.22
50+50	424.34	$114*5.0_2 = 2.86$		427.20		
51+00	423.84	$114*5.5_2 = 3.46$		427.30	0.15	0.24
52+00	422.84	$114*6.5_2 = 4.83$		427.67	0.37	0.22
52+50	422.34	$114*7.0_2 = 5.60$		427.94		
53+00	421.84	$114*7.5_2 = 6.43$		428.27	0.60	0.23
54+00	420.84	$114*8.5_2 = 8.26$		429.10	0.83	0.23
55+00	419.84	$114*9.5_2 = 10.31$		430.15	1.05	0.23
56+00	418.84	$114*10.5_2 = 12.60$		431.44	1.29	0.24
57+00	417.84	$114*11.5_2 = 15.11$		432.95	1.51	0.22
58+00	416.84	$114*12.5_2 = 17.86$		434.70	1.75	0.24
59+00	415.84	$114*13.5_2 = 20.83$		436.67	1.97	0.22
59+50	415.34	$114*14.0_2 = 22.40$		437.74		

One method of checking your calculations is to calculate the first and second differences of the curve elevation between the full stations. The second difference should be the same and is equal to 2A, which is the percent of constant change in slope per station.

3-220 FINAL MEASUREMENTS

Final measurements for pay quantities should be made concurrently with construction operations where feasible. This procedure results in greater accuracy and reliability. Naturally, some items can only be checked after construction is completed.

3-220.10 Items Measured During Construction

The following items should be measured immediately after they are constructed:

- Removal items
- Undercuts
- Storm sewers
- Conduit
- Buried Cable
- Clearing and grubbing

3-220.20 Items Measured After Construction

All measurements for final payment must conform to the requirements of the latest edition of the VTrans Standard Specifications for Construction and supplements thereto or for the edition specified in your contract.

- Fencing
- Guard rails
- Turf establishment
- Structure length
- Curb and gutter
- Sidewalks
- Bridge approach panels

3-220.30 Final Cross-Sections

Final cross-sections should be used for the computation of final pay quantities. Each final cross-section should be taken at the same station where the original section was taken. This eliminates any need for interpolation of an original at the new station.

3-220.40 Structures

Project field staff or a survey crew should measure drainage structures (catch basins, manholes, etc.) at the time of installation. Documentation of final elevations and locations will be required.

3-220.50 Final Plans

The original plan sheets must be corrected to show any changes and additions made during construction. All corrections or changes should be noted on the plan sheets. No original details should ever be removed from the plan sheets.

The following list provides some of the information that must be checked, corrected and added to the original plan sheets:

- Horizontal and vertical control
- Field-checked location, dimensions, and elevations of drainage structures
- Changes in typical sections
- Profile grade
- All underground units (cables, conduits, pipes, etc.)

3-230 MONUMENTATION

The Resident Engineer, working with the VTrans Route Survey Section, should be in charge of as much of the post construction monumentation as possible.

3-230.10 Final Alignment

Every effort should be made to install monumentation along the final alignment prior to the project being accepted. All PIs should be monumented, or if inaccessible, the adjoining tangents should be monumented. PCs and PTs should also be monumented.

3-230.20 Right-of-Way

The Right-of-Way (ROW) should be monumented and marked prior to construction and maintained throughout the duration of the contract. However, if the ROW must be re-monumented, it should be done under the supervision of a professional Land Surveyor (LS) licensed in the State of Vermont and in possession of a valid LS number. The Resident Engineer should contact the VTrans Route Survey Section to set the ROW bounds, unless stated otherwise in the contract for the specific project.

If any ROW bounds are set by a surveying crew provided by a Consultant, they should also have a valid Vermont LS number. The Consultant should provide documentation to the Resident Engineer showing the bounds that have been set, as well as any bounds that have not been set. Once this documentation (including station, offset, and coordinates) is provided, the Resident Engineer should send a copy to both the Chief of Plans & Titles and the Chief of Survey. If the VTrans Route Survey Section sets the bounds, they should notify the Resident Engineer as to which bounds were set and will also prepare the documentation for presentation via the Resident Engineer to the Chief of Plans & Titles and Chief of Survey.

3-230.30 Federal or State Agency Survey Monuments

When a Federal or VTrans survey monument is to be destroyed, the VTrans Route Survey Section in Montpelier should be notified so that the marker may be accurately transferred. The complete identification of stamped information on the marker should be given when reporting this information. The elevation of the marker should be transferred by the Resident Engineer to a stable and secure temporary bench mark until the new tablet can be set. This will provide a reference, in the case of a temporary bench mark, in the event that there is a delay in moving the marker or if the marker is accidentally damaged.

3-230.40 Property Line Fence and Boundary Markers

The Resident Engineer should assume the responsibility for the control of the Property Line Fence. Much of the fence layout can be done from the construction stakes. When the fence is not parallel to the centerline of the roadway with changes in offset designated by boundary markers, the Resident Engineer should stake the right-of-way Taking Line first, positioning the boundaries as specified on the plan. If a Boundary Marker is positioned as a corner and obviously is not on the accepted line (dividing property), make no attempt to reposition it.

All boundary markers should be positioned at the exact station and offset that is specified on the right-of-way plans. Property line fencing, generally speaking, proceeds from boundary marker to boundary marker. When staking bounds, the Resident Engineer should accurately locate the position of the boundary marker by positioning a stake with a survey tack in the top of it. From this, the Contractor will tie off the control, locate the bound and position it according to the ties used. A spot check should be made by the Resident Engineer on the accuracy of the location used by the Subcontractor. Boundary markers are only required when the taking line changes direction, i.e., the offset distance changes.

When the fence is on a tangent and it is possible to see from one boundary to the other, the exact position of the boundaries should be located. From that, the Fence Subcontractor can use intermediate alignment stakes to control the location.

When the fence is not parallel to the roadway centerline, then the Resident Engineer must use intermediate alignment control in order for the Fence Subcontractor to properly position the fence.

Intermediate staking is required on curves and tangents where it is not possible to see between boundary markers and on fence lines that are not parallel to the roadway centerline. This layout work is necessary to ensure the accurate location of the fence.

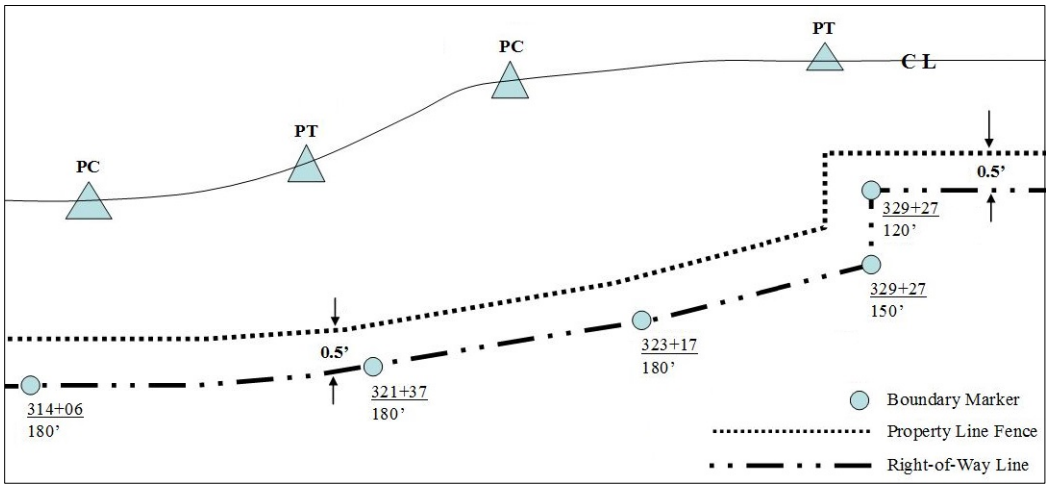


Figure 3-32: Property Line Fence and Boundary Markers

3-230.30 Bench Marks

During the course of construction, the status of the original bench marks and any temporary bench marks may change; as many are accidentally destroyed and will need to be reestablished. At the end of the project, a bench mark list should be made tabulating all remaining bench marks and temporary bench marks

3-230.40 Traverse Stations

On projects employing the Vermont State Plane Coordinate System, efforts should be made to perpetuate the control stations after completing construction. All remaining control stations should be shown on the final plan sheets.

STATE OF VERMONT

AGENCY OF TRANSPORTATION

CONSTRUCTION SECTION

2015

ENGLISH/METRIC

CONSTRUCTION MANUAL

SECTION IV

CONSTRUCTION AND INSPECTION DETAILS

4-100 GENERAL PROVISIONS

Section IV of this manual is intended as a guide to the Resident Engineer and the Inspector during actual construction operations. Construction inspection is recognized as the most important factor contributing to a quality, finished product and it is the responsibility of the Resident Engineer to provide for the complete and conscientious inspection of the project. Specific instructions to the Resident Engineer and Inspector are found in *Subsection 2-100.20 Project Supervision*, *Subsection 2-100.30 Instructions to the Resident Engineer*, and *Subsection 2-100.60 Instructions to Inspectors*.

This section clarifies and sets forth expectations relating to the various construction items, as set forth in the Standard Specifications for Construction, and is presented only for the benefit of VTrans employees. Care has been taken in assembling this section to be sure that nothing is in conflict with the Standard Specifications for Construction and it must be recognized that the Contractor is not bound by this manual, as it is not a part of the contract.

Before referring to any item discussed in *Section IV*, the Resident Engineer or Inspector should read and be familiar with the items as described in the Standard Specifications for Construction. For example, Item 201.10 Clearing and Grubbing, Including Individual Trees and Stumps of the Standard Specifications for Construction is covered in *Subsection 4-201 Clearing and Grubbing*.

4-110 ARRANGEMENT OF INFORMATION

4-110.10 General

The information in *Section IV* is arranged to logically answer the questions of the Resident Engineer or Inspector as each separate item becomes active. All items are addressed separately, except where the instructions might apply to a group of closely related items. Each subsection generally consists of discussion in the following areas:

1. General
2. Required Submittals
3. Engineering
4. Sampling and Testing
5. Construction and Inspection
6. Measurement and Documentation

4-110.20 Required Submittals

Any submittal requirements will be addressed in these subsections.

4-110.30 Engineering

Specific engineering-related information will be addressed in these subsections.

4-110.40 Sampling and Testing

In this subsection the requirements for sampling and testing of materials, both before the start of operations and during operations, are found. Refer to *Section 2-140 Control of Materials* and *Section 4-120 Sampling and Testing of Materials* for additional information.

4-110.50 Construction and Inspection

Typical construction problems and inspection hints are covered under this subsection. It should be noted that, except as specified in the Standard Specifications for Construction, construction methods are up to the Contractor and inspection is oriented towards the final results. No attempt has been made to write a textbook on each subject, but in some cases reference is made to certain publications, which are available from Construction Headquarters.

4-110.60 Measurement and Documentation

This subsection explains how to interpret information from the Standard Specifications for Construction regarding the specific measurement methods required to determine pay quantities and how these measurements are to be made. The acceptable methods for documenting pay quantities are also given. Methods vary from item to item but include weight slips, delivery slips, and signed and dated computations and measurements.

Examples of how measurements and documentations are properly recorded are provided in *Section V Sample Field Book.* Additional discussion on measurement and documentation may be found in *Section 2-170 Measurement, Documentation, and Payment* and *Section 109 Measurement and Payment* of the Standard Specifications for Construction.

4-120 SAMPLING AND TESTING MATERIALS

4-120.10 General

At the preconstruction conference, personnel from the Certification & Independent Assurance (C&IA) Unit of the Materials Section usually submit to the Resident Engineer and Contractor a Sampling and Certification Requirement table for the project which will contain a list of contract items which require certification, and/or sampling and testing. The Resident Engineer should verify that the required certification and/or sampling and testing, as listed, is complete. The minimum number of samples and tests required will be determined by the construction contract and the frequency guide schedule in the VTrans' Materials Sampling Manual.

The sampling and testing of materials shall be standardized throughout the Construction Section according to the procedures stated in the following subsections. The project team should test any material that they suspect does not meet specifications.

Acceptance sampling and testing shall be conducted in accordance with VTrans' Quality Assurance Program (QAP). A copy of the Quality Assurance Program may be found at the following URL:

http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/materialsandresearch/MandRVTrans_QAP_Final_030110.pdf

The federally-approved Quality Assurance Plan references the Materials Sampling Manual, which defines the sampling and testing standards. This Construction Manual provides additional guidance on how to meet those requirements. A copy of the Materials Sampling Manual may be found at the following URL:

http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/materialsandresearch/MandR2010_MSM_Final_030110.pdf

The Resident Engineer is responsible for sampling and testing of materials used on the project. At the conclusion of the project the Resident Engineer will need to justify any exceptions to the Materials Sampling Manual or the *Materials Certification Memo* (Appendix F-3). This will include; any omission of proper testing or certification of Materials, as well as failing or inadequate test results or certifications.

Material may occasionally be in place before tests on the particular portion are received, and it may later be found that the material fails to meet the specifications. This occurs most frequently with materials from natural sources, such as sand, gravel, and stone. Unless this material can be shown to substantially meet the requirements, the failing material must be removed and replaced with suitable material.

If the Resident Engineer accepts a material that fails a test, does not meet testing requirements, or was not tested at all, the Resident Engineer should provide an explanation for the justification of why the material was accepted.

For failed tests, this explanation should indicate the following:

- How the material failed
- The quantity of the test material represented
- The planned quantity of the material
- The magnitude of the material failure (for example, 4% high passing the #200 sieve)
- Why the material was accepted
- If any corrective action was taken, if appropriate

When a material is used on the project but not tested, an explanation should be provided. Refer to *Material Exceptions and Explanations – Guidance* (Appendix D-1) for additional direction on drafting explanations for justifying a "material exception."

The results of all tests should be shared with the Contractor.

The *Materials Toolbox* is a resource for the Resident Engineer, providing information about certification requirements, instructions on completing the certification forms, and the testing requirements and practices in materials certification. The *Materials Toolbox* may be found on the Field Forms CD and on the *Z:\ \Field Forms.*

The following is a brief description of each certification form and the circumstances in which the Resident Engineer must complete them.

Increase in Certified Quantity: The Resident Engineer may extend the quantity of the certification to match the installed quantity in the case of an installed material quantity exceeding the certified quantity by an amount not to exceed 20% and with the extra material coming from the same manufacturer and of the same type, lot, batch, or heat number. To extend the certified amount of an item, the Resident Engineer shall verify that the additional material being incorporated in the project is from the same manufacturer and is of the same type, lot, batch, or heat number as the original certification. The Resident Engineer will then complete the *TA-555 Increase in Certified Qty* (Appendix D-2a) form.

List of Materials with Advanced Certification: The Materials Section publishes an annual *List of Materials with Advanced Certification* (ACL), which contains materials and the manufacturers who have certified that their materials conform to VTrans' specifications. If a Contractor obtains material from such an approved source, the Resident Engineer will complete the *TA-555 Materials with Advance Certification* (Appendix D-2b) form in lieu of the Contractor obtaining a certification directly from the manufacturer.

The Resident Engineer should inspect all materials as they arrive on the project and verify that they come from approved sources. The Resident Engineer should notify the Material Section's C&IA Unit if they believe that they have discovered any material that does not conform to specifications.

Approved Products List (APL): VTrans requires the use of approved products for certain materials and items, and these products may be confused with materials requiring certification. The most important distinction between approved products and materials requiring certification is that the requirement for material certification may not be waived. Materials must appear on the VTrans *Approved Products List* (APL), which is also produced on an annual basis. The Resident Engineer will document the use of an approved product by completing the *TA 556 Approved Products List* (Appendix D-2c) form.

Certification of Minor Quantity: VTrans may waive the requirement for submittal of certification documents if the material cost is less than $5,000 and the material is not directly involved with the safety of the structure or roadway. While the requirement to provide documentation may be waived, the material must still comply with all applicable specifications. Certification of minor quantities cannot be used for items that are subject to the Buy America Provisions. Refer to *Buy America Provisions – Guidance* (Appendix B-29) for more information. The Resident Engineer will complete the *TA-555 Waive Small Quantity* (Appendix D-2d) form.

Minor Quantity Declaration: The VTrans Material Sampling Manual describes the allowable basis for the declaration of minor quantities. A minor quantity is defined as any total quantity, for the whole project, of one material, which is equal to or less than 230 CM (300 CY) for aggregates and 20% of the minimum sampling frequency for structural concrete and bituminous concrete. Minor quantities of materials may be accepted without sampling and testing. The acceptance of a minor quantity is the sole responsibility of the Resident Engineer. Sampling and testing of minor quantities will be determined on a project-by-project basis.

In the event that a material that requires acceptance testing, such as concrete, hot mix, or aggregate, cannot be tested, is not tested, or is of a small quantity, the Resident Engineer may waive the requirement for testing. However, every effort should be made to acquire at least one sample for each specified item during construction operations. Circumstances in the construction operation, the quantity of the item used, and the application in which a material is used are important considerations before any item should be considered as minor.

Materials that meet the criteria for minor quantities should be from reliable sources, perform satisfactorily, and meet the requirements for the intended purpose. This will be documented by the Resident Engineer using the *TA 557 Minor Quantity Declaration* (Appendix D-2e) form.

Material Sample Definitions and Requirements

There are five types of material sample classifications:

1. Acceptance
2. Quality Control, including process control
3. Independent Assurance
4. Investigative
5. Verification

Refer to the Materials Sampling Manual from the Materials Section for detailed definitions and explanations of these sample classifications.

Acceptance Samples: Project personnel shall be responsible for taking all acceptance samples in accordance with the requirements specified in the Materials Sampling Manual. Good engineering practice necessitates weighing all variables and determining how many additional acceptance tests are required to give a high level of confidence that all materials are meeting specifications. The total quantity represented by all of the acceptance samples for a particular item must be equal to, or greater than the total quantity of that item actually used in the project.

Failing Samples: The consequences of a sample failure should be addressed as soon as possible to mitigate any possible impacts to the project schedule. Whenever there is a material failure, the Construction Section's Paving Engineer, Structures Engineer, Regional Construction Engineer, the Project Manager, or an appropriate individual from the Materials Section, must be contacted to seek guidance on what corrective measures need to be taken. The disposition of the failing material should be indicated by notes on the *Notice of Out of Compliance Material Report* (Appendix D-3).

4-200 EARTHWORK

4-201 CLEARING

4-201.10 General

► Reference: *Section 201 Clearing* of the Standard Specifications for Construction

Clearing and grubbing of designated areas shall progress in such a manner that all erosion prevention and sediment control requirements are met per *Subsection 105.23 Erosion Prevention and Sediment Control* of the Standard Specifications for Construction, including the accepted *Erosion Prevention and Sediment Control* (EPSC) Plan submitted as required per that section or in accordance with the contract's Special Provisions.

Topsoil removed and stockpiled for later use shall not be considered a part of clearing and grubbing, but paid instead under Item 203.15 Common Excavation of the Standard Specifications for Construction.

Stump dumps may be located in the toes of fill slopes outside of a 1:1 slope when included in the design. Stumps are considered solid waste and therefore may require an *Insignificant Waste Management Event Approval* (IWMEA) form from the Vermont Agency of Natural Resources (ANR) Solid Waste Division. Stumps are exempt from these rules if they are buried on the same site from which they are extracted. An approval is required for transporting stumps off-site.

ANR's *Insignificant Waste Management Event Approval Guidance Document & Application Form* may be found at the following URL:

http://www.anr.state.vt.us/dec/wastediv/solid/Permits/IWMEA_guidanceandapp.pdf

When the need for maintenance of a stump dump is no longer necessary, it shall be closed to the satisfaction of the Resident Engineer, as per *Subsection 105.28 Closing Waste, Borrow, and Staging Areas* of the Standard Specifications for Construction. The burning of any waste materials, if necessary, will be in accordance with all local, state, and pollution control laws. The complete removal and disposal of single trees or stumps on an individual basis must be so designated on the plans in the Special Provisions or ordered by the Resident Engineer.

4-201.20 Required Submittals

None.

4-201.30 Engineering

The layout for thinning and trimming existing trees and brush shall be done before the work starts. The actual marking of clearing and/or grubbing limits, including individual trees and/or stumps to be removed should be done by the Contractors' personnel and checked by VTrans personnel.

4-201.40 Sampling and Testing

Topsoil and grubbing materials that have been stockpiled for more than one year and are intended for re-use as planting material on the project shall be laboratory tested to determine which amendments may need to be incorporated to aid in establishing new vegetation. Specific requirements and guidance for fulfilling those requirements may be found in *Section 4-651 Turf Establishment*.

4-201.50 Construction and Inspection

The Contractor should carry out the work in a manner that will prevent injury or damage to trees that are to be saved or are outside of the project's clearing and grubbing limits.

In locations that have limited access, such as deep and narrow ravines, hand clearing may be required if, in the opinion of the Resident Engineer, it is necessary to prevent the burying of objectionable material or to prevent unnecessary disturbance to the existing ground. When and where possible, sediment control measures shall be installed prior to grubbing operations.

4-201.60 Measurement and Documentation

When changes are proposed to the construction limits that result in an increase or decrease of the project area equal to or greater than 0.04 hectare (0.1 acre), the Resident Engineer should document this change with a *Written Order* (Appendix A-3). This modification to the project area should also be documented in the proper project field record book (Summary book #1 or, with cross-referencing, miscellaneous book #7).

The location of each tree or stump removed under Item 201.15 Removing Medium Trees, Item 201.16 Removing Large Trees, Item 201.20 Removing Medium Stumps, and Item 201.21 Removing Large Stumps should be recorded in the proper project record field book (Summary book #1 or, with cross-referencing, miscellaneous book #7).

4-202 DEMOLITION AND DISPOSAL OF BUILDINGS

4-202.10 General

► Reference: *Section 202 Demolition and Disposal of Buildings* of the Standard Specifications for Construction

When project requirements mandate the demolition or disposal of a building within the project area, a record of the building's previous owners or tenants and their current occupancy status will be maintained.

4-202.20 Required Submittals

None.

4-202.30 Engineering

The Resident Engineer should check to see that all buildings to be demolished are as shown on the plans and if any are still occupied. The locations of underground features such as septic tanks, cesspools, fuel tanks, and pipe lines should be clearly designated on the record plans.

4-202.40 Sampling and Testing

None.

4-202.50 Construction and Inspection

The Contractor may remove any structure called for on the plans by any method, as long as it does not cause any damage to that portion of a structure that is intended to remain. Further, the Contractor should not cause any damage to the surrounding area inside or outside of the construction limits, nor violate any local, state or federal laws or regulations. Once the building has been demolished, the Resident Engineer should ensure that the resulting waste materials are transported to an approved and/or licensed facility for recycling or disposal.

4-202.60 Measurements and Documentation

Work involved in the demolishing and disposal of buildings is covered under Item 202.10 Demolition and Disposal of Building and is paid by each item demolished and removed. Each building should be listed individually in the project summary book with the date the work was completed and the initials of the person making the field book entry. Notation should also be made in the summary book as to the disposition of the material removed.

4-203 EXCAVATION AND EMBANKMENTS

4-203.10 General

► References: *Section 203 Excavation and Embankments* of the Standard Specifications for Construction and *Subsection 3-180.40 Stripped Ledge Cross-sections*

The quantity of rock excavation must be determined for all projects regardless of the price bid for the excavation and regardless of whether the excavation is done under Item 203.16 Solid Rock Excavation or Item 203.17 Unclassified Excavation. Note that Item 203.17 Unclassified Excavation may not be used unless it is included in the contract as a bid item. Work done under Item 203.28 Excavation of Surfaces and Pavements involves the removal of existing road surfaces that lie outside of the new highway construction limits.

In an embankment area, unsuitable material below the original ground surface, unless designed as muck excavation or as an extension of a designed muck excavation area, will be considered as common excavation.

Channel excavation should be used for inlet and outlet channels on all structures that have a clear span of at least 1.22 m (4 ft) and where stone fill items are used, unless noted otherwise.

Borrow pits should not be common to more than one project and ideally not more than one item. If a borrow pit must be used by more than one project, it should be sectioned out (finalled) for the first project and then re-opened for the next project. When more than one item comes from a common source, specific areas may be sectioned and marked off for the different items.

Items that are paid for by an in-place measurement and taken from a sectioned borrow pit must have their volumes multiplied by a factor of 1.15 and deducted from the pit total. All borrow materials must come from sources outside the project right-of-way, unless specifically provided for in the Special Provisions or authorized in writing by the Construction Engineer.

Sand borrow is normally used in areas of the roadway where the subgrade is of such poor or unsuitable material that it cannot be properly compacted and graded as required before the placing of the normal sub-base material. A typical use is in an area where excavation of unsuitable material has been made.

Gravel backfill for slope stabilization should be of a relatively high quality, free draining material. Where slopes are exceptionally unstable, a stone fill item may be more suitable.

Fine grading subgrade material should be used on the roadway, approaches, and drives for the final preparation of the area immediately below the normal sub-base material and extending to a point of intersection with the design finish slope. The subgrade line is usually clearly marked on the typical sections which accompany each project. Grading is actually performed at several different levels, such as on the top of the sub-base of gravel, but is considered to be incidental to the item being worked.

Vermont highways are susceptible to frost penetration ranging from 1.52 to 2.13 m (5 to 7 ft) in depth. The class of highway, traffic, and other variables are evaluated to determine a "Design Frost Zone." This depth varies from 30% to 80% of local frost penetration.

A depth of 300 to 600 mm (12 to 18 in) of select granular material should be specified directly below subgrade, filling a portion of the design frost zone not occupied by the pavement structure. Select granular material should be specified as sand borrow in cut sections and as granular borrow for capping embankments. The select granular material should be uniformly graded and permeable.

The importance of uniformity in embankment construction cannot be overemphasized. To the extent economically feasible, construction methods should ensure uniformity of materials, layer thickness, moisture content, and compaction effort.

4-203.20 Required Submittals

None.

4-203.30 Engineering

The Contractor's personnel should perform all layout work pertaining to slope stakes for top of cuts and toe of embankments, as well as slope stakes to ensure that work proceeds according to the proper cross-sections. All cross-sections should be taken by VTrans personnel, although the Contractor's personnel may participate in the process. Refer to *Section III Engineering and Construction Surveying* for the proper procedures for taking cross-sections.

Refer to *Subsection 109.02 Purchases of Materials Based Upon Agency Measurements* of the Standard Specifications for Construction for information pertaining to the purchase of materials by the Contractor based upon VTrans measurements.

The Resident Engineer will determine the grade and cross-section of the completed work for excavation of surfaces and pavements, if not established on the plans. VTrans personnel will reproduce the survey centerline or base line, placing marks at each 20 m (50 ft) station. Refer to *Subsection 3-210 Curve Information* for more information regarding curve staking.

After these points are reproduced, the Contractor's personnel should place stakes at each of these points and also at right angles to these points at an offset to be outside the limit of the fine grading. It is important that these stakes be preserved for the duration of the project to be referenced as a control for items placed above this level.

After the stakes are in place, the finished profile grade will be measured by VTrans personnel using a transit/level, level rod and keel, or some other means, and marked on the stakes. These stakes and grades should be used by the Contractor's personnel to control the fine grading within the required tolerances. Refer to *Subsection 3-220.20* Items *Measured Under Construction* for more information.

Offset stakes with grades should be provided for each channel denoted in the Contract Plans. Preliminary cross-sections should be taken by VTrans personnel in all locations where channel excavation work will be performed. The cross-sections should be taken after the staking of the project and as close to the time of actually doing the work as is feasible. Final cross-sectioning should immediately follow the completion of each channel stake out.

4-203.40 Sampling and Testing

In-place density tests should be taken on large earth cuts and on earth and granular borrow pits in order to develop proctor values and charts to be used in compaction tests.

The Construction Section will perform the compaction and gradation testing of all acceptance samples. The Resident Engineer should confer with the Regional Materials Technician or the Materials Section to deal with any issues pertaining to the construction of embankments.

To maintain a graphic record of the compaction tests taken on each fill project, the Resident Engineer should plot the location of all compaction tests taken on the profile sheets of the job office plans, using different colors to denote passing and failing tests.

Silts and clays have a diverse range of particle sizes, shapes and compositions, and are extremely sensitive to moisture content. When used for embankment construction, they must be closely monitored and controlled to obtain desired density and yield acceptable stability.

The sources of material for Item 203.31 Sand Borrow, Item 203.32 Granular Borrow, and Item 203.35 Gravel Backfill for Slope Stabilization of the Standard Specifications for Construction for slope stabilization should be sampled prior to use and tested for gradation and organic content. During construction, the material should constantly be checked visually for changes in quality and sampled according to the Material Sampling Manual to assure that it remains within the specifications.

The soil classification of excavation material will be determined by the Soils and Foundations Engineer when requested by the Resident Engineer.

4-203.50 Construction and Inspection

After the limits of excavation are marked, all surface boulders that have a volume greater than 1.5 CM (2 CY) not covered by the cross-sections should be measured and the dimensions properly recorded in the permanent job record books. The amount of the boulder that appears above the ground line should be measured, but no attempt to determine the amount below the ground line should be made. The total volume of boulders so measured should be added to the total excavation, both earth and rock, for the project.

During the excavation, the entire boulder must be measured and treated as a deductible boulder in determining the amount of net earth excavation. A deductible boulder is only one that is within the excavation limits (below original ground). Deductible boulders should be deducted from the final quantity of common excavation when common excavation is calculated as the difference between original ground and bottom of excavation. The use of paint to mark boulders can prevent duplication of measurement. Lists of boulders should be agreed upon and signed by the Inspector and the Contractor's representative on the day the boulders are measured in order to prevent any future disagreement.

The Regional Construction Engineer should be made immediately aware of any unusual situations that develop during excavation operations so that the problem may be resolved as quickly as possible, and not wait for settlement at the final estimation.

Original cross-sections for Item 203.20 Muck Excavation to be used for computation of quantities should be taken at 10 m (50 ft) intervals or as directed by the Resident Engineer. Final cross-sections should be taken as the work progresses and as close behind the excavation as is physically possible. Field measurements may be taken and depths noted in areas where sections are not practical. Backfill material should be blasted ledge or granular material meeting the requirements listed under Table 703.04 Granular Borrow of the Standard Specifications for Construction.

Where sand borrow is used to build up the subbase in an area where unsuitable material has been excavated below the normal subgrade level, it cannot be expected that the bottom of the excavation will be as true to grade or as compacted as is normally required prior to the placement of a subbase material.

Areas that are composed of unstable natural materials that are unsuitable for supporting the weight and movement of typical excavation equipment may need to be excavated using a dragline excavator. The bottom of the excavation should be shaped as much as possible with the available equipment and should not contain holes which will hold any water. The proper elevation of the bottom of the excavation should be verified either by cross-sectioning or by string checking.

The maximum depth of sand that is required to provide a stable base over silt or clay excavation is 600 mm (18 in). The full depth of sand is normally applied in one lift in order to avoid disturbing the subgrade by travel with heavy spreading equipment. The sand should be dumped in piles on the previously spread sand and pushed ahead by a bulldozer.

The completed sand borrow should be compacted to an unyielding surface and graded to the desired elevation, which is usually the normal subgrade elevation. The surface should then be fine graded and checked.

VTrans personnel should check the subgrade at each station by stretching a string from stake to stake across the road and measuring down with a ruler to verify that the required template has been constructed. This check should be carefully made, as this is the level at which that the riding quality of the road starts to develop.

Events that require the substitution of alternate materials for the project, for example, Solid Rock Excavation for Sand Borrow, Granular Borrow, or Granular Backfill for Structures, to those specified, should be reviewed to evaluate possible adverse effects, such as the application of unexpected stresses to a structure or alteration to the drainage pattern surrounding a structure. Substitutions to be authorized must be documented in accordance with *Subsection 105.04 Conformity with Plans and Allowable Deviations* of the Standard Specifications for Construction.

4-203.60 Measurement and Documentation

The volume of excavation should be computed from cross-sections using the average end area method. Final cross-sections must be taken accurately so that unwarranted deductions will not be made from the final quantities for apparent overfilling. If the original cross-sections were produced from a three-dimensional survey, cross-sections for payment may also be done by the three-dimensional method, upon approval issued by the Finals Unit.

If the project has revised centerlines, final cross-sections should be taken from the revised centerlines provided that revised cross-sections were originally taken. Final cross-sections should be taken from preliminary survey lines if the preliminary survey line is the construction line or if the revised survey line was not re-sectioned.

Quantities for Item 203.20 Muck Excavation should be the amount actually removed from within the project limits, as designated on *Standard Sheet B-5* and/or the project cross-sections.

Quantities for Item 203.35 Gravel Backfill for Slope Stabilization are determined by computations based on field measurements or prescribed typical sections. Payment should not be made for material outside the section that was ordered by the Resident Engineer.

Quantities for Item 203.31 Sand Borrow should be determined by cross-sections taken prior to placement. Payment of the sand borrow should not be made below the specified depth or above the elevation indicated on the typical section. If the sand borrow is obtained from a sectioned earth or granular borrow pit, the sand borrow quantity paid in place must be multiplied by a factor of 1.15 and the result deducted from the sectioned pit quantity.

Spreadsheets may be used for calculations under normal conditions and for computing fine grading for most projects. Irregular areas and/or field conditions may necessitate field measurements and computations. The field book notations for these types of measurement should include the name of the surveyor, the date, the location, and whether or not the measurements are satisfactory considering the conditions.

Cross-sections and field measurements for Item 203.20 Muck Excavation; Item 203.31 Sand Borrow, and Item 203.35 Gravel Backfill for Slope Stabilization should be recorded in the project record field book # 6. These notes should be initialed, dated, and cross-referenced.

Common excavation, solid rock excavation, unclassified excavation and borrow pit sections should be taken on computer-generated cross-section paper. Refer to *Section III Engineering and Construction Surveying* for further details and methods for working with cross-sections.

"Load count" is an acceptable method of measurement for small quantities of certain items, as long as written permission is obtained from the Resident Engineer. However, per *Subsection 203.13 Method of Measurement* of the Standard Specifications for Construction, a load ticket must be supplied with each load. Tickets indicating the number of loads delivered per day are not permissible.

The quantity of Item 203.28 Excavation of Surfaces and Pavements to be measured for payment should be the number of cubic meters (cubic yards) of material which have been removed and disposed. It should be measured in its original position by cross-sections or three-dimensional measurements recorded in the Summary Book under Item 203.28 Excavation of Surfaces and Pavements or in the miscellaneous book with cross-referencing to the summary book.

4-204 EXCAVATION FOR STRUCTURES

4-204.10 General

► References: *Section 204 Excavation for Structures* of the Standard Specifications for Construction

Items in this section involve work for the excavation and backfill of structures. Trench excavation pertains to excavation and backfill required for proper installation of drainage structures or other utilities with clear spans of 1.2 m (4 ft) and under. The type of trench excavation is classified by earth and rock.

Structure excavation is used for excavation down to the footing, or the bottom of structure elevation. This work shall to be done in dry conditions with methods that minimize the disturbance of the soil below the bottom of the excavation.

Item 204.30 Granular Backfill for Structures is intended to provide a backfill for structures that is a high quality, free-draining material with the necessary friction angle for stability and/or strength of the structure.

4-204.20 Required Submittals

None.

4-204.30 Engineering

The Resident Engineer should verify that the Contractor has laid out the correct location for excavations and that excavations are to the correct depth.

4-204.40 Sampling and Testing

The source of material for granular backfill for structures must be sampled prior to use and tested for gradation and organic content per *Subsection 704.08 Granular Backfill for Structures* of the Standard Specifications for Construction. During construction, the material must constantly be checked visually for changes in quality and sampled according to the Materials Sampling Manual for acceptance within the specifications.

Compaction tests must be taken of the granular backfill for structures during installation to verify that the Contractor is achieving the required density. Some buried structures such as elliptical plate arches have project-specific compaction requirements that must be attained.

If there are contract requirements for compaction or proof-rolling of soil underlying the granular backfill for any structure, the soil shall be tested to verify that the required density is met.

4-204.50 Construction and Inspection

Trench excavation operations should be inspected to verify that the excavation is as specified in the contract for the utility that is being installed. The excavation dimensions should be to the width and depth as specified. Proper backfilling is a very important factor, especially in pipe installations. The pipe structure depends on the proper placement of the backfill to develop sufficient strength to support the embankment. Compaction tests should be conducted of the backfill in accordance with the specifications.

When trench excavation occurs in solid rock, the excavation operations must be inspected to verify that the proper minimum widths and depths are achieved for the installation of the utility or pipe.

Structure excavation operations should be monitored to ensure that the methods that are being used will preserve the underlying soil or rock bearing capacity. The excavation must be done in dry conditions to the elevation required without over-excavating. The bottom of the excavation should be examined and compared with any borings or other subsurface information in the contract. If the soil is different than what was anticipated or seems unsuitable for the structure, the Project Manager should be contacted. Any over-excavation should to be corrected according to the specifications at the Contractor's expense.

When a structure is to be located on a ledge, the excavation should remove all loose and weathered rock and all soil on top of the rock. Any deep fissures or cracks should be grouted prior to placing the footing. If the slope or elevation of the rock is different than what was anticipated in the contract, the Project Manager should be contacted to determine if raising or lowering the footing is allowable.

If the material at the bottom of the excavation is unsuitable, the Resident Engineer may authorize a 300 mm (1 ft) undercut below the indicated bottom or footing of the structure. The undercut should be backfilled with crushed stone meeting the requirements under *Subsection 704.02 Coarse Aggregate for Concrete* of the Standard Specifications for Construction.

The coarse aggregate should be measured and paid under Item 204.30 Granular Backfill for Structures. Granular backfill for structures must be inspected during installation to verify that it is being installed in the proper lifts and compacted according to specifications. Backfilling operations are restricted until the adjacent concrete has reached 85% of the specified design strength. Often granular backfill for structures is limited to 600 mm (2 ft) feet below bridge seat until after the superstructure has been completed. This is to prevent movement or rotation of the substructure caused by construction loads.

The safety conditions of the excavation and backfilling operation should be closely monitored. Deviation from acceptable Vermont Occupational Safety and Health Agency (VOSHA) rules should be brought to the attention of the Contractor immediately. Refer to *Section X Safety* for more information about excavation safety.

4-204.60 Measurement and Documentation

The pay limits for Item 204.21 Trench Excavation of Rock, Item 204.25 Structure Excavation, and Item 204.30 Granular Backfill for Structures should be "neat line" measurements. The pay limits are defined in the specifications for the items and are usually further defined by "Typical Earth Work Sections" shown on the contract plans.

The pay limits for excavation and backfill are for measurement and payment. They are not intended to confine the Contractor's operations to these limits, provided the Contractor absorbs the cost of additional excavation and/or backfill outside of the defined limits and the work does not interfere with or endanger other work or property outside of the project limits.

When exploratory excavation is necessary to determine where underground utilities are located, the contract may call for hand excavation under Item 204.22 Trench Excavation of Earth, Exploratory. This measurement method should have a factor applied to the measured volume to compensate for the hand excavation.

All cross-section notes, measurements, and computations should be recorded in the proper project record field book. All notes should be initialed, dated, and cross-referenced. Structure excavation shall be computed from cross-sections taken at right angles to the centerline of the structure (for pipes and boxes); or at right angles from a baseline set up in relation to the structure footing (for abutments and piers). Quantities for Item 204.30 Granular Backfill for Structures are determined by computations based on field measurements or prescribed typical sections.

4-205 DRILLING AND BLASTING

4-205.10 General

► References: *Section 205 Drilling and Blasting* of the Standard Specifications for Construction

Work performed for Item 205.10 Drilling and Blasting of Solid Rock involves drilling, blasting, and removing rock ledge and any similar obstructions within the project limits. The goal is to have a stable, non-slip plane on which to build embankments, roadway subgrades, and any other highway structures. Work performed for Item 205.20 Drilling and Blasting of Solid Rock Subgrade involves drilling, blasting, and removing subgrade materials to lower the groundwater elevation.

4-205.20 Required Submittals

None.

4-205.30 Engineering

The drilling pattern for Item 205.10 Drilling and Blasting of Solid Rock should be marked out by the Contractor's personnel, as directed by the Resident Engineer. Typically, designers specify a 1.8 x 1.8 m (6 x 6 ft) square drilling pattern with a 1.5 m (5 ft) drilling depth. Refer to *Standard Sheet B-5* for more information.

4-205.40 Sampling and Testing

None.

4-205.50 Construction and Inspection

► References: *Subsection 205.02 Drilling and Blasting of Solid Rock* and *Subsection 205.03 Drilling and Blasting of Solid Rock Subgrade* of the Standard Specifications for Construction, and *Standard Sheet B-5*

Payment for Item 205.20 Drilling and Blasting of Solid Rock Subgrade is for work done at the same time as the drilling and blasting for the bottom lift of rock. The method should be as determined by the contractor providing the rock below subgrade is shattered, as indicated on the plans or ordered by the Resident Engineer. The limits along the stationing should be the entire length of the rock cut to a depth of 1.2 m (4 ft) below subgrade. The limits across the roadway are shown on *Standard Sheet A-50* and *Standard Sheet A-61*. Test trenches shall be dug, if necessary, to verify compliance with specifications.

4-205.60 Measurement and Documentation

Field measurements for Item 205.10 Drilling and Blasting of Solid Rock, showing the drill pattern and drill hole depths, should be recorded in the appropriate field book.

Measurement for Item 205.20 Drilling and Blasting of Solid Rock Subgrade should be taken in order to compute the area to be drilled and blasted at subgrade level. Special attention should be given to the limits of the rock drilled and blasted at right angles to the stations, as well as along the stations. These measurements should be recorded in the appropriate field book.

Trench excavation used to inspect the depth of shattered and rearranged rock below subgrade should be documented with a *Written Order* (Appendix A-3).

4-208 COFFERDAMS

4-208.10 General

► Reference: *Section 208 Cofferdams* of the Standard Specifications for Construction

A cofferdam is a temporary enclosure that is constructed to provide a dry working environment and a stable excavation area for erection of structural elements such as abutments and piers. The cofferdam shall be watertight or involve alternate methods to dewater and stabilize the specific site. Payment for work done under Item 208.40 Cofferdam includes the design, construction, maintenance, and eventual removal of the cofferdam.

The soundness and integrity of the cofferdam and stability of the excavation area shall be the prime concern at all times.

The excavation of material classified under Item 208.30 Cofferdam Excavation, Earth, shall consist of all materials within the pay limits of the cofferdam, excepting solid rock, but including mortared stone, masonry, concrete and boulders measuring 0.5 CM (0.4 CY) or less in volume. The excavation of material classified under Item 208.35 Cofferdam Excavation, Rock should consist of all solid rock within the pay limits of the cofferdam.

4-208.20 Required Submittals

The adequacy of the cofferdam is the responsibility of the Contractor. The Contractor should prepare detailed plans and a schedule of operations for each cofferdam. The design and structural details of the cofferdams must be stamped by a qualified Professional Engineer registered in the State of Vermont. The Contractor should provide the Resident Engineer with three copies of the design and structural details. One copy each of the design and structural details should be forwarded to the Structures Engineer and the Construction Structures Engineer.

4-208.30 Engineering

The Resident Engineer, Project Manager, and Construction Structures Engineer should review the submitted cofferdam design and schedule of operations. If the submitted plan and schedule of operations does not contain all of the information required by *Section 208 Cofferdams* of the Standard Specifications for Construction or if there are questions about the constructability and/or adequacy of the cofferdam plan, the Contractor should be made aware of the deficiencies or concerns by the Resident Engineer.

VTrans is not responsible for approving the Contractor's cofferdam plan; however, the Regional Construction Engineer should accept or reject the plan in writing. Acceptance of the cofferdam design by the Regional Construction Engineer means that it meets the requirements of *Section 208 Cofferdams*, but VTrans does not endorse the safety or effectiveness of the plan. The location, size, and construction of the cofferdam must be in accordance with the contract, the submitted cofferdam design, and schedule of operations. The location of the cofferdam should be verified after the Contractor has completed the cofferdam layout but prior to the start of construction.

4-208.40 Sampling and Testing

No acceptance sampling or testing is required for cofferdam construction. However, the Resident Engineer shall, as much as practical, verify that the materials used in the construction of the cofferdam match those specified in the accepted submittal of the cofferdam design.

4-208.50 Construction and Inspection

The Resident Engineer should be familiar with the contract and the submitted cofferdam design. The Resident Engineer should verify that the cofferdam is constructed according to the design with respect to such things as sheet piling embedment, height of sheets, location of structural frames, bracing, and concrete seal depths. The response of the structural members of the cofferdam should be observed during the time the cofferdam is in service. Any indications of distress of the cofferdam should be reported to the Contractor. Employees should not be allowed into a cofferdam that is deemed unsafe.

All structural members used in cofferdam construction should be examined for loss of section due to corrosion, previous welding, and rivet or bolt holes. Members of questionable integrity, in the opinion of the Resident Engineer, should be replaced prior to being incorporated into the work or specifically examined and approved by the Contractor's Professional Engineer of Record.

The Construction Structures Engineer should assist in the assessment of questionable structural members and aid the Resident Engineer in the decision to require specific approval by the Contractor's Engineer. Deviations from the accepted cofferdam design are prohibited without the approval of the Engineer of Record.

The Resident Engineer should verify that the proper depth of excavation is obtained for footings. The excavation should be accomplished in dry conditions with a minimum of disturbance of material below the footing. When excavating for a spread footing, extra care should be exercised to avoid excavating below the bottom of the footing and to verify that the footing is in good material.

The excavation limits are defined in the contract and are for measurement and payment. The limits are not intended to confine the Contractor's operations, provided that the cost of excavation outside the limits is absorbed by the Contractor and does not interfere with adjacent structures or property. The cofferdam frames and bracing should be installed in a timely manner as excavation progresses and as indicated in the cofferdam schedule.

After excavation is complete and as construction progresses within the cofferdam, the-Resident Engineer should periodically inspect the cofferdam for compliance with the cofferdam design.

It may be necessary for the Contractor to remove frames and bracing from the cofferdam to allow space for formwork for structural elements, but this may only be done with written authorization from the Professional Engineer who designed the cofferdam.

If the cofferdam design requires an underwater structural concrete seal, the placement of the underwater concrete should follow the specifications and best practices associated with placing underwater concrete. The underwater concrete placement should be monitored for workability, with the flowability of the concrete and its self-consolidation and cohesion characteristics closely observed.

The underwater concrete placement should be accomplished with use of a tremie pipe and/or concrete pump truck. The tube or pump hose should be moved as little as necessary around the bottom of the excavation to avoid mixing water and concrete. The tremie pipe should be moved slowly without pulling the tip of the pipe out of the freshly poured concrete.

If the tremie tip is lifted out of the concrete prior to completing the full concrete pour, the tube shall be completely removed and the tip replugged with a rubber or foam ball prior to pumping more concrete. The tremie tube should then be repositioned at least 5 ft (1.5 m) below the concrete surface before resuming concrete pumping. Concrete should always be pumped in place at the bottom of the excavation and never be allowed to fall through the water from above.

The contract may contain special permit requirements for cofferdams, to which all plans and personnel should adhere. The *Erosion Prevention and Sediment Control* (EPSC) Plan for the project should also contain treatment and dewatering requirements for pumping out the cofferdam.

4-208.60 Measurement and Documentation

Payment is made for Item 208.40 Cofferdam as a lump sum for each cofferdam constructed. The lump sum includes all costs associated with the construction, operation, and removal of the cofferdam.

The pay limits for Item 208.30 Cofferdam Excavation, Earth and Item 208.35 Cofferdam Excavation, Rock are "neat line" measurements and correspond to the assumed limits of the cofferdam. The pay limits and cofferdam limits are defined in the specifications for the items and usually are further defined by "Typical Earth Work Sections" shown on the contract plans.

The pay limits are for measurement and payment. They are not intended to confine the Contractor's operations to these limits, provided the Contractor absorbs the cost of additional excavation and/or backfill outside of the defined limits and the work does not interfere with or endanger other work or property outside of the project limits. The Contractor should not be additionally compensated for hauling and disposing unsuitable materials.

Quantities for Item 208.30 Cofferdam Excavation, Earth and Item 208.35 Cofferdam Excavation, Rock are determined by computations based on field measurements or prescribed typical sections. Boulders, concrete, or other items that are larger than 0.5 CM (0.4 CY) may need to be separated from the earth and measured individually.

4-210 COLD PLANING

4-210.10 General

► Reference: *Section 210 Cold Planing* of the Standard Specifications for Construction

Cold planing is the controlled removal of the surface of the existing pavement to a specified depth, with specially designed milling equipment to restore the pavement surface to the specified grade and cross-slope.

Payment for work under Item 210.10 Cold Planing, Bituminous Pavement involves the elimination of excess build up of pavement on bridge decks, roadways, and areas of excessive rutting. Also, this item covers removal of excess pavement when maintaining overhead clearance at bridges, stop lights, wires, etc., and at the end of the project when tying into existing pavement surfaces.

4-210.20 Required Submittals

None.

4-210.30 Engineering

Cold planing work is paid under Item 210.10 Cold Planing, Bituminous Pavement by the square meter (square yard), with material removed to a specified depth. The Contractor's personnel should mark out the area to be cold planed with the Resident Engineer's approval before any cold planing work commences.

4-210.40 Sampling and Testing

None.

4-210.50 Construction and Inspection

The actual work accomplished under Item 210.10 Cold Planing, Bituminous Pavement is performed using a milling or grinding machine that allows for the removal of material to a specified depth. This specified depth will be indicated on the plans or ordered by the Resident Engineer. The limits of material removal by Cold Planing should be in compliance with the plans or as directed by the Resident Engineer.

4-210.60 Measurement and Documentation

Cold planing operations should be closely monitored by the Resident Engineer or an authorized representative to ensure that the proper amount of material is being removed to the proper depth. Field measurements for Item 210.10 Cold Planing, Bituminous Pavement showing the location, area, and depths should be recorded in the appropriate field book for each day's operation.

4-300 SUBBASE AND BASE COURSES

4-301 SUBBASE

4-301.10 General

► Reference: *Section 301 Subbase* of the Standard Specifications for Construction

In highway engineering, the subbase is the layer of aggregate material laid on the subgrade, upon which the base course layer will be laid. The subbase is often the main load-bearing layer of the pavement, and its role is to spread highway vehicle loads evenly over the subgrade. The subbase materials used may be either unbound granular or cement-bound.

The quality of the subbase is very important for the useful life of the road, and it is the interlocking ability of the particles of the subbase materials that give it strength. The subbase material must be completely permeable so that it will not retain water and subsequently lose its strength.

4-301.20 Required Submittals

None.

4-301.30 Engineering

Work is performed under the following six Items involving subbase materials:

- Item 301.15 Subbase of Gravel
- Item 301.25 Subbase of Crushed Gravel, Coarse Graded
- Item 301.26 Subbase of Crushed Gravel, Fine Graded (Metric Ton (Ton))
- Item 301.28 Subbase of Crushed Gravel, Fine Graded (Cubic Meter (Cubic Yard))
- Item 301.35 Subbase of Dense Graded Crushed Stone
- Item 301.40 Subbase, RAP

An established centerline and graded stakes are a prerequisite for work done under any of these six items. The Contractor may prefer to set new stakes or steel pins along the completed alignment for the final grading of the paved surface; these should be checked by VTrans personnel.

4-301.40 Sampling and Testing

The subbase source material should be sampled from the proposed supplier's gravel pit prior to the start of the operation and tested for gradation, wear, and organic matter. After the start of the subbase placement operation, the pit must be observed for any change in the material—a common occurrence in Vermont gravel pits. Acceptance samples should be taken and tested periodically by project personnel according to the frequency established in the Materials Sampling Manual.

If the subbase material is created by crushing larger-sized aggregate, samples may be taken directly from the final belt of the crusher system at the time of crushing or taken from the crusher's stockpile, based on the sampling requirements specified in the Materials Sampling Manual. The sand that will be used as the subbase sand cushion and filler should also be sampled and tested for compliance with specifications.

4-301.50 Construction and Inspection

Prior to the start of subbase placement operations, the subgrade must be checked for proper grade and hardness as described under *Subsection 203.12 Subgrade* of the Standard Specification for Construction.

During the spreading of the subbase gravel, the Inspector should verify that the gravel remains approximately constant in gradation and is placed in lifts of the proper depth. Occasional large stones having dimensions exceeding ⅔ of the depth of the lift being placed will need to be removed by hand. Gravel may be spread on the subgrade or the previous lift of gravel with either an approved spreader box or it can be dumped in piles and spread out until it has been completely removed from the area where it was first deposited.

The subbase gravel should be compacted by steel wheel vibratory rollers, pneumatic tire rollers, or other mechanical means. Sprinkling gravel with water during the compaction process and again when compaction is just about complete will yield improved results. Material testing requirements are two-fold, pending the quantity of material to be placed as part of the contract. Refer to *Subsection 301.06 Compaction* of the Standard Specifications of Construction for specific material testing requirements. Field density testing to confirm theoretical compaction requirements should be performed by the Regional Soils Technician.

Once the subbase gravel is spread, a power grader should be used to bring the surface to the design grade. Using finely graded gravel for the final two or three inches of the last lift will aid in final grading, but this procedure will be the Contractor's option. This fine gravel, if used, must still meet gradation specification.

The gravel grade should be checked by the Resident Engineer using a string line and a ruler. The method normally used when the roadway is in a full bank section is to stretch a string an even 300 mm (12 in) above the desired gravel grade at each stake. When plans indicate a parabolic section, the appropriate finish grade elevation, as marked on stakes at each station, should be used. The string is stretched between these marks resulting in a leveled line; the Inspector then calculates the proper measurement from this string to the top of gravel elevation for each offset from the centerline to be checked, including the centerline itself, the quarter-point, the edge of pavement, and the shoulder point.

A tolerance of 25 mm (1 in) above or below the designed grade is desirable provided that this 25 mm (1 in) variation is not maintained for a distance of greater than 15 m (50 ft) and that the required crown is maintained over the road surface.

Grade checks should be made by VTrans personnel with a representative of the Contractor present so that any conditions that require correction are known to both parties. A string check should be made at 20 m (50 ft) intervals along the stationing of the road, but the areas between the 20 m (50 ft) stations should also be visually checked for obvious sags or bumps. After the above checks, any centerline stakes should be pulled, the road given a final honing by the grader, and the road driven with a test vehicle at design highway speed to further check the riding quality, with corrections being made as necessary.

The dense graded crushed stone should be spread by means of a mechanical stone spreader or bulldozer. The loose depth required will have to be determined by experience or trial and error. The stone should be rolled by a roller weighing not less than 9 metric tons (10 tons), or by other methods as approved by the Resident Engineer, but the stone should not be subject to crushing by the roller.

If the surface of dense graded crushed stone is not more than 25 mm (1 in) below true grade, it may be brought to grade by the addition of approved filler material. If the stone is more than 25 mm (1 in) below grade it must be built up by adding stone, either by use of the stone described under Item 301.35 Subbase of Dense Graded Crushed Stone or by a finer gradation of stone described under Item 303.25 Subbase of Crushed Gravel, Coarse Graded. In any case, provision should be made for the use of some filler material as a truing course, because it is virtually impossible to grade the stone to a good riding surface. The surface of the truing course should be string checked and tested for riding quality by driving at design speed prior to the giving of approval to proceed with the following course.

When it is necessary to allow traffic on a completed layer of stone before further work can be done, it usually results in considerable raveling of the stone. Before laying the subbase recommences, the surface should be graded and the loose stone relocated off to one side before proceeding with the next lift or truing course.

4-301.60 Measurement and Documentation

The cost of filler material should be included in the bid price of the Item requiring it. The volume of items to be paid is the in-place, compacted volume as computed from the project typical sections for the roadway and as computed from field measurements for non-typical drives, intersections, or other irregular shapes.

A grading check should be performed to verify that the subbase material conforms to the typical section and noted in the field book as shown in *Section V Sample Field Book*. Field dimensions taken from irregular areas should be entered in Field Book #7. All measurements and computations should be dated and initialed by the person performing the work.

4-310 RECLAIMED STABILIZED BASE (RSB)

4-310.10 General

► Reference: *Section 310 Reclaimed Stabilized Base* of the Standard Specifications for Construction

Reclaimed Stabilized Base (RSB) refers to a class of paving materials that are mixtures of one or more sources of aggregate and cementitious material(s) blended with a sufficient amount of water, that result in a mixture having a moist, non-plastic consistency that can be compacted to form a dense mass and gain strength.

The process of road reclamation that involves RSB material is commonly referred to as "Bomaging." The term "Bomaging" comes from BOMAG, a German manufacturing company that produces soil, asphalt and refuse compaction equipment as well as stabilizers and recyclers. Highway engineers from BOMAG pioneered modern compaction technology in the 1950s and 1960s. The "Bomaging" process involves passing over an existing paved surface with Milling and Asphalt Recycling machines that pulverize the pavement along with the underlying base course material to a specified width and depth. This pulverized mix is further processed to produce RSB.

Payment for work under Item 310.20 Reclaimed Stabilized Base includes the addition of material, grading, shaping, and compacting in place to serve as a new stable homogeneous base material which should receive a new pavement structure.

4-310.20 Required Submittals

None.

4-310.30 Engineering

The layout and survey work required for RSB projects need not be as precise as when constructing a new roadway alignment. The Contractor should employ a station and offset method to reestablish the existing roadway centerline post-reclamation. Virgin material, or more commonly, a 50/50 blend of virgin and Recycled Asphalt Pavement (RAP) should be used to correct any horizontal deficiencies.

4-310.40 Sampling and Testing

Process control and quality control testing should be performed by the Contractor with results supplied to the Resident Engineer as per *Subsection 310.05 Testing* of the Standard Specifications for Construction. The Regional Soils Technician should be responsible for acceptance testing of RSB materials.

4-310.50 Construction and Inspection

The actual pavement thickness and associated required RSB depth may vary greatly throughout the length of the project. The guidance found in *Subsection 310.09 Method of Measurement* requires that additional compensation is due the Contractor should certain additional depth be required beyond that specified in the contract.

The RSB pulverizer must penetrate fully through the pavement layers and into the subbase material, but excessive additional depth beyond the specified design depth is unacceptable practice. A good rule of thumb is that with a thin AC pavement layer, the AC depth plus 50% or, with a thick AC pavement layer, the AC depth plus 25 to 50 mm (1 to 2 in) is sufficient. Road reclamation equipment varies in what depth is achievable, but equipment is readily available that will penetrate a full 450 mm (18 in).

As with all unconfined and confined materials, proper shaping, grading and compaction are necessary to yield a roadway surface that performs per specifications. Refer to *Section 310.07 Shaping and Compaction* for more information regarding the proper execution of this important work.

A foot roller should be used to compact the in-place RSB to its specified density. The use of vibratory steel wheel rollers is not sufficient. Surface watering should be used to aid compaction operations as outlined in *Section 310.05 Testing*. Additionally, the grading and compaction process should produce a grade tolerance no greater than 10 mm (⅝ in) provided that this deviation is not maintained for a distance greater than 15 m (50 ft).

The reestablishment of super elevation is generally included within the scope of RSB projects. The AASHTO “Green Book” values for super elevation detailed in the contact plans cannot be constructed in the field; typically, this is due to existing site constraints. Features such as intersecting roadways and drives may also prohibit the designed super elevation from being constructed in the field.

VTrans personnel and the Contractor should work together to produce the proper strategy for the roadway reclamation project prior to the grading, shaping, and compacting operations. The Contractor should have a bituminous mix design in place prior to commencement of the reclamation process and begin construction of the newly designed overlay as soon as is practicable.

The nuisance of dust and damage to the reclaimed surface due to traffic and/or rain events can become an issue should the newly reclaimed surface be left open for extended periods of time. Water is commonly used as a dust controlling agent and is not paid for separately. Dust can become an issue in the field, particularly over weekend periods should the surface be unprotected and open to traffic. Coordination of the completion of the reclamation process, constructing the designed overlay, and implementing dust control are critical to ensure a smooth operation.

Stabilizing agents and dust control measures other than water may be specified in the contract documents. This may alleviate the dust problem, but can also result in another set of issues. For example, a contract may specify portland cement be used as a stabilizing agent and that an emulsion be used as a dust control measure. This addition of cement as a stabilizer shortens the time that the newly reclaimed material may be graded, shaped, and compacted before setting up. Additionally, the use of an emulsion as a dust controlling agent instead of water results in different traffic control requirements.

4-310.60 Measurement and Documentation

The work performed under Item 310.20 Reclaimed Stabilized Base is paid by the area of in-place, pulverized, graded, shaped, and compacted RSB as computed from field measurements of the roadway length and width reclaimed. No allowance should be made for overlapping passes of the reclamation equipment. Any items added to correct geometric deficiencies are paid by the unit used and as provided in the contract documents. Any water used during the entire reclamation process, up to and including dust control, will not be paid for separately but rather considered incidental to the reclamation item.

4-400 SURFACE COURSES AND PAVEMENT

4-401 AGGREGATE SURFACE COURSE

4-401.10 General

► Reference: *Section 401 Aggregate Surface Course* of the Standard Specifications for Construction

Materials specified for work done under Item 401.10 Aggregate Surface Course should be bank-run gravel, crushed gravel, or crushed stone, and may be used to construct town or frontage roads.

4-401.20 Required Submittal

None.

4-401.30 Engineering

A roadway centerline and graded stakes will be the references for application of the aggregate surface course.

4-401.40 Sampling and Testing

The proposed source of gravel for the aggregate surface course should be sampled prior to the start of the operation and tested for gradation, wear, and organic matter. After the start of the placement operation, the pit must be observed for changes in the material—a common occurrence in Vermont gravel pits. Acceptance samples should be taken and tested periodically by project personnel according to the frequency established in the Materials Sampling Manual. If crushed material is used instead, samples should be taken directly from the roadway.

4-401.50 Construction and Inspection

Prior to the start of aggregate surface course placement operations, the subgrade should be checked for proper grade and hardness, as described under *Subsection 203.12 Subgrade*. During the spreading of the aggregate surface course material, the Inspector should verify that the gravel remains approximately constant in gradation and is placed in lifts of the proper depth.

The gravel should be compacted by steel wheel vibratory or pneumatic tire rollers. The gravel should be sprinkled with water during the compaction process and again when the compaction is just about complete; this will yield improved compaction results. Refer to *Section 4-301 Subbase* for the method to follow for checking the final grade.

4-401.60 Measurement and Documentation

The work performed under Item 401.10 Aggregate Surface Course is paid by the in-place, compacted volume as computed from the project typical sections for the roadway and as computed from field measurements for non-typical driveways, intersections, or other irregular shapes. A grading check should be performed to verify that the aggregate surface course material conforms to the typical section and noted in the field book as shown in *Section V Sample Field Book*. Field dimensions taken from irregular areas should be entered in Field Book #7. All measurements and computations should be dated and initialed by the person performing the work.

4-402 AGGREGATE SHOULDERS

4-402.10 General

► Reference: *Section 402 Aggregate Shoulders* of the Standard Specifications for Construction

The shoulders of any roadway serve as a safety area for traffic and a parking area for disabled vehicles. Normally the subbase under the shoulders is of the same material as the roadway and only the base and surfacing are different. The shoulders should be well compacted and carefully constructed in order to provide a durable and traversable surface.

4-402.20 Required Submittals

None.

4-402.30 Engineering

The location and width of the shoulder are determined by measurement from the surveyed roadway centerline, from the edge of the surface course, or from construction stakes, if they are still standing and intact at the time of the shoulder construction. Grades may be based on the surface course and no additional elevations need be given. The slope of the shoulder is shown on the typical sections for the project.

4-402.40 Sampling and Testing

Preliminary samples of the material to be used should be taken and tested well ahead of the intended time of use. Sampling should continue during the construction of the shoulders and because the shoulder material is applied rapidly, a visual check on the material should be maintained to detect any changes in gradation.

4-402.50 Construction and Inspection

Shoulder material is usually spread by trucks or a stone box and brought to the proper elevation by a grader or a stone box. The material is then compacted by a roller and usually must be sprinkled with water to obtain good compaction. Care must be taken that damage is not done to the new pavement when spreading and compacting shoulder material.

While actual density of the shoulder material may not be determined, proper compaction can be checked by scraping the material with a boot heel; this should result in little or no displacement of the material. Good compaction is especially important for any shoulder which is to receive some type of surface treatment. The subbase course should be checked for proper grade and cross-section prior to the placement of the shoulder material.

The finished shoulder should be checked for proper width and cross-section. A carpenter's level mounted on a board of length equal to the width of the shoulder and tapered to the required slope of the shoulder is useful in checking the slope of the compacted shoulder. A digital "Smart Level" may also be employed to indicate the actual slope of the surface on which it is placed.

Gravel shoulders should be graded in accordance with the typical section. Drainage issues should be addressed in the shoulder design. Conditions in which water could run along the edge of pavement or along berms in front of the guardrail, causing damage to the project, should be avoided.

4-402.60 Measurement and Documentation

Work performed under Item 401.10 Aggregate Shoulders, In-Place and Item 401.10 Aggregate Shoulders, Truck Measurement is paid by the volume of aggregate shoulder material in cubic meters (cubic yards) placed based on the computed cross-sectional area for the various normal banked and guardrail sections as shown on the typical sections for the project and on the horizontal station distances. Two additional Items cover the placement of aggregate shoulders by the metric ton (ton).

There are three methods by which the volume of material used for aggregate shoulders is measured, as follows:

1. **In-Place Measurement**: The quantity of shoulder material determined by in-place measurement is based on the plan values of the three-dimensional volume of material furnished and compacted in place.
2. **Truck Measurement**: The quantity of shoulder material determined by truck measurement is based on determining the bed capacity by cubic meter (thousand gallons) of water of each truck involved in the delivery of material to the project. Notation of each truck's capacity should be made, with this information included on the load ticket accompanying each delivery. Total in-place volume is calculated by dividing the delivered volume of material by a factor of 1.15.
3. **Metric Ton (Ton) Measurement**: The quantity of shoulder material determined by metric ton (ton) measurement is based on the total weight of material furnished and compacted in place determined from the load tickets.

Documentation will consist of notations of field checks for conformity with the typical sections. If the contract specifies payment by the metric ton (ton) or by the cubic meter (cubic yard) measured in the truck, care should be taken to ensure that no unnecessary material is used and that no material is wasted. When this method of measurement is specified, the Inspector should collect either weight tickets or load count slips to document the material volumes.

4-404 SURFACE TREATMENT MATERIALS

4-404.10 General

► Reference: *Section 404 Surface Treatment Materials* of the Standard Specifications for Construction

Work performed under Item 404.45 Tar Emulsion (by Liter or Gallon) and Item 404.46 Tar Emulsion (by Kilogram or CWT) involves furnishing and applying bituminous treatment when specified for an approved surface.

Work performed under Item 404.65 Emulsified Asphalt involves furnishing and applying emulsified asphalt between existing and new pavement, between lifts of new pavement, on all cold planed surfaces, and to coat drop inlets prior to placing pavement adjacent to them.

4-404.20 Required Submittals

None.

4-404.30 Engineering

The only engineering required for surface treatment materials is to provide the Contractor with a method of marking the limits of the sealing or tacking work. This should be accomplished by the use of a surveyed centerline or from previously established offset or working stakes, if these stakes are in good condition at the time of the treatment work.

4-404.40 Sampling and Testing

Surface treatment materials may include sand, pea stone, or grits. Samples should be taken before and during the time of their use and sent to the laboratory for tests required by the respective material specifications. These samples should be taken well in advance of the surface treatment application to allow the Contractor to make necessary corrections if any samples should fail.

All bituminous material delivered to the project for surface treatment should be certified by the supplier before it is applied. The Resident Engineer should also take a sample to be sent to the Berlin Materials Section. Emulsions should be thoroughly mixed prior to sampling to ensure representative samples. Certification provided by the supplier for each load should denote the type of material and the total weight. The Resident Engineer should receive two copies of this certification, retain one for project records, and forward the other with the field sample to the Materials Section.

All bituminous material delivered to hot mix plants should be treated in the same manner, except that laboratory personnel assigned to the plant should be responsible for collecting the samples and forwarding the certifications. The field copies of the certification should be passed on to the Resident Engineer upon completion of the paving. However, this does not relieve the Resident Engineer of responsibility for the overall surface treatment materials work.

4-404.50 Construction and Inspection

The road surface to be treated should be well graded and well compacted, as this will determine the riding qualities of the highway. The choice of surface treatment material depends on the condition and hardness of material to be tacked, the time of year, and anticipated weather conditions during the application.

The quantity of asphalt to be used, within the limits indicated in the specifications, is dependent on the surface to be treated, the type of bituminous material, the prevailing weather conditions, and the gradation of the pea stone or grits to be used. For good durability, the maximum application allowed by specifications should be used as long as this does not cause "fat" spots on the surface. Some trial and error is usually required to arrive at the proper amount.

The application rates given in the specifications are based on volume at an ambient temperature of 16˚C (60˚F), so a hot application rate will be somewhat higher than the actual rate. The temperature of the bituminous material should be in compliance with *Section 702.06 Application Temperatures* of the Standard Specifications for Construction. During the application of the bituminous material, the area covered by each load or partial load should be determined to calculate the actual application rate for comparison with the application rate specified.

Before the application of bituminous material should be authorized to start, trucks loaded with the required aggregate should be standing by at the designated starting point. Spreaders and rollers likewise should be in operating condition and ready to go, and provisions made for maintenance of traffic during these operations.

4-404.60 Measurement and Documentation

The only material paid for under surface treatment Items is bituminous material. When specifying the measurement of bituminous material volumes by weight under Item 404.46 Tar Emulsion (by Kilogram or CWT), the necessity for converting to the number of gallons at 16˚C (60˚F) is eliminated. The Contractor's delivery invoice should show the total weight of material delivered, the project name and number, and load seal number. The Inspector should initial and date each invoice and file them with the project records for documentation.

The amount of surface treatment material actually used should be accurately documented. If only part of a load of bituminous material is used, with the remainder going to another project or back to the loading point, the remaining portion of the load should be weighed locally if scales are available, and a valid weight slip obtained.

If no local scales are available to weigh the partial load, the load should be returned to the loading point and re-weighed with a request for a credit slip. The amount of unused material should be determined at the loading point and the Contractor sent copies of the credit slip. This credit slip should be filed with the original delivery slip in the project records for documentation.

4-406 BITUMINOUS CONCRETE PAVEMENT and 4-490 SUPERPAVE BITUMINOUS CONCRETE PAVEMENT

4-406.10 General

► References: *Section 406 Marshall Bituminous Concrete Pavement* and *Section 490 Superpave Bituminous Concrete Pavement* of the Standard Specifications for Construction

Two types of concrete bituminous pavement, Marshall Mix and Superpave Mix, are covered in this section.

Marshall Mix

The Marshall mix design method for bituminous concrete pavement was originally developed by Bruce Marshall of the Mississippi Highway Department in 1939. Currently used in 38 states, the Marshall mix design method is based upon the proper selection of the asphalt binder content at a desired density that satisfies minimum stability and a range of flow values.

Work that is conducted for Item 406.25 Bituminous Concrete Pavement and Item 406.27 Medium Duty Bituminous Concrete Pavement involves paving materials that are still used on some VTrans projects. Bituminous concrete pavement may be applied either as a single course pavement or in multiple lifts as a base course, a binder course, a leveling course, and a wearing course.

Bituminous concrete is also used to construct gutters and traffic islands for Item 616.47 Bituminous Concrete Gutters and Traffic Islands and to construct curbing for Item 616.30 Bituminous Concrete Curb, Type A and Item 616.31 Bituminous Concrete Curb, Type B.

There are five aggregate gradations that may be used in a bituminous concrete pavement mixture as follows:

- **Type I:** 25 mm (1 in) nominal maximum aggregate size
- **Type II:** 19 mm (¾ in) nominal maximum aggregate size
- **Type III:** 12 mm (½ in) nominal maximum aggregate size
- **Type IV:** 9 mm (⅜ in) nominal maximum aggregate size
- **Type V:** 9 mm (⅜ in) nominal maximum aggregate size

The type of bituminous mixture required is designated on the plans or typical sections. Materials that are regulated under Item 406.25 Bituminous Concrete Pavement and Item 406.27 Medium Duty Bituminous Concrete Pavement are typically specified with Performance Graded (PG) asphalt cements as discussed below.

Superpave Bituminous Concrete Pavement

Superpave (SUperior PERforming PAVEments) Bituminous Concrete Pavement is the newest method of mix design practice and associated testing program specifically based on addressing traffic loading and environmental conditions. Superpave bituminous concrete pavement was developed by the Strategic Highway Research Program (SHRP), which was established by Congress in 1987 as a research program dedicated to improve the performance and durability of roads in the United States. The Superpave system incorporates performance-based Liquid Asphalt with higher quality aggregate combinations to improve performance by controlling rutting, low temperature cracking, and fatigue cracking.

Work that is conducted under Item 490.30 Superpave Bituminous Concrete Pavement involves paving material that is currently used on most current VTrans projects. Superpave bituminous concrete pavement may be applied either as a single course pavement or in multiple lifts as a base course, a binder course, a leveling course, and a wearing course.

There are six aggregate gradations that may be used in a Superpave bituminous concrete pavement mixture as follows:

- **Type MS**: 37.5 mm (1 ½ in) nominal maximum aggregate size
- **Type IS**: 25.0 mm (1 in) nominal maximum aggregate size
- **Type IIS**: 19.0 mm (¾ in) nominal maximum aggregate size
- **Type IIIS**: 12.5 mm (½ in) nominal maximum aggregate size
- **Type IVS**: 9.5 mm (⅜ in) nominal maximum aggregate size
- **Type VS**: 4.75 mm ($^{3}/_{16}$ in) nominal maximum aggregate size

The aggregate type required for the project should be designated on the plans or typical sections.

The grade of asphalt cement used to produce Superpave Bituminous Concrete Pavement and Marshall Mixes is designated as Performance Graded (PG) with two designed temperature criteria. One example is PG 64-28 where 64°C (147°F) is the high temperature limit (to protect against premature rutting) and –28°C (–18°F) is the low temperature limit (to protect against premature thermal cracking).

Performance Graded asphalt should be as detailed on the plans and specifications as per *Section 702.02 Performance-Graded Asphalt Binder (Prepared from Petroleum)* of the Standard Specifications for Construction.

4-406.20 Required Submittals

For submittal of bituminous concrete mix designs to the Bituminous Concrete Section of the Materials Testing Laboratory, a minimum of three weeks should be allowed for testing, evaluation, and approval of a Superpave mix design per *Subsection 490.03(c) Mix Design* and a maximum of ten working days for a Marshall mix design per *Subsection 406.03(c) Mix Design*. Once a mix design is approved, it is valid until a change is made in aggregate source, asphalt grade, or asphalt source. It is allowable to list three different suppliers of liquid asphalt on the approved mix designs.

If a proposed change is made in asphalt suppliers to one of the alternate suppliers listed on the mix design, at least a 24-hour notice should be given by the Contractor to the Materials laboratory and a new cover sheet of the design submitted for the project records. If a change is made in the asphalt supplier to one that is not listed on the approved mix design list, a new mix design cover sheet should be submitted to the Materials Laboratory and at least one of the three liquids originally identified on the cover sheet should be removed and replaced with the liquid proposed for use. Approval of the new mix depends on whether or not the asphalt binder itself has been certified, tested, and approved.

If a change is made in the aggregate source, a new mix design needs to be submitted to the Materials Testing Laboratory and a minimum three week evaluation period allowed prior to resuming production. If a change is made in asphalt grade or asphalt source, a new asphalt binder selection evaluation should be submitted and a minimum three week evaluation period allowed prior to resuming production. Mix designs are normally submitted directly by the Contractor to the Materials Section and approval rendered by that unit with notification to the Resident Engineer.

Mix designs are typically project-specific and they may be carried over for one construction season pending certain conditions. Alternately, a Contractor may submit a

plant-specific "master" mix design whereby a request, or submission, to use the master on any particular project will consist of a cover sheet and *Letter of Intent* and the first signed design cover sheet of the specific design. Master mix designs may be used on multiple projects throughout the season.

4-406.30 Engineering

The roadway centerline (or some other appropriate reference line) should be established prior to the start of any paving operations. This is done by running the line by transit or by establishing the centerline from offset stakes, if an accurate set of stakes is available. The roadway should be stationed from town line mile markers or other tie points that are indicated on the project plans through the use of a survey, a Distance Measuring Instrument (DMI), or by physically walking the entire project with a wheel and tying the stationing on the wheel with the plans throughout the project at locations such as side roads, where accurate stations will be found.

Vertical curves, sight distances, transitions, and super elevation areas depend on the accuracy of the stationing in order to be located properly according to the plan designs. The line for the top course should be established by transit, if at all possible. The survey may also be done from traverse points using total stations. Tie sheets, included with project plan sets, should be used to facilitate project staking.

An inventory of all ditching that may be required per the plans prior to starting any paving operations should also be made. All existing drainage structures throughout the project that may require work such as pipe extensions, new drop inlets (DI), etc., should be properly indicated. Some pipes may have to be extended and new DIs may be required due to the roadway being widened in various locations as part of a redesign. The ditching and the drainage configuration are a combined system and should be treated as such.

An inventory should be taken for the existing and the new guardrail runs on the entire project. New guardrail installations may also require stone fill along the shoulders to stabilize areas where the roadway is to be widened. The Resident Engineer should verify the stationing and inventory all existing guardrail runs that are to be removed and verify and field stake the stationing for the new guardrail runs as detailed on the project plans.

The Project Manager should be consulted to clarify any questionable intent of the project plans prior to the commencement of any ditching, pipe extensions, guardrail runs, or related construction activities.

4-406.40 Sampling and Testing

Bituminous concrete pavement is normally sampled and tested at the producer's bituminous concrete plant by personnel of the Bituminous Concrete Section of the Materials Laboratory. The test results should be made known to the Resident Engineer by phone, pager, or text (or any other immediate form of communication) as soon as tests are completed.

Select projects operate under Quality Assurance (QA) provisions rather than traditional "method spec" provisions. "Method spec" provisions imply that the bituminous concrete production may continue until such time that two consecutive tests at the plant fail in any aspect and thus require adjustments at the plant and a trial drop conducted before full production may resume.

The qualifying event to elevate a project to QA provisions is typically based on the tonnage of mix type to be placed on the project and is accompanied in the contract by the applicable pay adjustment item. Refer to *Subsection 490.03 (d, Control of Mixtures* for Superpave mix designs, *Subsection 406.03 (d) Control of Mixtures* for Marshall mix designs, and any project-specific Special Provisions to determine the required mix control and testing procedures to be followed.

When the Contractor is ready to begin producing the bituminous mixture for a particular project and providing the projected tonnage, the Bituminous Concrete Section of the Materials Laboratory should be notified at least 48 hours prior to the Contractor initiating this work. The Resident Engineer should confirm the Contractor's schedule to the Bituminous Concrete Section of the Materials Laboratory on Thursday the week prior to scheduled paving, with a follow-up confirmation communicated on Friday. Saturday or nighttime activities require a five working day notification to allow time for the lab to make arrangements for the plant inspection and quality control.

Project personnel should refer to the project's Special Provisions to determine exactly what testing provisions apply to each particular project. If it is not possible for the Bituminous Concrete Section of the Materials Laboratory, for whatever reason, to provide an Inspector at the plant, box samples should be taken on the project and a sample of the asphalt taken by the Contractor's plant technician in the company of the Resident Engineer or their authorized designee. The procedures for taking box samples and sampling the asphalt cement at the plant may be obtained from the Materials Section or the Construction Paving Engineer.

If requested by the Resident Engineer, a "Pre-pave Meeting" should be scheduled by the Construction Paving Engineer and the Resident Engineer prior to the commencement of any paving operations. These meetings are typically more technical in nature than

preconstruction conferences and often delve into the finer details of a project. The pre-pave meeting may be held at any time in advance of the project, but they are most effective when held a day or two ahead of the actual paving operations.

Attendees to the pre-pave meeting may include, but not be limited to, the following parties:

- The Resident Engineer
- Project Inspectors
- The Contractor's main office staff
- The Contractor's QC staff
- The Contractor's paving specialist
- The Project Superintendent and Foreman
- The paving crew
- The paving and rolling equipment operators

Others interested parties may be invited to the pre-pave meeting to suit the project as applicable.

The Contractor's personnel should be prepared to have production facilities inspected and approved, QA plans approved, and mix designs approved prior to the commencement of any paving operations. The Contractor may also be required, through the project's Special Provisions, to submit a list of their intended personnel, equipment, and methods that are intended to be used on the project. Any and all issues related to the paving operations should be considered at the pre-pave meeting, with the goal of addressing up front the expectations and intentions of all parties with respect to the execution of the project, which may also avoid later issues arising mid-construction.

During the paving operation itself, travel lane core samples should be extracted by an agent of the Contractor in the presence of the Resident Engineer or their authorized designee to determine the compacted depth and density. Refer to *Subsection 406.14(c) Coring Protocol* and *Subsection 490.14(c) Coring Protocol* for information about core sampling locations for both Marshall and Superpave Mix designs.

If necessary, shoulders should be core-sampled to verify that the compacted mix complies with the contract specifications. Generally, mix constructed on shoulders is

accepted through review and acceptance of the Contractor's means and methods. Within two working days of the bituminous mixture being placed, original core sampling locations should be selected by the Resident Engineer or their authorized designee.

The Resident Engineer should use a calculation spreadsheet, provided by Construction Headquarters, along with guidance from ASTM D 3665 *Standard Practice for Random Sampling of Construction Materials* to determine the random core locations. Refer to the *Mat Density Core Location Selection Sheet* (Appendix D-4) which may be found on the Field Forms CD or on the Construction Section's Z drive for more information.

The Contractor will be advised in writing of the selected core sampling locations. Upon notification of core sampling locations, the Contractor should complete the coring work within one working day in the presence of the Resident Engineer. The core samples should be submitted to the Resident Engineer on the same day the samples are taken in a suitable container featuring a flat, rigid, and debris-free bottom in which the entire core sample may be placed flat, rolled side down.

The sample core numbers, station or mile marker, and the offset should be noted and summarized on the *Bituminous Concrete Core Data Sheet* (Appendix D-5). Payment to the Contractor is dependent on the pay factors as determined by the results of the core samples and as specified by the contract specifications.

The Resident Engineer or their authorized designee should complete the paperwork, prepare the core samples for transport, and immediately inform the Bituminous Core Technician that the core samples are ready to be picked up and processed. This work is covered under *Subsection 406.14 Compaction* and *Subsection 490.14 Compaction* of the Standard Specifications for Construction for both Marshall and Superpave mix designs or as modified by any project-specific Special Provisions and should be accompanied by the applicable pay adjustment item.

The Resident Engineer should communicate frequently with and make visits to the Plant Inspector to maintain good coordination between the Plant Laboratory testing technician and VTrans construction field personnel.

Longitudinal joint compaction acceptance should be completed as outlined in the contract. The applicable specifications are *Subsection 406.15 Joints* and *Subsection*

490.15 Joints of the Standard Specifications for Construction for both Marshall and Superpave Mix designs, or as modified by any project-specific Special Provisions and is accompanied by the applicable pay adjustment item. The Resident Engineer should refer to the *Bituminous Pay Adjustments Calculation Sheet* (Appendix E-3), a calculation spreadsheet used in determining the value of the applicable adjustment Item. This form is available from Construction Headquarters and may be found on the Field Forms CD or on the Construction Section Z drive.

From one construction season to the next, specifications change, and this may affect the adjustment factors to be used. The Resident Engineer should verify that the correct spreadsheet is being used for their contract, and, when in doubt, consult with the Construction Paving Engineer**.**

After the paving has been completed on the entire project, the surface roughness of the wearing course is ready to be measured with a Road Surface Profiler (RSP) provided by VTrans. The RSP should meet the requirements for Class 1 performance set forth in ASTM E 950 Standard Test Method for Measuring the Longitudinal Profile of Travelled Surfaces with an Accelerometer Established Inertial Profiling Reference.

Refer to *Subsection 406.16 Surface Tolerance* and *Subsection 490.16 Surface Tolerance* of the Standard Specifications for Construction for both Marshall and Superpave mix designs or as modified by any project-specific Special Provisions to determine if the ride specification applies to any individual project accompanied by the applicable pay adjustment item. The Resident Engineer should contact the VTrans Pavement Management Unit to arrange for surface testing to be performed when the project is deemed to be substantially complete.

4-406.50 Construction and Inspection

Proper inspection of a bituminous concrete paving operation requires considerable experience, which is normally gained through working with a Resident Engineer with paving experience. The Principles of Construction of Hot Mix Asphalt Pavements and other manuals published by the Asphalt Institute thoroughly cover paving operations and provide excellent references for any paving inspector. Paving inspector certification may be obtained from attending the course that is given by the Northeast Transportation Technician Certification Program (NETTCP).

Paving inspection requires great attention to detail and a continuous check and re-check of all paving operations. The Inspector should be on the project well before the

Contractor starts in the morning each day to check the following areas of the paving operations:

- Inspect the joint at the old pavement surface that will receive the new pavement, the starting point of the day's operation
- Inspect the existing pavement surface for cleanliness
- Inspect the existing pavement surface for the need for any emulsion treatment, if required
- Inspect all paver equipment for precise adjustment and proper screed temperature
- Inspect all roller equipment for proper operating condition
- Verify that each additional piece of equipment has an operator available and is fully fueled, watered, and outfitted with the appropriate gear to complete its assigned task

The Resident Engineer or their authorized designee should keep a regular log of equipment that is involved with the paving operation, including the type of equipment with ID numbers, so that identification can be made of all equipment that is either used or is idle on the project on any given day.

Before adding any new paving materials to an existing pavement, an application of the specified emulsified asphalt should be applied to the following pavement features:

- Existing pavement surface
- Cold planed areas
- Between all lifts of pavement materials
- Existing pavement joints
- Existing curbs
- Existing manholes

The application of emulsified asphalt is covered by *Subsection 406.12 Conditioning of Existing Surface*, *Subsection 490.12 Conditioning of Existing Surface*, and *Subsection 702.04 Emulsified Asphalt* of the Standard Specifications For Construction. The proper emulsified asphalt application rates are typically indicated by a project-specific note on the project plans.

Ideally, all loads of paving mix delivered to the paver should be checked for proper temperature and mixture appearance. The first paving slip should be signed by the

Resident Engineer or their authorized designee and each slip throughout the day should be initialed and, if possible, marked with the temperature of each mix load.

All haul units delivering paving mix to the project should be equipped with tarps meeting the requirements of *Subsection 406.09 Hauling Equipment* and *Subsection 490.09 Hauling Equipment* of the Standard Specifications for Construction for both Marshall and Superpave mix designs. If any haul unit is discovered to have inadequate tarp coverage, general practice will allow the load in question to be incorporated into the project and the Contractor will be advised that the hauling units lacking sufficient load coverage will no longer be permitted on the project.

The appearance of the newly-laid pavement mat behind the paver should be continually observed, as this is a good indication of a proper mix and operation. If visible segregation or other defects are detected in the mat, the paving operation should be discontinued until the issue can be resolved. A proper paving operation is one that is "balanced" by way of having sufficient paving material available to the project while also having sufficient transport available to deliver the material such that the speed of the paving material application is continuous and consistent with a minimum of paver stoppages throughout the day.

Care should be taken at the beginning of each day in constructing and rolling the transverse joint to result in a straight seam with no discernable "bumps" at the new joint. This is typically accomplished through the use of "take off" blocks, or bituminous pads. These blocks or pads should be utilized in each day's startup when taking off from a cold joint to compensate for the "fluff" necessary such that the finished compacted mat on takeoff equals that thickness as designed and that as placed the subsequent day. Hot mix fluff is typically estimated at 6 mm (¼ in) per 25 mm (1 in) of finished thickness. For example, if the desired outcome is a 50 mm (2 in) thick compacted mat, the material should be laid at a loose thickness of 62 mm (2 ½ in) out of the paver.

A mat that starts off too thin may be corrected by starting over or by adding material. Adding material can only be accomplished when the initial material and the added material are at a temperature that can be successfully compacted. However, this technique may result in degradation of the pavement appearance, compaction parameters, and ride quality.

The proper rolling of the mat has a great deal to do with the compaction and ride qualities of the completed pavement surface. The rolling train should have an adequate number of rollers of the proper type and weight to allow for slow and steady movement to suitably compact the mix while it is still at its desirable temperature.

All mix designs have a specified temperature range for compaction that should be adhered to, but care should also be taken not to compact the pavement mix at temperatures which would cause shoving and/or cracking of the applied materials.

Proper paving material compaction is dependent on many factors, including, but not limited to, the following:

- The size and width of the paving equipment (roller weight, roller drum width, screed weight, screed width, etc.)
- The pavement thickness
- The mix type
- The asphalt binder type
- The specified mix temperature
- The ambient air temperature and humidity during the material application
- The ambient ground temperature during the material application
- The cloud cover during the material application
- Previous and forecast weather events

Throughout the paving operations, Contractors should employ testing (QC) personnel to check for proper compaction behind the pavers and to make any necessary adjustments to the rolling operation and equipment in order to obtain the best results. It is important to note that different mix types (I, II, Superpave vs. Marshall, etc.) exhibit different behaviors and characteristics while undergoing the compaction process. Attention paid to the different roller patterns, temperatures, asphalt binder types, and paving mix manufacturers used during the paving operations will greatly enhance the chances of achieving the desired results.

A leveling course consisting of a thin lift of Type III or Type IV material with a usual thickness of 12.5 mm (½ in) should be used to fill wheel ruts and other irregularities in the existing pavement surface. The Contractor should not use a steel drum roller to compact leveling courses as steel drum rollers tend to “bridge” over any existing wheel ruts resulting in the mix in the ruts remaining uncompacted.

The leveling course should be rolled with a pneumatic tire roller, outfitted with a skirt to reduce the possibility of the roller tires picking up the fresh mat, to compact the pavement in the wheel ruts. The attached skirt also assists in maintaining the proper temperature by blocking wind during the material application. The pneumatic rollers should be preheated by running the roller back and forth on a section of previously placed pavement prior to moving onto the freshly placed mat. Preheating reduces “picking” of the pavement surface by mechanical means.

The pneumatic tire roller may also be used as a breakdown roller, but if it causes excessive problems such as the picking, rutting, or marking of the mat, such that the intermediate and finish rollers cannot correct these defects, then that particular pneumatic tire roller may warrant being removed from the project.

The breakdown roller should be followed by a tandem roller to smooth out the rutting and other irregularities. The base, binder, and wearing courses should be compacted using a static or vibratory tandem roller for the breakdown roller, followed by an intermediate second and possibly third tandem static or vibratory roller. The intermediate roller may be eliminated in some cases if the breakdown roller can obtain the desired compaction and keep up with the paver.

To complete the paving train, a finish roller should be used when the mix has cooled to a temperature which will allow for the removal of all previous roller marks. This roller should be a static tandem, triple-axle, or vibratory roller. Very little if any additional compaction is achieved by the use of the finish roller, as its primary objective is to eliminate any roller marks left by the breakdown and intermediate rollers and generally smooth out the mat in order to achieve a satisfactory finished pavement surface for optimum ride quality.

In general, the different types of pavement rollers operate in the following ranges:

- Breakdown Rollers: 120°C to 150°C (250°F to 300°F)
- Intermediate Rollers: 80°C to 110°C (175°F to 225°F)
- Finish Rollers: 50°C to 80°C (125°F to 175°F)

The completed, compacted paving mat may be opened up to traffic when the mat has cooled to a temperature of 60°C (140°F), unless other project specific conditions warrant opening at a higher temperature. Caution should be exercised when opening traffic up to thicker mats as the internal retained temperature of these mats will be higher than the typical surface measured temperature and those of thinner lifts.

It is not the duty of VTrans personnel to “engineer” the compaction equipment and rolling patterns, particularly in the case of a contract containing “end result” or “I/D” specifications, but it certainly remains VTrans’ responsibility to be aware of and discuss with paving contractor personnel any obvious deficiencies in the paving train.

As the paving project progresses, continual checks should be made to determine the theoretical tonnage of the applied paving materials. Checking the loose depth behind the paver may give an indication of what the compacted depth will be, but due to base irregularities, voids in the surface of the base stone, and other minor factors, a mathematical check on the tonnage should be used to verify that the proper depth is being maintained during the application and planned paving material quantities closely match the amounts in the actual application.

The definitive measure of paving material depth should be determined from core samples taken from the roadway as the paving project progresses, with the computed results correlated with the cores. In computing the theoretical tonnage required to cover a given area, the actual unit weight of the mix being produced should be obtained from the cores or plant personnel, if possible, and used in the computations.

The actual unit weight as obtained from core data is derived from the average bulk specific gravities (BSG) of the core samples. The maximum specific gravity of the material as obtained from the mixing plant is not used in calculating tonnage, but if the field bulk is not known, it could be reasonably estimated by taking 94% to 95% of the maximum.

The bulk specific gravity of an asphalt mixture is defined as the ratio of the mass of a given volume of material at a temperature of 25°C (77°F) to the mass of an equal volume of water at the same temperature. Proper measurements of the bulk specific gravity of compacted hot-mix asphalt (HMA) samples are essential to HMA mix design, field control, and construction acceptance.

The unit weight (sometimes referred to as specific weight) of the paving material (γ_{PM}) can be calculated by the following formula:

$$\gamma_{PM} = (BSG)\ (62.4\ lbs/CF)\ (27\ CF/CY)\ /\ (2000\ lbs/ton) = tons/CY$$

The theoretical tonnage (T_T) of paving materials placed can be calculated by:

$T_T = ((D_M/12)(L_M)(W_M) / (27\ CF/CY))\ (\gamma_{PM})$,

where,

D_M = Design depth of paving mat (in),

L_M = Length of paving mat placed (ft),

and

W_M = Width of paving mat placed (ft)

Example:

Calculate the unit weight of paving material (γ_{PM}) placed in a week's operation, using an average BSG value derived from the week's core samples of 2.478.

γ_{PM} = (BSG) (62.4 lbs/CF) (27 CF/CY) / (2000 lbs/ton)

γ_{PM} = (2.478) (1,684.8 lbs/CY) / (2000 lbs/ton)

γ_{PM} = 4,174.934 lbs/CY / (2000 lbs/ton)

γ_{PM} = 2.087 tons/CY

Therefore, **2.1** tons/CY is the unit weight of paving material in this example.

Note: Use a running average of calculated unit weights to check yields in the field.

Example:

Calculate the theoretical tonnage (T_T) of paving material placed for a length (L_M) of one mile, at a width (W_M) of 16 ft and a depth (D_M) of 1 ½ in, and a unit weight of 2.1 tons/CY.

$T_T = ((D_M/12)(L_M)(W_M) / (27\ CF/CY))\ (\gamma_{PM})$,

T_T = (1.5 in/12 in) (5,280 ft) (16 ft) / (27 CF/CY)) (2.1 tons/CY)

T_T = 10,560 CF / (27 CF/CY) (2.1 tons/CY)

T_T = 391.11 CY (2.1 tons/CY)

T_T = **821.33** tons

Therefore, 821.3 tons of paving material was placed in this example.

Note: Compare the theoretical tonnage values to delivery slip values to verify the calculations.

Note: Project design personnel typically use the calculated 2.1 tons/CY unit weight value for project quantity estimating purposes.

By comparing the calculated total tonnage value with the actual tonnage used for the area concerned as determined by the weigh slips, the Resident Engineer will be able to monitor the process. An ideal situation is to have the two values identical, but that is rarely the case. When the two values differ to any extent and it is verified that the correct (design) lift thickness is being constructed and the proper mat width is being laid, the Resident Engineer should investigate causes that explain major differences between the two values. This process of check and balance is referred to as "checking the yield."

The Resident Engineer should pay attention and note any significant finish grade changes that may be created from pavement widening, changes in super elevation, or for other reasons that may occur on the project that would affect driveways, adjacent businesses, or side roads. Gravel driveways and side road approaches on overlay projects should be constructed as designated on the plans. In most cases, the work should replicate the existing usable driveway openings and be graded with gravel or shoulder material for reasonable egress and ingress.

4-406.60 Measurement and Documentation

Paving materials are paid for by the ton, based on weight slips made out at the plant. These slips are given to the truck drivers who bring them to the project site. The Resident Engineer or their authorized designee will monitor these slips throughout the day as the Contractor's personnel collect them from haul vehicles. This will eliminate any possibility of slips becoming lost or of receiving slips from loads that did not actually reach the paver, as well as to verify that the Contractor is adhering to the legal load limits.

The Inspector should verify that the following items are listed on all weight slips:

- The date
- The project number
- The truck registration number
- The load weight
- The amount of "virgin" asphalt in the mix

The Resident Engineer or their authorized designee receiving the load will initial the weight slip. The first slip received each day by each Inspector should bear the full printed name and signature of the Inspector. The last slip received each day should be labeled "Last Load" by the Inspector when initialed.

If, for some reason, a load of mix is rejected either at the plant after weighing or on the road, the weight slip should still be picked up, initialed, and clearly marked "Void," showing the reason for rejection. This voided slip should be part of the plant's and the Contractor's records.

At the end of the day, the slips should be totaled, neatly bound, and placed in a manila envelope labeled with the project name and number, the date, the tonnage, and the locations where the mix was used. The entry in the spreadsheet should agree with the slip total each day and should show a breakdown between roadway, bridges, shoulders and sidelines, etc.

4-406.70 Weather and Seasonal Limitations

Bituminous material should not be applied between November 1 and May 1 without the written approval of the Resident Engineer. Furthermore, bituminous wearing course materials should not be applied before May 15 or after October 15 without the approval of the Construction Engineer.

The courses should not be placed when the ambient air and pavement temperatures at the paving site in the shade and away from artificial heat are below 5°C (40°F) for courses 35 mm (1¼ in) or greater in compacted thickness, or below 10°C (50°F) for courses less than 35 mm (1¼ in) in compacted thickness.

Bituminous material should not be placed on a wet or frozen surface or when weather or other conditions would prevent the proper handling, finishing, or compacting of the material, unless otherwise approved by the Resident Engineer.

4-415 COLD MIXED RECYCLED BITUMINOUS PAVEMENT (CIR)

4-415.10 General

As its name implies, Cold Mixed Recycled Bituminous Pavement (CIR) recycles a portion of the existing pavement, typically to a depth of 75 mm to 100 mm (3 in to 4 in), and lays it back upon the existing roadway to be used as a base for a designed overlay. Unlike the RSB treatment which must penetrate through the entire pavement structure, CIR is intended not to pulverize the existing material in its entirety but rather leave a portion in place, untouched, to be used as a structural base upon which to build.

The process can either take place entirely on the roadway in one process or alternately, material can be trucked off site to be manipulated, returned and subsequently replaced. The fully on-site or in-place method typically employs a recycling "train" of equipment which cold planes the existing material off of the roadway, remixes with any required aggregate and virgin liquid binder, and replaces it on the roadway with conventional paving equipment. The off-site method is essentially the same process but with the required remixing performed at an offsite portable facility and replaced on the roadway through conventional means.

4-415.20 Required Submittals

None.

4-415.30 Engineering

The layout and survey work required for CIR projects need not be as precise as when constructing a new roadway alignment. The Contractor should employ a station and offset method to reestablish the existing roadway centerline after the recycling of the existing roadway is completed.

4-415.40 Sampling and Testing

The Contractor should perform process control and quality control testing and submit the results to the Resident Engineer as per *Subsection 415.08 Control Section* of the Standard Specifications for Construction. This subsection prescribes the test control section to be constructed by the Contractor with Marshall mix design testing performed to determine the optimal amount of emulsified asphalt required for proper compaction.

4-415.50 Construction and Inspection

CIR is essentially a mix design method of construction, with the quality of construction dependent on the quality of the mix design and the available materials. Upon arriving at a mix design and the compaction target value, the process is the same as that for a paving-type project.

The Resident Engineer and the Contractor should meet to discuss all of the aspects of the CIR project well in advance of any work, including the timing of any sealant application to the pavement as well as the steps to take if traffic damages the newly laid CIR surface.

A CIR project uses a recycling train, a moving mixing facility with on-board automation to control and mix the components to be replaced upon the roadway. The Contractor and the Resident Engineer should monitor the consistency of the existing roadway materials being planed and the effect, if any, that any differences they may have on the finished recycled product. For example, severely oxidized sections may require more liquid than sections that have experienced recent shimming. The Resident Engineer should review trucking operations with the Contractor to ensure that freshly-laid paving materials are not disturbed by any vehicles.

The depth range of CIR materials as applied should be 75 mm to 100 mm (3 in to 4 in). A 75 mm (3 in) thick mat of CIR may be placed in a single pass, but the placement of 100 mm (4 in) thick mat of CIR should be done in two lifts of 50 mm (2 in) each, unless specified otherwise in the contract. Generally, a 100 mm (4 in) thick mat of CIR placed in a single lift tends to be unstable under subsequent roller operations, with the resulting rough finished surface unsuitable to meet specifications. Refer to *Subsection 415.06 Compaction* of the Standard Specifications for Construction for acceptable grade tolerances for the CIR project.

An emulsion may be added as a stabilizer to allow the CIR materials to gain strength, but the freshly-laid surface should be left open to allow any internal moisture to evaporate before further operations are undertaken. However, if cement or lime is added as a stabilizer to the CIR materials, the surface should be sealed to retain moisture within the mat to facilitate curing and strengthening.

4-415.60 Measurement and Documentation

The work covered under Item 415.20 Cold Mixed Recycled Bituminous Pavement to be paid is the in-place, compacted area as computed from field measurements of the roadway length and width that comprises the recycled area. No allowance will be made for overlapping passes of the recycling equipment. The work covered under Item 415.25 Emulsified Asphalt involves any emulsified asphalt that may be used to stabilize the mix (or other stabilizer as specified) and is paid by the unit used and as provided in the contract documents.

4-417 BITUMINOUS CRACK FILLING

4-417.10 General

The work covered under Item 417.10 Bituminous Crack Sealing involves sealing cracks in the existing bituminous concrete pavement with a hot poured joint sealer and is intended to help preserve the condition of overlay pavements.

4-417.20 Required Submittals

None.

4-417.30 Engineering

None.

4-417.40 Sampling and Testing

This item requires certification.

4-417.50 Construction and Inspection

While the Contractor is engaged in the process of sealing cracks, the Resident Engineer should ensure compliance with *Section 417 Bituminous Crack Sealing* of the Standard Specifications for Construction.

4-417.60 Measurement and Documentation

Bituminous crack sealant is measured and paid by weight, and is generally shipped and delivered to the project site in containers (blocks) on wrapped pallets. The Inspector should maintain a daily inventory of pallets, and the number of blocks on each. This pallet inventory should be checked at the start and at the end of each working day.

Each pallet should have an associated weight slip that should be provided to the Inspector when the pallet is opened. The Inspector should note the date and calculate the average block weight (the total pallet weight divided by the number of blocks on the pallet), adding both to the weight slip. The Inspector should also calculate the daily weight of bituminous crack sealant (the number of blocks used multiplied by the average block weight for the pallet) used from each pallet, entering this data on the daily work report and into the appropriate field book.

The volume of bituminous crack sealant in the melting kettle should be measured at the completion of the current day's activities and checked against the starting volume the following day. Any difference should result in subtracting the equivalent volume from the material presented upon opened pallets to date.

4-500 STRUCTURES

4-501 HPC STRUCTURAL CONCRETE

4-501.10 General

► Reference: *Section 501 HPC Structural Concrete* of the Standard Specifications for Construction

Work in this section involves furnishing, placing, and curing HPC (High Performance Portland Cement) Concrete for such important highway structures as bridges and retaining walls. The portland cement concrete should consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, water, admixtures, and pozzolans, and be proportioned and mixed according to *Subsection 501.03 Classification and Proportioning* of the Standard Specifications for Construction.

4-501.20 Required Submittals

The concrete supplier should submit a mix design directly to the Structural Concrete Engineer for each type of concrete produced from each plant. The mix design should be submitted and approved prior to any concrete being placed on the project. The Resident Engineer should confirm the mix design has been submitted and approved.

If required by the contract or ordered by the Resident Engineer, false work and form plans should be submitted by the contractor in conformance with *Subsection 501.03 Classification and Proportioning* of the Standard Specifications for Construction.

Prior to placing any structural concrete, the Resident Engineer and the Inspectors should be familiar with the approved concrete mix design, including the types of admixtures and how they may affect the concrete properties. Since admixtures are a very important component of high performance concrete, it is the responsibility of the Contractor to determine the correct quantity of approved admixtures to produce a concrete product that meets the contract requirements.

When a concrete deck is being placed, a qualified representative from the concrete producer should be on the project to determine, based on the current conditions, the final amount of admixtures to be added to the concrete mix to achieve the required properties.

4-501.30 Engineering

The Resident Engineer and the Inspectors should review and understand all of the provisions of the contract that pertain to the type and class of concrete that is being placed on the project.

The Structures section of VTrans typically provides beam profiles to the Resident Engineer for use in determining the theoretical screed elevations and haunch depths for concrete decks over the structural elements. The Resident Engineer must determine the elevation of the tops of the beams at the locations where the beam profiles are calculated. If the beam profiles result in less than the required haunch depths or other measured problems during the forming or the "dry-run", contact the Construction Structures Engineer or the Structures Section for help in addressing the issues. There may be an error in the beam profiles or the grade may have to be adjusted.

Prior to placing concrete, the Resident Engineer and the Inspectors should be familiar with the approved concrete mix design. This includes the types of admixtures and how they affect the concrete properties. Admixtures are a very important component of high performance concrete. It is the responsibility of the Contractor to determine the correct quantity of approved admixtures to obtain concrete that meets the contract requirements. When a concrete deck is being placed, a qualified representative from the concrete producer shall be on the project to determine the final dosage of the admixtures to achieve the required properties

4-501.40 Sampling and Testing

► References: *Subsection 501.06 Field Tests* of the Standard Specifications for Construction

The Resident Engineer should require at least a 24-hour notice of the Contractor's intent to place concrete, so that preparations can be made with the Materials Section for the proper inspection at the batch plant.

Before any work is done, the Resident Engineer should verify that all field sampling and testing equipment required by *Section 501.06 Field Tests* of the Standard Specifications for Construction and supplied by the Contractor is available, in good working condition, and properly calibrated. Testing technicians with a current American Concrete Institute (ACI) certification should perform the sampling and testing of the concrete. The Resident Engineer should ensure that sufficient staff is available to perform the necessary tests.

During the concrete placement, acceptance testing should be conducted in accordance with the Material Sampling Manual, the contract documents, and the appropriate ASTM test protocol.

The following tests may need to be performed:

- Determining whether or not the operator has added any water to the mix
- Noting the water gauge level
- Noting the time of batching
- Determining the total water volume batched and verify that the maximum water volume allowed on the batch slip has not been exceeded
- Conducting ASTM C 172 test: Standard Practice for Sampling Freshly Mixed Concrete
- Conducting ASTM C 1064 test: Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
- Conducting ASTM C 143 test: Standard Test Method for Slump of Hydraulic-Cement Concrete
- Conducting ASTM C 1611 test: Standard Test Method for Slump Flow of Self-Consolidating Concrete
- Conducting ASTM C 138 test: Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) for Concrete
- Conducting ASTM C 231 test: Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- Conducting ASTM C 173 test: Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- Conducting ASTM C 31 test: Standard Practice for Making and Curing Concrete Test Specimens in the Field
- Completing the "Concrete Batch Slip"
- Filling out the "Report on Concrete Test Beams or Cylinders"

The Resident Engineer is responsible for delivery of test specimens to the Materials Section at the appropriate time for testing.

4-501.50 Construction and Inspection

► References: *Subsection 501.09 Forms* and *Subsection 501.10 Placing Concrete* of the Standard Specifications for Construction

The location and dimensions of the concrete forms should be verified after they have been laid out and constructed by the Contractor. After the forming is complete, the dimensions and elevations should be checked for conformance with the contract. Prior to placing the concrete, the forms should be cleaned to remove any loose wood, tie wire, or trash. Excessive standing water or any flowing water should not be allowed in the formwork. The forms should be wetted just prior to the concrete pour to ensure that the forms do not pull any water out of the concrete.

The Structures Section typically provides beam profiles to the Resident Engineer for use in determining the theoretical screed elevations and haunch depths for concrete decks over the structural elements. The Resident Engineer should determine the elevation of the tops of the beams at the locations where the beam profiles are calculated. If the beam profiles result in less than the required haunch depths or other measured problems during the forming or the "dry-run," there may be an error in the beam profiles or the grade may have to be adjusted. In any case, these issues should be addressed by contacting either the Construction Structures Engineer or the Structures Section.

The location and dimensions of the concrete forms should be verified after they have been laid out and constructed by the Contractor. After the forming is complete, the primary dimensions and elevations should be checked for conformance with the contract. Prior to placing the concrete, the forms should be cleaned to remove any loose wood, tie wire, or trash. The forms should be wetted just prior to the concrete pour to ensure that the forms do not pull any water out of the concrete.

Reinforcing steel should be checked for the proper size bar, tying interval, spacing, and clear cover. Any nicks and cuts in the coating of the rebar should be repaired with a repair kit endorsed by the rebar manufacturer.

Concrete placement operations require close, even constant, inspection. Verify that the Contractor is employing an appropriate method of placing the concrete. Concrete should be placed in the forms in a manner that minimizes segregation, and at a point near its final location. Common placement methods include chutes, pumps, concrete buckets, tremies, and elephant trunks.

The concrete placement should be in accordance *Subsection 510.10 Placing Concrete* of the Standard Specifications for Construction. Concrete formwork should be continually monitored for any leaks, deformations, or movement. The reinforcing steel should be continually monitored for displacement, especially as the concrete is being poured and consolidated around it.

Monitor the finishing operations to ensure that the final finish of the concrete meets the project requirements. Caution should be taken not to overwork the concrete. The thickness of the concrete and the proper coverage of the reinforcing steel should be periodically monitored for conformity with the specifications during a deck placement.

The Resident Engineer should conduct a pre-placement meeting prior to any deck placement on the project. Required attendees should include, but not be limited to, the following parties:

- The Contractor's superintendent
- A representative of the concrete producer
- The Project Manager
- The Regional Construction Engineer
- The Structural Concrete Engineer or the Construction Structures Engineer

The purpose of the meeting is to discuss all aspects of how the deck will be placed and inspected. Refer to the *Deck Pre-placement Meeting Agenda* (Appendix D-6) and the *Bare Deck Pre-placement Meeting Agenda* (Appendix D-7) for more information.

Prior to deck placement, the Contractor should conduct a dry-run, demonstrating the set-up and operation of the screed machine that will be used to finish the concrete. The screed machine should be checked to ensure that the correct cross slope is achieved. The screed machine should than be operated over the entire limits of the deck placement while the grade, deck thickness, and concrete cover are measured for conformance with the contract requirements.

Measurements should be taken and recorded at every haunch shot as well as at intermediate points throughout the deck. In addition to the operation of the screed machine, smoothness, and the integrity of the screed rails should all be observed during the dry-run. Adjustments to the screed machine or screed rails should not be allowed once the dry run has successfully been performed.

The Contractor should next conduct a demonstration of the operation of the fogging equipment that will be used for the deck placement. Fogging, or fog spraying, over freshly placed concrete is effective in reducing the chances of plastic shrinkage cracking in mixes with low rates of bleeding. It can also make the difference between success and failure in controlling evaporation between placing and curing the concrete.

Accepted practice specifies pressure washer-type sprayers that operate at a minimum pressure of 2.1 kg/cm^2 (30 lbs/in^2) and are fitted with a fogging nozzle can be used in fogging operations. A clean source of water should be used, and the equipment monitored for proper operation throughout the application, especially for clogs in the water lines or the nozzle.

The fogging operation should be carefully monitored to maintain the optimum humidity level in the air directly above the concrete slab. Too much water falling directly on the slab itself will damage the surface. The fogging equipment should be capable of producing an atomized flow of fog over the full extent of the area to be worked. Enough equipment should be used to compensate for any environmental conditions.

The day before any concrete placement, the operating condition of the concrete vibrators that will be used for consolidation of the freshly-poured concrete on the project should be evaluated. The vibrator's head should be outfitted with a protective sleeve to prevent damage if it is to be used in direct proximity to any coated reinforcing steel.

When pouring decks, the curing of the concrete is very important. Curing is the process by which the concrete is protected from loss of moisture and kept within a required temperature range, with the result being a finished concrete product of increased strength and decreased permeability. Curing is also important in preventing cracks in the concrete, which severely impacts durability.

The specifications require that deck curing operations begin within ten minutes of finishing the surface with the application of either pre-wetted burlap or cotton mats. The pre-wetted burlap or cotton mats must contain adequate moisture prior to installation, which usually involves soaking overnight in a tank. Note that new burlap is coated with a preservative and therefore takes even longer to absorb water.

The proper application of pre-wetted burlap or cotton mats involves positioning them properly to cover the entire work area, securing them in place, and maintaining proper moisture and temperature levels for the proper amount of time as the concrete cures.

When concrete is to be placed in cold weather, the materials and equipment for protecting the concrete must be in place on the project and be acceptable to the Resident Engineer prior to placing the concrete. Concrete should not be directly placed on frozen ground or in frozen forms. The contractor should have adequate heating systems in place ensure that the forms are thawed before and during the pour. The contractor should present a plan describing what measures will be employed to protect the work.

Properly curing bridge decks in cold weather is important, particularly in maintaining a concrete temperature of at least 10°C (50°F). The Contractor should keep the deck continuously wet with water, warming the water as necessary with the proper equipment. Prior to allowing a deck to be poured in cold weather conditions, the project team should consult with VTrans subject matter experts and verify that all necessary precautions are being taken to protect the work.

Concrete placed and cured in cold weather is especially susceptible to the effects of deicing salts, and should be protected by applying an appropriate waterproofing agent. Refer to the waterproofing agent manufacturer's specifications and the Standard Specifications for Construction for information regarding proper surface conditions and minimum required air temperatures required for the application of waterproofing agents. All efforts should be made to meet these recommendations.

If certain conditions cannot be met for optimum waterproofing application during winter projects, the application should be made nonetheless. Another waterproofing application should then be made in the spring after thoroughly pressure-washing and drying the concrete surface.

Highway structures are intended to give many years of service and the Inspector's job is to see that proper procedures are followed at every step of the way. The Inspector has a direct effect on the usefulness and life of the structure. The Resident Engineer should have the final word on whether or not the concrete has been tested, placed, finished, and cured properly and conforms to the project specifications.

4-501.60 Measurement and Documentation

Working with high performance concrete is covered under the following Items:

- Item 501.32 Concrete, High Performance Class AA
- Item 501.33 Concrete, High Performance Class A
- Item 501.34 Concrete, High Performance Class B
- Item 501.35 Concrete, High Performance Class SCC
- Item 501.36 Concrete, High Performance Class LW

Payment shall be made based on the calculated volume as shown on the plans. Concrete can often times be a Final Pay Quantity, so the contract should be checked to determine the correct payment limits. Concrete batch tickets may not be used as a basis of payment.

Concrete batch slips should be retained as documentation of the acceptability of the concrete. The Inspector should sign the first slip of the day and initial subsequent slips, noting the delivery time, the amount of water added on project, test results, and strength test specimens made on each slip.

4-502 SHORING SUPERSTRUCTURES

4-502.10 General

► Reference: *Section 502 Shoring Superstructures* of the Standard Specifications for Construction

This work consists of furnishing the necessary shoring, vertically jacking any structure or bearing to position immediately above its present location, holding it in position during any construction process, lowering it to its supports, and removing all shoring and false work.

4-502.20 Required Submittals

The Contractor is responsible for the adequacy of the shoring system. The Contractor will prepare details and calculations of the required shoring and jacking. These details and design calculations must be stamped by a qualified Professional Engineer registered in the State of Vermont. The Contractor will provide the Resident Engineer with electronic copies of the design and details. Copies should be forwarded to the Structures Engineer for approval and to the Construction Structures Engineer for comment. No shoring work shall be allowed until the Structures Engineer has approved the shoring plan.

If the shoring requires any welding of structural steel, the necessary welding procedures shall be included in the submittal. If there are plans for the structure to continue to carry traffic while being shored, the shoring details should clearly demonstrate any required safety measures for the traveling public.

4-502.30 Engineering

The Resident Engineer should become familiar with and understand all of the details in the submitted shoring plan. The location and method of shoring must be as detailed in the approved shoring plan.

4-502.40 Sampling and Testing

No acceptance sampling or testing is required for shoring materials. However, the Resident Engineer should, as much as is practical, verify that the materials used in the shoring work match those specified in the design. If the shoring requires permanent alteration of structural members such as welding bearing stiffeners to beams, these materials should have the appropriate certifications.

4-502.50 Construction and Inspection

The Resident Engineer should be familiar with the contract and the submitted shoring details and design. The Resident Engineer will verify that the shoring is constructed according to the design with respect to such things as piling size, blocking, beam size and location, and welded or bolted connections. The response of structural members of the shoring as well as the structure should be monitored during the time that any structure is shored. Any indications of distress of the shoring shall be reported to the Contractor immediately.

Unless otherwise detailed in the shoring design, all shoring or structure shall be plumbed (vertical in both directions). Deviations from the approved shoring details are not permitted without revised details stamped from the Professional Engineer of Record.

The Resident Engineer will verify that any welding necessary for the shoring is completed by a welder certified in the welding procedure that is required. The Resident Engineer may consult the Structures Section for assistance with any proposed welding operations. Refer to the *VTrans Field Welding Manual* for more information regarding the field welding process.

The *VTrans Field Welding Manual* may be found at the following URL:

http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/structures/VTrans%20Field%20Welding%20Manual%20%28revision%201%29.pdf

Commonly used or salvaged steel may be used for temporary shoring after it has been carefully examined for loss of section due to corrosion, previous welding, and rivet or bolt holes. Structural members of questionable integrity, in the opinion of the Resident Engineer, shall be replaced prior to being incorporated into the work or specifically examined and approved by the Contractor's Professional Engineer of Record. The Construction Structures Engineer should be available to help assess structural members and assist the Resident Engineer in the decision to require examination and approval by the Contractor's Engineer.

Any timber that is to be incorporated into the shoring works should be examined for large shakes, checks, splits, or warps. Timbers containing such defects shall not be used at critical locations. Timber that has been damaged by previous use may no longer be capable of sustaining the original allowable stress. The Contractor's Engineer should be consulted for an approval of questionable timber where the Resident Engineer deems necessary.

Any field welding shall be carefully inspected for conformance with the design and specifications. Any field welds that will be permanently incorporated into the structure shall be done in accordance with *Subsection 506.10 (d) Field Welding* of the Standard Specifications for Construction.

4-502.60 Measurement and Documentation

The work performed under Item 502.10 Shoring Superstructure and Item 502.11 Shoring Superstructure Bearings shall be paid as lump-sum items per the contract documents, and includes the erection, maintenance, and removal of all shoring work and materials.

4-503 PREPARING SUBSURFACE FOR DRIVING PILING

4-503.10 General

Preparing the site's subsurface for driving piling involves the loosening the foundation materials that may be encountered in designated areas to permit the driving of piles. This work may involve shattering a steep underlying rock surface, by drilling and blasting, to prevent the tips of the piles from sliding down the sloping ledge.

This section is occasionally used when constructing integral abutment bridges. The work is pre-excavation of integral abutment piles. Pre-excavation of integral abutment piles usually consists of pre-excavating and backfilling the upper ten feet with a less dense material to facilitate thermal expansion of the bridge. Pre-excavation may also be used to core into the underlying rock to increase the embedment depth of the piles. Any required pre-excavation should be clearly defined in the Contract Plans or the Special Provisions.

4-503.20 Required Submittals

Generally, there are no submittals required for piling work. If the work requires blasting near existing structures or buildings, however, special provisions require the Contractor to make a digital video recording of all adjacent structures and interiors of existing buildings and submit a copy to the Resident Engineer. This video recording may be used to resolve disputes that may arise due to potential damage from the blasting activities. If the video recording requirement is part of the contract, no blasting will be allowed prior to the video recording being submitted.

4-503.30 Engineering

Items in this section are likely to have special provisions and plan notes associated with them. The Resident Engineer should have the Contractor explain the means and methods that will be employed to do the work. If drilling and blasting are required, the experience of the individuals who will do the work will be documented to the satisfaction of the Resident Engineer.

4-503.40 Sampling and Testing

None.

4-503.50 Construction and Inspection

When pre-excavating for integral abutment piles, the location of the pre-excavation will be verified by the Resident Engineer. The depth of the pre-excavation shall be verified to conform to the requirements of the contract.

4-503.60 Measurement and Documentation

Payment for work done under any of the 13 specific items for piling work is made by length of the particular type of piling per contract documents.

4-504 FURNISHING EQUIPMENT FOR DRIVING PILING

4-504.10 General

► Reference: *Subsection 504 Furnishing Equipment for Driving Piling* of the Standard Specifications for Construction

The work covered under Item 504.10 Furnishing Equipment for Driving Piling involves furnishing and mobilizing pile driving equipment that is capable of installing the specified piles within the required tolerances. This equipment includes fixed leads or bracing frames that may be required to align and restrain the pile to install it to the required batter and plan location.

The pile driving operation should be monitored with a saximeter, which is an instrument that registers all relevant pile driving parameters, including calculating the hammer operating rate in blows per minute and, for single-acting, open-end diesel hammers, the hammer potential energy and ram stroke. The Inspector will create a pile driving log based on the saximeter data which is used to verify that the pile is being driven properly, avoiding any pile damage that may occur from excessive stroke impact.

The Resident Engineer may omit the requirement to use a saximeter when temporary or permanent sheet piling is being installed. Refer to *Section 504 Furnishing Equipment for Driving Piling* Piles of the Standard Specifications for Construction for information about pile driving equipment and procedures.

4-504.20 Required Submittals

A minimum of 14 days before starting any pile driving work, the Contractor will complete and return to the Resident Engineer the *Pile and Driving Equipment Data Form* (Appendix D-8), with each pile hammer listed on a separate form along with relevant pile data. The Resident Engineer will submit copies of the *Pile and Driving Equipment Data Form* to the Geotechnical Engineer at the Materials Section and the Construction Structures Engineer.

4-504.30 Engineering

The Geotechnical Engineer will perform a "Wave Equation Analysis" to verify that proposed equipment has the capability of driving the pile and that the pile has the capacity to be installed with the proposed equipment. Wave equation analysis is a numerical method of analysis developed to describe the behavior of driven foundation piles. It predicts the pile capacity versus blow count relationship (bearing graph) and pile driving stress. The model mathematically represents the pile driving hammer and all its accessories (ram, cap, and cap block), as well as the pile, as a series of lumped masses and springs in a one-dimensional analysis. The soil response for each pile segment is modeled as viscoelastic-plastic. The method was first developed in the 1950s by E.A. Smith of the Raymond Pile Driving Company.

Once the wave equation analysis has been performed, the Geotechnical Engineer will inform the Resident Engineer of the results. Once the specific pile driving equipment has been approved, no changes will be permitted without revising the analysis. The size and type of pile driving equipment shall be approved by the Resident Engineer prior to being moved onto the project. The Contractor shall remove any unsatisfactory pile driving equipment from the site and replace it with satisfactory equipment when directed by the Resident Engineer.

4-504.40 Sampling and Testing

None.

4-504.50 Construction and Inspection

The Resident Engineer shall verify that the equipment that is proposed for use in the *Pile and Driving Equipment Data Form* is the equipment that is actually being used on the project. The diesel hammer fuel setting shall match its approved setting. The hammer cushion shall be inspected as outlined in the specifications and replaced as required. Inspection of the pile driving equipment shall take place prior to the installation of any piles, including test piles.

4-504.60 Measurement and Documentation

The work under Item *504.10 Furnishing Equipment for Driving Piling* is paid by lump sum per the contract documents.

4-505 PILING

4-505.10 General

► Reference: *Subsection 505 Piling* of the Standard Specifications for Construction

Steel H-piles, installed as end-bearing on rock, are the most common type of pile used by VTrans. Steel H-piles that rely on skin friction are also frequently used. Concrete, timber, or pipe piles are almost never utilized in VTrans construction projects.

Steel sheet piling consists of interlocking steel sheet members that are driven to a specified embedment depth. Steel sheet piling is used to retain earth or protect against long-term scour. Steel sheet piling may be either of a permanent or temporary nature.

Permanent steel sheet piling shall be left in place as part of the structure, while any temporary steel sheet piling must be removed. There are instances when the Contractor will elect to leave temporary steel sheet piling (without compensation) for reasons of their own. This is acceptable as long as it does not interfere with other work and does not create a hazard. Requests to leave temporary sheet piling in place should be discussed with the Project Manager and, if accepted, the Resident Engineer should issue a *Written Order* (Appendix A-3) acknowledging that the sheeting will remain in place.

4-505.20 Required Submittals

Proper welding procedures are required for pile tips and any welded splices, and should be submitted to the Structures Engineer for approval.

If the contract requires a static or dynamic pile loading test, the Contractor will employ a qualified Geotechnical Consultant to perform the testing. The results, including the pile driving criteria, should be submitted to the Resident Engineer for acceptance.

If pre-stressed concrete piles are used, the Contractor will submit shop drawings for approval to the Structures Engineer.

If temporary sheet piling is used, the Contractor should submit design details and calculations stamped by a Professional Engineer that detail at each location the length, type, classification, and necessary quantity of sheet piles. Copies of the design should be forwarded to the Structures Engineer, the Construction Structures Engineer, and Regional Construction Engineer for review and documentation purposes. The Regional Construction Engineer should indicate acceptance of the temporary sheet piling design with a letter to the all interested and responsible parties.

4-505.30 Engineering

The Resident Engineer will verify the location of the piles as laid out by the Contractor, as well as verifying that the pile cut-off grade is correct.

If the contract requires a dynamic or static pile-loading test, the Resident Engineer should work with the Contractor's Geotechnical Consultant to verify that the test is completed in conformance with the specifications and that the appropriate information is contained in the final pile-loading test report. This final report should contain driving criteria for the installation of the piles, which dictates the number of blows per foot required to attain the ultimate capacity of the pile, or when refusal has been attained.

The pile hammer should be warmed up by striking a pile other than the test pile before the driving of the test pile is commenced. The pile load tests should be performed on the test piles prior to driving any production piles.

4-505.40 Sampling and Testing

Steel piling and permanent sheet piling should be provided with a Type C certification for the quantity to be used. The Resident Engineer or Inspector should check the heat and lot numbers marked on the piles before they are driven to verify that the certification matches the piles delivered. The correct piling size and length should also be verified.

Pile points should be used to protect the pile flanges from damage during driving and to aid in seating the piles on bedrock, and one extra pile point of each size and type should be furnished by the Contractor for destructive testing. Driving piling without protective tips should not be allowed unless expressly provided for in the contract documents.

No acceptance sampling or testing is required for the temporary sheet piling. However, the Resident Engineer should, as much as practical, verify that the materials used for temporary sheet piling match those specified in the accepted design.

Cast-in place concrete used to fill pipe piles requires the usual acceptance sampling as required in *Section 501 HPC Structural Concrete* of the Standard Specifications for Construction.

4-505.50 Construction and Inspection

Special attention should be paid to the boring sheets in Contract Plans as they show actual soil conditions in the area of pile driving. The Resident Engineer should verify that the Contractor is using the submitted and approved equipment that matches those listed on the *Pile and Driving Equipment Data Form* covered in *Section 4-504 Furnishing Equipment for Driving Piling*.

The pile should be marked at correct intervals in meters (feet) before it is driven or put in the leads. As the pile starts to take up, smaller graduations should be marked on it so that penetration can be monitored.

The Resident Engineer and Inspectors should review and become familiar with the driving criteria for which the structural piles are being driven. The pile driving criteria are provided by the Contractor's Geotechnical Consultant as a result of any pile loading tests. If pile-loading tests are not included in the contract, the pile driving criteria shall be determined from the results of the wave equation analysis done by the VTrans Geotechnical Engineer.

The pile driving criteria should be used to determine when the pile has reached ultimate capacity, minimum tip elevation, or refusal. The determination of when the pile has achieved the required criteria is an acceptance function and must be made by the Resident Engineer or Inspector.

Unless otherwise specified in the contract, pile tips for steel H-piles should be reinforced. If the pile is being driven to ledge, the point should contain five cutting wedges meeting the requirements of *Section 505 Piling* of the Standard Specifications for Construction. The number of splices allowed in each pile is dependent on the length of the pile and this information can likewise be found in this section.

The ends of the piles that are to be spliced or to be reinforced should be cut square and even and the flanges should be beveled as required in approved welding procedures. All field welding for splices or attachment of the pile tip reinforcement should be done per approved welding procedures and *Section 506 Structural Steel* of the Standard Specifications for Construction.

The splice and tip reinforcement for steel pipe piles, timber piles, and pre-stressed concrete piles should be detailed in the contract along with any necessary specially fabricated steel splices. The pile should be marked at correct intervals in meters (feet) before it is put in the leads. As the pile starts to take up, smaller graduations should be marked on it so that the overall penetration distance can be monitored.

Piles are designed to either be vertical or battered. The orientation of the pile should be monitored during driving operations so that required verticality or batter is maintained. The batter can be adjusted slightly during the driving process, but large amounts of force should not be applied to the leads to adjust the batter. The correct batter should be established before driving begins and be maintained for the entire installation. After piles have been driven, they shall be cut off at the proper elevation. The tops of the piles that are retained should be inspected and found to be free from pile driving damage.

No piling shall be driven within 35 m (115 ft) of concrete that has not cured for at least seven days or attained 85% of its designed compressive strength.

Steel piling for integral abutments is a specialized type of structural pile that is used to support integral abutment bridges. Integral abutment bridges are a type of bridge in which the superstructure and the abutments are constructed as one unit, and the abutments are supported by a single row of flexible piles. The piles are designed to flex to allow temperature movement and live load rotation of the bridge. Because of high bending moments induced by contraction and expansion of the bridge, there are additional structural requirements and tighter tolerances for construction.

The total number of splices in the upper 6 m (20 ft) of the piles shall be limited to one per abutment. The splicing sequence shall be arranged to exclude splices from the upper 6 m (20 ft) section of the piles. Piles should be installed so that vertical alignment of the top 3 m (10 ft) of the pile is within 2% of specified alignment. A 25 mm (1 in) maximum horizontal deviation for every 1200 mm (4 ft) vertically as a four-foot level is generally used to monitor the alignment of the pile as it is being driven. These and any other additional requirements are typically outlined in the Special Provisions and the general notes on the contract plans.

4-505.60 Measurement and Documentation

A summary of structural foundation piling location should be a part of the summary book, while the completed *Pile Record Form* (Appendix D-9) becomes part of the permanent file. It is not necessary to transfer all of the *Pile Record Form* information into the summary book, only the total pay lengths. The in-place pay length for Steel H-piling will be recorded to the nearest meter (foot) for each pile driven. Cut-offs should not to be paid for. A *Pile Record Form* must be kept for each pile as the official record of the pile driving.

4-506 STRUCTURAL STEEL

4-506.10 General

► References: *Subsection 105.03 Plans and Working Drawings* and *Subsection 506 Structural Steel* of the Standard Specifications for Construction

The work in this section consists of furnishing and erecting metal structures and structural components. Structural steel is generally shop-fabricated prior to delivery to the project. The scope of this section covers main load-carrying members such as plate girders and rolled beams as well as miscellaneous items such as down spouts and scuppers. Many other components under other items such as railings, bearings, and joints should be fabricated in conformance with *Section 506 Structural Steel* of the Standard Specifications for Construction.

4-506.20 Required Submittals

All items fabricated and supplied for this section require shop drawings per *Subsection 105.03 Plans and Working Drawings* of the Standard Specifications for Construction. The shop drawing shall be forwarded to the Structures Engineer for approval. All required welding procedures for fabrication of structural steel must accompany the shop drawings for approval. If there is any field welding of structural steel, the Contractor shall submit welding procedures for approval prior to welding.

The Contractor shall submit an erection plan for acceptance prior to erecting the structural steel. The erection plan shall also be prepared in conformance with *Subsection 105.03 Plans and Working Drawings* and *Section 506 Structural Steel* of the Standard Specifications for Construction. The erection plan shall contain provisions for all stages of construction, including temporary stoppages. A copy of the erection plan should be forwarded to the Regional Engineer and to the Construction Structures Engineer for review, with the Regional Engineer providing a formal response to the Contractor.

After all fabrication and erection, the fabricator must submit extended weight calculations for the final quantity of structural steel. The following is an outline of how extended weight calculations should be handled:

1. The structural steel fabricator will submit the extended weight calculations to the Project Manager once the structural steel has been fabricated for the project.
2. The Project Manager or authorized designee will check the extended weights for accuracy, and once this has been done, the Project Manager will send a memo to the Resident Engineer that contains the final quantity that should be paid for each structural steel item. The checked extended weight calculations should be attached to the memo for inclusion in the final records.
3. Project personnel should understand that extended weights are not the same as the Bill of Materials that are part of most shop drawings. The Bill of Materials is an inventory of materials that the fabricator uses to construct the structural elements and includes everything from unfinished steel plate sizes (larger than the finished product) to items such as high-strength bolts. The extended weights will only tabulate the final sizes and the material that is measured for payment.
4. The Resident Engineer is authorized to withhold the final 5% of the payment for the structural steel until verified extended weight calculations have been received. The remaining payment will be based on the extended weights quantity.

4-506.30 Engineering

The Resident Engineer should verify the locations and grades for any structural steel bearing devices, and this work should be completed prior to arrival of structural steel on the project. The Resident Engineer and Inspectors should review the project plans, shop drawings, and erection plan to clearly understand how the structural steel will be installed.

4-506.40 Sampling and Testing

The Structures Section will coordinate and oversee all inspection activities at the steel fabrication plant. During the fabrication process, verification must be provided that the structural steel is being fabricated according to the specifications and approved shop drawings. The Structures Section Plant Inspectors are available to provide assistance should any issues arise in the field regarding the fabrication process. All structural steel used on the project must have a VTrans Type D certification.

High strength bolts must also have a Type D or equivalent certification. The bolts will be subject to sampling and destructive verification testing and will be sampled and tested per specifications and the Materials Sampling Manual. The daily requirements for checking bolt tension based on the installation method is covered in Construction and Inspection below.

4-506.50 Construction and Inspection

Structural steel is inspected at the time that it is loaded for transport to the project. The components, even though previously inspected, should be given a visual inspection at the time of delivery. If there is any delivery damage it should be evaluated prior to erection. Unloading and handling must be accomplished by methods that will not damage the members. The location of the lifting points and type of attachment will be shown on the erection plan. Conformance with the accepted erection plan will be verified.

If beams are to be stored on the project prior to erection they should be stored in an area that is well drained and free of excess vegetation. The members should be placed on timber blocking in an upright position and securely shored to prevent overturning. Improper storage of weathering steel can lead to accelerated corrosion prior to erection. The storage location should be secured to prevent public access or vandalism.

As the steel erection progresses, the Resident Engineer will verify that the match marks on steel sections match those shown on the approved shop drawings.

Connections made with high strength bolts require detailed inspection. The bolted connections are designed as “slip critical,” which is a condition in which loads are transferred between connected elements by friction. The mating surfaces in “slip critical” joint are called faying surfaces. The faying surfaces must be properly prepared and the bolts properly tensioned. The specifications must be closely followed.

All material within the grip of the bolt shall be steel, with no compressible material such as gaskets or insulation within the grip. Shims between bolted parts are not permitted unless required in the contract or granted by written permission of the Structures Engineer. At the time of assembly all faying surfaces and surfaces adjacent to the nut or bolt, should be free of scale, except tight mill scale, and must be free of dirt, oil, or other foreign material. Burrs or other defects that would prevent solid mating of the faying surfaces in a snug tight condition of the bolts should be removed. Typically paint is not used inside of the bolted connections for our projects. The faying surfaces are given only a primer coat.

High strength bolts must be installed by the Contractor using a tensioning method that is allowed in the specifications. Direct Tension Indicators are required to verify the tension in structural bolts. Refer to *Subsection 506.19 Bolting and Connections* of the Standard Specifications for Construction for acceptance procedures for bolts tensioned using Direct Tension Indicators.

Bolts shall be installed in all holes in a connection and brought to a snug tight condition prior to bringing the bolts to the specified tension. Snug tight is defined as tightness that exists when plies are in firm contact and should require full effort of a worker using an ordinary spud wrench. Snug tightening should progress systematically from the most rigid part of the connection to the free edges. The bolts should be systematically retightened as necessary until all bolts in the connection are simultaneously snug tight.

The use of drift pins for alignment of structural steel members is a legitimate method for alignment. However, the use of drift pins must be monitored, as drifting that results in distortion of members or elongation of the hole will not be permitted. Reaming may be proposed by the Contractor to deal with holes that do not align. Main members are specified to be shop reamed to fit the designed profile and under most situations should not require field reaming. Field reaming of main members shall not be permitted unless authorized in writing by the Structures Engineer. Secondary members may be subjected to limited field reaming as allowed in the specifications, but any such reaming shall be monitored closely.

All field welding will be done in accordance with approved welding procedures and the *Field Welding Manual*. The welding shall be done by a welder certified for the type of weld and the position of the weld. These requirements apply to all welds, including such things as temporary form supports.

Beam profiles should be taken once all of the structural steel connections have been made and the bolts properly tensioned. Beam profiles are elevations taken at known locations along the top of a beam or girder, and are also referred to as haunch shots. The haunch is the distance from the top of the beam to the bottom of the typical deck section. Haunch shots are taken usually every 1.5 to 3.0 m (5 to 10 ft) and at the centerline of bearing locations.

By comparing the actual elevation to the theoretical elevation, the structural designer can provide the correct haunch thickness for forming the deck. The project team should confer with the Project Manager to determine the location and the interval of the haunch shot locations.

4-506.60 Measurement and Documentation

The quantity of structural steel to be measured for payment under items in this section is the number of kilograms (pounds) used in the complete and accepted work. The weight of structural steel should be calculated according to specifications.

The weight of bolts, nuts, and washers—whether temporarily or permanently incorporated into the structure—are incidental to this Item and are not measured for payment. The weight of welded connections, whether done in the shop or in the field, is also incidental to this Item and is not measured for payment.

4-507 REINFORCING STEEL

4-507.10 General

► Reference: *Section 507 Reinforcing Steel* of the Standard Specifications for Construction

The work for this section consists of furnishing, placing, and securing steel bars, dowels, wire, and wire fabric for structural concrete reinforcement.

4-507.20 Required Submittals

A reinforcing steel schedule may be provided in the contract plans and prepared for the purpose of arriving at an estimated reinforcing steel quantity. The Contractor should verify that the reinforcing steel vendor's lists and schedules specify the correct quantity, size, and shape of the reinforcing steel components. Prior to the installation of any reinforcing steel, the Contractor should submit fabrication drawings to the Project Manager for approval. When reinforcing steel is delivered to the project, the Contractor will submit a copy of the shipping schedule and a tabulation of the reinforcing steel weights to the Resident Engineer.

4-507.30 Engineering

The Resident Engineer and Inspectors will review all specifications and the contract documents to become familiar with the requirements for placing the steel reinforcement. The Resident Engineer is not responsible for verifying the suitability of the bar list for the Contractor.

4-507.40 Sampling and Testing

Reinforcing steel shall be sampled and tested per specifications and the Materials Sampling Manual. A representative sample of reinforcing steel, consisting of a 1.5 m (60 in) long straight segment, shall be provided for testing prior to its acceptance for use on the project.

If the reinforcing steel is coated, the supplier must submit a Type A Certification for the coating and coating process.

The *Reinforcing Steel Schedule Sheet* lists the specific bars and their specifications that need to be sent to the Materials Section for testing. If the project does not identify the specific reinforcing steel to be tested, refer to the current Materials Sampling Manual for guidance regarding the location and the number of reinforcing steel bars that need to be tested.

4-507.50 Construction and Inspection

Reinforcing steel should be protected from damage on the project site by being stored on blocking sufficient to prevent the steel from contacting the ground, with blocking placed between bundles. Long term outdoor storage should be avoided and the material delivery schedule should suit the construction schedule. Reinforcing steel shall not be straightened or further bent after its fabrication. Any field bending, if found to be absolutely necessary, must be approved by the Resident Engineer.

Coated steel reinforcing bars must be protected from abrasion damage. Handle coated reinforcing steel carefully and store it in padded contact areas. Bundles of coated reinforcing steel should be lifted in a manner that minimizes bar-to-bar abrasion from sags. Coated steel bars or bundles should never be dragged or dropped. During storage, coated steel should be covered with canvas or other suitable material that will protect the coating from UV damage. Coated reinforcing steel shall not be field bent or flame cut. Refer to *Subsection 507.04 Protection of Material* Standard Specifications for Construction for more information regarding the on-site storage of reinforcing steel.

Any damaged areas of reinforcement coating should be repaired with a repair material that is approved by the coating manufacturer. The Resident Engineer will inspect the coating on the reinforcing steel at the time of delivery and verify its integrity. The coated steel should be checked again once it is placed and tied in its final location. Any defects in the coating should be repaired prior to concrete placement.

The Resident Engineer or Inspector shall verify that the reinforcing steel is installed in the correct location, with the correct spacing and cover. The reinforcing steel shall be secured using adequate chairs or supports prior to placing the concrete. The reinforcing steel shall be tied at spacing per the specifications or as shown on the contract plans. The Resident Engineer may order additional tying if required.

Tie wire and supports for coated reinforcing steel shall be constructed of plastic, epoxy, or other approved materials that will prevent damage to the coating. Refer to *Subsection 507.05 Placing and Fastening Reinforcing Steel* for more information regarding the installation of reinforcing steel.

Bar splices are important to the structural performance of reinforced concrete, and lap splices are the most common type. Lap splices should be inspected to verify that they conform to the minimum length as specified in the contract plans. Welded splices are only permitted if shown on contract plans or if approve by the Structures Engineer. If welded splices are used, the Contractor must submit welding procedures for approval. No other welding to reinforcing steel is allowed unless previously approved by the Structures Engineer

Mechanical bar connectors are sometimes specified for splicing reinforcing steel. The Contractor should provide the Resident Engineer with proper installation methods for the type of mechanical bar connector used, and the performance and acceptance testing should be completed prior to splicing of any reinforcing steel with mechanical bar connectors.

All drilling and grouting of dowels shall be to the depth specified and in the locations shown on the plans. Grout shall be mixed and placed according to specifications or manufacturer's instructions if it is a commercial product from the Approved Products List (APL).

4-507.60 Measurement and Documentation

The payment for reinforcing steel quantities is made under the appropriate items under Section 507, and is based on the weight of the reinforcing steel installed on the project. An invoice listing all of the reinforcing steel used on the project shall be verified by the Resident Engineer for the proper number and types of reinforcing steel bars incorporated in the work.

The payment for drilling and grouting dowels is made under Item 507.16 Drilling and Grouting Dowels, and is measured by the length of the hole that is drilled in meters (feet). Payment for the installed dowel is measured by weight of the reinforcing steel.

The payment for mechanical bar connectors is made under Item 507.19 Mechanical Bar Connector, with each mechanical bar connector is paid for individually.

4-508 SHEAR CONNECTORS

4-508.10 General

► Reference: *Section 508 Shear Connectors* of the Standard Specifications for Construction

This item consists of furnishing and welding shear connectors of either structural steel shapes or studs to structural members. If the shear connectors are to be field welded, they should be installed as detailed on the approved shop drawings.

4-508.20 Required Submittals

Shear Connectors are detailed on the Structural Steel Fabrication drawings.

4-508.30 Engineering

The Resident Engineer shall verify that shear connectors are spaced and located as shown on approved shop drawings.

4-508.40 Sampling and Testing

This item requires certification.

4-508.50 Construction and Inspection

The use of templates may be useful in marking shear connector locations.

Shear connectors and the surface to which they are to be welded must be reasonably clean and dry to ensure a good connection.

Once completed, shear connector welds should be inspected both visually and audibly by striking each shear connector lightly with a hammer. The ringing sound from the hammer blow should be compared from stud to stud, and when a change in sound is detected under a particular shear connector, the weld and stud should be more closely visually inspected for any defects.

The stud should also be bent about 15° and inspected again for cracks in the weld or shank. Studs that display cracks should be replaced. Additionally, the first two studs on each row should be allowed to cool, and then bent approximately 45° by blows from a hammer. Welds that display cracks under this bend test should require a change in the welding procedure.

4-508.60 Measurement and Documentation

Payment for shear connectors is made under Item 508.15 Shear Connectors on a lump sum basis.

4-510 PRESTRESSED CONCRETE

4-510.10 General

► Reference: *Section 510 Prestressed Concrete* of the Standard Specifications for Construction

This item consists of furnishing and erecting precast, prestressed concrete members.

4-510.20 Required Submittals

All items fabricated and supplied for this section require shop drawings per *Subsection 105.03 Plans and Working Drawings,* which should be forwarded to the Structures Engineer for approval.

The Contractor shall submit an erection plan, prepared and stamped by a Professional Engineer, for acceptance prior to erecting the pre-cast units. The erection plan shall include methods and sequence of erection, temporary blocking, and equipment to be used for the erection. The erection plan shall include necessary computations to indicate magnitude of stress in the segments during erection and to demonstrate that all erection equipment has adequate capacity for the work to be performed.

The erection plan shall contain provisions for all stages of construction, including temporary stoppages. A copy of the erection plan will be forwarded to the Regional Construction Engineer and to the Construction Structures Engineer for comment. Based on these comments, the Regional Construction Engineer will either accept the plan as is, forward the comments and request a re-submittal, or accept the plan with minor modifications as noted.

A grouting procedure per *Subsection 510.13 Grout* of the Standard Specifications for Construction shall be submitted for approval. Copies of the proposal should be sent to the Structural Concrete Engineer and Construction Structures Engineer for comment. The Resident Engineer will approve or require a re-submittal based comments received.

4-510.30 Engineering

Engineering for this item consists of setting grades and marking layout for bearing devices. It is recommended that only one benchmark be used for all bridge grades.

4-510.40 Sampling and Testing

Certification is not required for this item, but samples of cement and reinforcing steel shall be taken by the Inspector for project records.

4-510.50 Construction and Inspection

The Materials Section shall inspect the casting of the pre-stressed concrete members to be used at the fabricator, and when the members arrive on the project, they shall be inspected to ensure they were not damaged during shipping. The dimensions of the members shall be verified to match the dimensions on the approved shop drawings.

Generally, precast prestressed concrete members are delivered with cast-in lifting hooks, and these should be the only lifting points allowed to be used without approval from the fabricator and Contractor's Engineer. The structural integrity of precast prestressed concrete members depends on the members being properly stored on-site in their upright, as-delivered orientation. The prestressed members should not be positioned on their sides or lifted or moved by any unapproved methods.

The grouting of shear keys should be performed with adequate labor to progress the work continuously along each shear key without the formation of any cold joints. Each keyway should be pre-wetted prior to grouting and cured with wet burlap for three days.

4-510.60 Measurement and Documentation

Work performed in the erection of prestressed concrete members is covered under Item 510.21 Prestressed Concrete Box Beams, Item 510.22 Prestressed Concrete Voided Slabs, and Item 510.23 Prestressed Concrete Girders and is paid by the measured length in meters (feet) of the particular concrete member. A note should be inserted in the Summary Book indicating that the members do in fact conform to the approved shop drawings.

Work performed in grouting shear keys is covered under Item 510.24 Grouting Shear Keys and is paid by the measured length in meters (feet) of each shear keyway.

4-513 PROTECTIVE COATINGS

4-513.10 General

These items consist of surface preparation, painting, and greasing of new and existing structures as well as containment and environmental protection measures.

4-513.20 Required Submittals

The contractor shall select a coating system from the approved products list and provide product data sheets for each coating to be applied.

A *Containment and Environmental Protection Proposal* for the proposed protective coating to be used shall be submitted to the Regional Construction Engineer, Hazardous Waste Coordinator, Construction Safety Technician, and Project Manager for comment. The Regional Construction Engineer should consider comments and reply to the Contractor with an approval, request for re-submittal addressing specific comments, or approval of the plan with minor points of clarification.

4-513.30 Engineering

None.

4-513.40 Sampling and Testing

Paints require certification as well as sampling prior to and during painting operations.

4-513.50 Construction and Inspection

The Resident Engineer should ensure that all areas to be painted are thoroughly cleaned, and that the temperature requirements and environmental conditions for the application are met. Prior to application of a new coating system, all of the surfaces to be coated should be properly prepared.

An on-site meeting should be scheduled with the Construction Section's Safety Technician and the VTrans Hazmat Coordinator to discuss safety issues pertaining to lead-based paints, the protocol for inspection procedures, and the containment of hazardous paint wastes. The contractor should not begin removal of any existing paint coatings until the Resident Engineer and Inspectors are have determined that the proper procedures for the timely inspection, handling, containment, and storage of any lead or other hazardous paint waste materials are in place.

Specifications require that a prime coat be applied within eight hours after blast-cleaning a surface. Therefore, timely and coordinated inspection procedures will be expected by the contractor and necessary to keep the work progressing.

Prior to any applications, the Contractor should provide product data sheets, which list critical environmental application conditions such as acceptable temperature, humidity and dew point ranges, for the selected coatings that are to be used. The proper application thickness for each coat and the allowable time lapse before re-coating should also be listed on the product data sheets. The coating manufacturer's technical representative should be consulted, if necessary, to answer any questions specific to the application of their product

Some surface features and areas may be inaccessible to coating applications from a spray gun and must be painted by hand with "striping" or a "stripe coat" before spray painting operations commence. A stripe coat ensures that adequate paint coat thicknesses are achieved in hard-to-reach areas and along edges.

The Resident Engineer should schedule a meeting with the Contractor and painting sub-contractor prior to beginning coating preparation work to clarify stripe coating expectations, timing of quality assurance testing, and monitoring of environmental conditions. Other items for discussion should be the site conditions that either allow operations to proceed or force a shutdown, the daily collection and storage of hazardous material, and the expectations for site cleanliness at the end of each day's work.

4-513.60 Measurement and Documentation

These items are paid as lump sums.

4-514 WATER REPELLENT

4-514.10 General

► Reference: *Section 514 Water Repellent, Silane* of the Standard Specifications for Construction

This item is used to waterproof exterior concrete surfaces and protect them from deterioration that occurs with water and water-borne salt penetration.

4-514.20 Required Submittals

None.

4-514.30 Engineering

None.

4-514.40 Sampling and Testing

This item must be certified.

4-514.50 Construction and Inspection

The application of water repellent must be monitored to ensure that proper surface coverage is obtained. Water repellent product used on the project should be delivered in new, original containers from the manufacturer. The water repellent product data sheets should be consulted to ensure that the manufacturer's recommendations are being followed with respect to surface moisture of the concrete and air temperature prior to application.

Curbs and other areas subject to high salt exposure should receive two water repellent coatings. This provides extra protection to the surface and may allow the Contractor to use up any remaining quantities of product. The use of partial quantities of product from past projects is prohibited. If a partial container of product remains following the completed application operation, use and payment for the remaining quantity, within reason, should be considered acceptable.

Application of Silane, a component granule containing reactive groups of organic silicone (SiH_4) with a powder carrier, should be applied between 14 and 40 days following the concrete placement. Also, Silane should not be applied if it has rained on the project within the previous 48 hours. Strict adherence to the Silane manufacturer's specifications for application should be observed.

4-514.60 Measurement and Documentation

Work performed in applying any type of water repellent coating is covered under Item 514.10 Water Repellent, Silane and is paid by the liter (gallon) of coating used on the project. The Contractor shall provide invoices, initialed by the Inspector, that document the quantities of water repellent used, the project number and the date of application.

4-516 EXPANSION DEVICES

4-516.10 General

► Reference: *Section 516 Expansion Devices* of the Standard Specifications for Construction

Expansion devices are formed from galvanized or metalized materials and are used to separate bridge deck joints to allow for thermal expansion and contraction of the superstructure.

4-516.20 Required Submittals

Fabrication drawings shall be submitted per *Subsection 105.03 Plans and Working Drawings* of the Standard Specifications for Construction for the Project Manager's review and approval prior to fabrication.

4-516.30 Engineering

Finish grade elevations for the expansion device shall be provided by the Resident Engineer.

4-516.40 Sampling and Testing

These items require certification.

4-516.50 Construction and Inspection

The profile, grade, and temperature gap are critical to the successful operations of these items and must be checked accordingly. A thin neat coat of epoxy bonding compound shall be applied where concrete is to be poured against an expansion device. The Contractor shall have the proper bonding agent available to be applied prior to the concrete being poured on the deck.

4-516.60 Measurement and Documentation

Work performed in the installation of expansion devices is covered under Item *516.10 Bridge Expansion Joint, Asphaltic Plug*, Item *516.11 Bridge Expansion Joint, Vermont*, and Item *516.12 Bridge Expansion Joint, Finder Plate* and is paid by the measured meter (feet) of installed expansion devices.

4-519 SHEET MEMBRANE WATERPROOFING, TORCH APPLIED

4-519.10 General

► Reference: *Section 519 Sheet Membrane Waterproofing* of the Standard Specifications for Construction

This section covers the application of a reinforced asphalt, synthetic resin, or coal-tar based preformed sheet membrane to bridge decks to serve as a waterproof barrier between the concrete bridge deck and the bituminous concrete surface pavement. As the membrane is rolled out, heat from a torch is applied to soften the membrane and enhance its adhesive qualities during the application. The Contractor shall select an approved sheet membrane waterproofing system based on the specifications of the project.

4-519.20 Required Submittals

None.

4-519.30 Engineering

None.

4-519.40 Sampling and Testing

These items require certification.

4-519.50 Construction and Inspection

Before applying a sheet membrane, the deck must be dry, clean, and free of any holes or projections which could puncture the membrane. The bridge should be sand or shot blasted per the manufacturer's recommendations prior to application of the primer. The curb should also be sand blasted to the height of the final lift of pavement. Using rollers, a primer is then applied to the horizontal deck surface to a point approximately 100 mm (4 in) from the curb face, expansion joints, and scuppers, and allowed to dry as required by the manufacturer.

Next, a liquid membrane is applied to the unprimed area along the base of the curb, expansion joints, scuppers, and approximately 75 mm (3 in) up the face of the curb. The material may have to be reworked up the face of the curb to ensure a build-up of material on the face. The sheet membrane is then rolled out parallel, starting at the curb, with each successive strip overlapping the previous and progressing toward the center crown of the bridge. The final strip should straddle the crown of the deck.

On a bank curve, the membrane should start on the low side and continue to the high side of the deck. When the bridge is on a grade, care should be taken to ensure that the strips are lapped properly to carry water across the joint. The manufacturer's directions should be reviewed and followed at all times.

The completed membrane should be checked for blisters and defects, which could allow entry of water. Blisters should be punctured and sealed as they may reflect up through the pavement. Small pieces of membrane should be retained for repair patches, should the membrane get damaged prior to or during paving operations.

Within three days of installing a membrane, the full depth of asphalt specified on the plans should be placed. This is especially important during the hottest months of the summer, as excessive blistering of the membrane tends to occur during this period. In rare instances, delay in accomplishing the paving operations within three days may be allowed provided the Contractor acknowledges their responsibility for this action in writing to the Resident Engineer.

The Inspector should be knowledgeable of the membrane manufacturer's specification for asphalt temperature requirements. Typically, the minimum asphalt temperature required is higher than the minimum required for roadway paving. The pavement mix design proposed for use should have an acceptable compaction temperature for use on the membrane. The pavement mix should be applied at a hot enough temperature to result in the asphalt being pushed down into the membrane as it is compacted. The paving contractor should deliver the pavement mix to the project at the proper application temperature and consistency.

4-519.60 Measurement and Documentation

Work performed in applying sheet membrane is covered under Item 519.20 Sheet Membrane Waterproofing, Torch Applied and is paid by the square meter (square yard) of membrane used on the project. Verified field measurements, with sketches, of the completed membrane application should be entered in the appropriate field book.

4-522 LUMBER AND TIMBER

This section is reserved for future development. Refer to *Section 522 Lumber and Timber* of the Standard Specifications for Construction for more information pertaining to this item.

4-524 JOINT SEALER

4-524.10 General

► Reference: *Section 524 Joint Sealer* of the Standard Specifications for Construction

Joint sealers are generally used in joints in concrete and bituminous concrete pavement on bridge decks and curbs.

4-524.20 Required Submittals

None.

4-524.30 Engineering

Before performing work under Item 524.10 Joint Sealer, Hot Poured (by Liter (Gallon)) or Item 524.10 Joint Sealer, Hot Poured (by Meter (Lineal Foot)); the joint in the concrete should be tied in and marked so that the joint can be located for sawing after the bridge deck is paved. A straight joint may be located by crayon marks on the curb, but a joint having a break in direction should require additional ties.

4-524.40 Sampling and Testing

These items require certification.

4-524.50 Construction and Inspection

Joint sealant technology is always advancing, and it is important to refer to the applicable plans, specifications, and any General or Special Provisions in the Contract for the latest information.

4-524.60 Measurement and Documentation

Work performed for the installation of joint sealant is covered under six Items with three categories of joint sealant: Hot Poured, Cold Poured, and Polyurethane. Depending on the Item utilized, joint sealant application is paid by either the liter (gallon) or the meter (linear foot) of joint sealant used on the project. Verified measurements should be entered in the field book and should be dated and initialed by the person making the measurements.

4-525 METAL RAILINGS

4-525.10 General

► Reference: *Section 525 Bridge Railings* of the Standard Specifications for Construction

Railings are a structural element and their installation requires strict attention to the railings design details. The Project Manager should be consulted if any issues that involve railing construction details arise.

4-525.20 Required Submittals

Fabrication drawings are required for metal railings and should be provided in accordance with *Subsection 105.03 Plans and Working Drawings* and *Section 506 Structural Steel* of the Standard Specifications for Construction.

4-525.30 Engineering

In the railing project design phase, the Structures Division will specify the end post positions for the metal railing and send these plans to the railing supplier. The railing supplier will prepare shop drawings based on the end post locations and submit them to VTrans for approval. The approved shop drawings will show the railing post spacing along with other details and allow the Contractor to locate railing post anchor bolts and plates that are to be poured in place. This layout from the approved shop drawings shall be verified by the Resident Engineer.

4-525.40 Sampling and Testing

Materials used for metal railings shall be covered by the proper certification. Anchor bolts used for fastening metal railings will have a Type D certification and shall be subject to sampling and destructive verification testing per the current edition of the Materials Sampling Manual. Typically, four bolt assemblies comprise a standard sample size.

4-525.50 Construction and Inspection

Complete construction information for the railing project shall be found in the Project Plans, Standard Sheet, and Specifications. The Resident Engineer should verify that the area under each railing post is level. A 3 mm (⅛ in) fabric pad should be used under aluminum posts. Aluminum alloy shims may be used for aluminum railing, if necessary, and an aluminum-impregnated caulking compound may be used to fill voids under aluminum posts. Galvanized sheet metal shims may be used, if necessary, for steel railing. The Resident Engineer should verify that the completed railing installation is properly aligned both horizontally and vertically.

4-525.60 Measurement and Documentation

Work performed to install, remove, or repair metal (and concrete) railing is covered under 11 Items in this section and is paid by the meter (linear foot) of installed, removed, or repaired railing. Railing measurements should be made in the field and the overall dimensions of each separate section should be entered in the summary field book.

4-526 RETAINING WALLS

This section is reserved for future development.

4-527 MAINTENANCE OF STRUCTURES AND APPROACHES

This section is reserved for future development. Refer to *Section 527 Maintenance of Structures and Approaches* of the Standard Specifications for Construction for more information pertaining to this item.

4-528 TEMPORARY BRIDGE

4-528.10 General

► Reference: *Section 528 Temporary Bridge* of the Standard Specifications for Construction

The Contractor shall submit detailed drawings of all temporary one-way, two-way, and pedestrian bridges to the Project Manager for approval. Construction Headquarters should be notified immediately by telephone when a temporary bridge is opened to traffic and again when it is closed to traffic. This information is essential to the Motor Vehicle Permit Section.

4-528 .20 Required Submittals

A temporary bridge plan, including welding procedures per *Subsection 506.10 Welding* of the Standard Specifications for Construction, is required for approval by the Project Manager. An erection plan will be part of this submittal and should be reviewed by the Resident Engineer, the Construction Structures Engineer, and the Regional Construction Engineer. The Regional Construction Engineer should indicate acceptance of the erection plan to all interested and responsible parties.

4-528.30 Engineering

The Contractor shall be responsible for the construction, maintenance, and removal of all temporary bridges.

4-528.40 Sampling and Testing

None.

4-528.50 Construction and Inspection

The safety and convenience of the traveling public shall be the Resident Engineer's prime concern in constructing a temporary bridge. Particular attention shall be given to the proper installation and maintenance of all barricades and lights. The Contractor shall be responsible for maintenance of the temporary bridge and approaches.

The Contractor and the Resident Engineer should routinely inspect the condition of the temporary bridge to ensure the bridge continues to provide the intended service, including a smooth riding surface over the approaches and bridge, railings in good condition, and verification that the overall structural integrity of the temporary bridge has not been compromised in any way. The Motor Vehicle Department requires a minimum lead time of two weeks for permitting the installation of any temporary bridge that has a restriction of 4.27 m (14 ft) or less in width.

4-528.60 Measurement and Documentation

Work performed in the installation, maintenance, and removal of temporary bridges is covered under Item 528.10 One-Way Temporary Bridge, Item 528.11 Two-Way Temporary Bridge, and Item 528.12 Temporary Pedestrian Bridge and is paid as a lump sum for each bridge. The opening and closing dates of each temporary bridge should be entered in the proper field book.

4-529 REMOVAL OF STRUCTURES AND BRIDGE PAVEMENT

This section is reserved for future development. Refer to *Section 529 Removal of Structures and Bridge Pavement* of the Standard Specifications for Construction for more information pertaining to this item.

4-531 BEARING DEVICES

4-531.10 General

► Reference: *Section 531 Bridge Bearing Devices* of the Standard Specifications for Construction

Bearing devices shall conform to all applicable provisions of *Subsection 506.03 General Fabrication Requirements* and *Subsection 506.16 Marking, Storing, and Shipping* of the Standard Specifications of Construction.

4-531.20 Required Submittals

Fabrication drawings are required per *Subsection 105.03 Plans and Working Drawings* of the Standard Specifications for Construction for bearing devices. Fabrication drawings shall be forwarded to the Project Manager for review and approval.

Anchor bolts for bearing devices shall have a Type D certification. The bolts shall be subject to sampling and destructive verification testing per the specifications and the current Materials Sampling Manual.

4-531.30 Engineering

Bearing areas of the substructure units shall be marked and leveled prior to setting any bearing devices. The benchmark used to set the bearing devices shall be the same one that has been used throughout the construction of this structure.

4-531.40 Sampling and Testing

This item requires certification.

4-531.50 Construction and Inspection

Bearing devices shall be positioned in accordance with plan requirements. Refer to *Section 506 Structural Steel* for more information pertaining to material requirements for bearing devices. Refer to the structural plans for applicable temperature adjustment information.

4-531.60 Measurement and Documentation

Work performed installing bearing device assemblies (and removing and replacing existing anchor bolts) is covered under five Items in this Section and is paid by each bearing device assembly installed. Field measurements, with sketches, of the completed items shall be entered in the appropriate field book.

4-540 PRECAST CONCRETE

This section is reserved for future development. Refer to *Section 540 Precast Concrete* of the Standard Specifications for Construction for more information pertaining to this item.

4-541 STRUCTURAL CONCRETE

4-541.10 General

Structural concrete is most commonly used for roadway sidewalks and drainage structures. This work consists of furnishing and placing portland cement concrete for structures and incidental construction. The portland cement concrete should consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed according to *Section 541 Structural Concrete* of the Standard Specifications for Construction.

4-580 STRUCTURAL CONCRETE REPAIR

4-580.10 General

► Reference: *Section 580 Structural Concrete Repair* of the Standard Specifications for Construction

Structural concrete repair involves the removal and disposal of delaminated and unsound concrete from existing structures and its replacement with new portland cement concrete. Refer to the plans and *Special Provisions* for guidelines and direction for the extent and completeness of the concrete repair work to be done.

4-580-20 Required Submittals

None.

4-580.30 Engineering

None.

4-580.40 Sampling and Testing

Concrete sampling and testing shall be conducted in the same manner as for HPC Structural Concrete. Refer to *Section 4-501 HPC Structural Concrete*, for more information about concrete sampling and testing.

4-580.50 Construction and Inspection

► Refer to Section 4-501 HPC Structural Concrete, for more information about construction and inspection of concrete.

When the areas for preparation of concrete surface Class I and II have been defined, the Contractor should make a 25 mm (1 in) deep saw cut at the outer limits of the area to provide a neat edge against which the new concrete will be placed. Prior to placing new concrete, the area should be cleaned with high pressure air or water and wherever possible, the surface of the existing area to be repaired should be saturated with water prior to placing new concrete. Pre-wetting may not be possible for some vertical and overhead repairs where the formwork is in the way.

Sometimes, because of traffic running adjacent to an area being repaired and other reasons, it is necessary to extend the concrete removal area beyond the original limits, in which case another saw cut is required. Since this adds to the Contractor's expense, it may be desirable to make the cut after most of the concrete has been removed in that area. Workers should take care not to loosen concrete beyond the desired limit during chipping operations.

The Resident Engineer should verify that the use of jackhammers does not exceed limits imposed on the plans for weight and operating angle to reduce probability of breaking through the entire deck.

Exposed reinforcing steel that has lost more than one quarter of its cross-sectional area should be replaced to a point that will allow a 0.6 meter (2 ft) overlap for a reinforcing steel splice at each end. All other exposed reinforcing steel that is retained should be cleaned by sandblasting.

The placement and curing of thin lifts of concrete is very important to the concrete repair process. The new concrete should match the grade of the remaining concrete, and should be properly cured with water to avoid any cracking. Regardless of the concrete placement method used, the process should be carefully monitored and changed if the results are unsatisfactory.

4-580.60 Measurement and Documentation

Concrete repair work is covered under 11 Items in this section, and is paid, in most cases, by square meter (square yard) of portland cement concrete used on the project. Some concrete repair Items are paid by the square meter (square yard) of new concrete placed.

4-600 INCIDENTAL CONSTRUCTION

4-601 CULVERTS AND STORM DRAINS

4-601.10 General

► Reference: *Section 601 Culverts and Storm Drains* of the Standard Specifications for Construction

This section covers the work of the construction, cleaning, and reconditioning of culverts and storm drains. Different types and sizes of pipes are used to convey water across and away from the roadway. Careful attention should be paid to proper installation of all drainage pipes, because good drainage is necessary to ensure a sound and serviceable highway. The installation of drainage culverts begins with the installation of bottom drainage immediately following clearing and grubbing operation, and continues throughout the job and is finished with the installation of slope pipes after cuts and embankments are made.

Structural plate pipes, pipe arches, and arch assembly material may be delivered to the project in individual sheets or in sections pre-assembled at the plant.

4-601.20 Required Submittals

None.

4-601.30 Engineering

All pipes shall be staked out according to the requirements as explained in *Subsection 3-190.10 Culverts*. For structural plate pipes, pipe arches, or arch assemblies, cambering is generally required.

4-601.40 Sampling and Testing

All of the Items in this section items require certification, with the exception of Item *601.99 Re-laying Pipe Culverts*. Sampling and testing for these items shall be handled with a certification process through the Certification & Independent Assurance Unit of the Materials Section. The Resident Engineer shall verify the physical condition of all piping and associated materials as they are delivered to the project.

4-601.50 Construction and Inspection

The material delivered to the project should be inspected to verify that it is in fact the material called for by the plans and specifications. When working with corrugated steel pipe, the guidelines from AASHTO M36 *Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains* state that the average inside diameter of metal culvert pipe should not vary more than 13 mm (½ in) from the nominal diameter (when measured on the inside crest of the corrugations) for diameters up to 1.2 m (4 ft) and 1% for diameters greater than 1.2 m (4 ft). In no case should the difference in diameter of abutting pipe ends be more than 13 mm (½ in).

The Inspector should verify that the proper Class "C" bedding has been constructed to receive the culvert piping before permitting any culvert to be laid The bed should be shaped and compacted to fit the pipe for a depth not less than 10% of its overall height. Templates cut to the proper shape for each size pipe may be employed to verify the proper configuration of the excavated profile.

When excavating a pipe trench through ledge, or to replace poor foundation material, 0.3 m (1 ft) of granular backfill for structures, sand borrow, or 19 mm (¾ in) stone should be placed as the pipe bed.

The proper pipe alignment should be verified by referencing a string set along and above the pipe's centerline. Suspend a plumb bob from the centerline string and use a 2 m (6ft) ruler across the diameter of the pipe to check the alignment during installation of the pipe.

Several approved methods of joining concrete pipe are available as noted in *Subsection 601.07 Joining Pipe* of the Standard Specifications for Construction. When joining concrete pipes with mortar, the lower half of the joint on the inside of the pipe that is across the bottom should be covered with mortar and up each side a distance of at least one-half of the pipe diameter, and then finished smooth.

The upper half of the joint on the outside of the pipe that is across the top should be covered with mortar and down each side a distance of at least one-half of the pipe diameter. In this manner, mortar will be placed completely around the pipe joint with one-half the circumference covered inside the pipe and the other half covered outside the pipe.

The Inspector should verify that the correct gage plates are being furnished and located correctly according to the contract when joining concrete pipe. Holes for approved anchor bolts should be field-drilled and anchor bolts should be installed and tightened to the proper torque value.

The first three sections of concrete pipe that occur at the end of a culvert and are not restrained by drop inlets or catch basins should be connected together along their spring line, that is, the line of maximum horizontal dimension in a transverse cross section of the pipe. Connections should be made to ensure that the any movement in the sections is restrained.

When joining sections of metal pipe, coupling bands should be attached with the corrugations properly overlapped and securely tightened. 180 mm (7 in) wide coupling bands are required for metal pipes up to 900 mm (36 in) in diameter. Larger metal pipes require bands of sufficient width to engage the second full corrugation on each pipe. Metal pipes laid on grades exceeding 14% require 610 mm (24 in) wide coupling bands.

On any metal pipe that has insufficient circumferential corrugations to allow the use of a 61 mm (2 ½ in) wide band and maintain approximately 25 mm (1 in) separation between the ends of the pipes being joined, an alternate such as the Armco Hugger Band with silo rods or cables, may be used. See *Subsection 7-190 Welded Wire Mesh* for more information.

Once the pipe is laid, it must be properly backfilled, with particular attention paid to working material into the area next to the pipe, above the flow line, and below the half diameter height of the pipe. Backfill around the pipe should be laid in 150 mm (6 in) layers and properly compacted, with compaction tests made as the work progresses.

All stones greater than 75 mm (3 in) in diameter should be removed from direct contact with the pipe. The Contractor should be responsible for preventing any damage to newly installed culverts, and heavy equipment should be prohibited from travelling over the culvert in the absence of sufficient cover. The pipe should be protected with at least 1.2 m (4 ft) of fill before allowing the passage of any equipment or traffic

Only partial payment should be made for any culvert laying operation until the pipe is properly backfilled.

Construction of pipe headers shall proceed immediately following the completion of the backfill operations to minimize the possibility of a sudden heavy rain washing out the pipe and pipe backfill. The pipe headers act as anchors to hold the pipe in place, as well as to prevent water infiltration.

Headwalls may be constructed to within 0.3 m (1 ft) of the flow line of the pipe before the pipe is installed. This will provide a more complete bed on which to lay the pipe and will aid in backfilling behind the headwall, and is of particular value when working with short pipe runs.

4-601.60 Measurement and Documentation

Work performed in laying (and cleaning) culvert piping is covered under 32 Items in the section, with payment made by meter (linear foot) for piping and cleaning, and for each pipe fitting (elbow, reducer, etc.) used on the project. Designs, field measurements, and computations shall be used substantiate pay quantities. This information shall be entered on the drainage sheets and in the proper field book, as well as authorization for any undercuts, material sources, work dates, and any other pertinent information.

4-602 MASONRY

4-602.10 General

► Reference: *Section 602 Masonry* of the Standard Specifications for Construction

Masonry shall be used for all headers above the pipe flow line. The types of masonry most commonly used on VTrans projects are covered under Item *602.15 Cement Masonry* and Item *501.34 Concrete, High Performance Class B.* The types of work performed under Item *602.20 Dry Masonry*, Item *602.25 Stone Masonry Facing*, and Item *602.30 Repointing Masonry* are seldom used on VTrans projects.

4-602.20 Required Submittals

None.

4-602.30 Engineering

The Contractor will be provided with a typical headwall drawing or with any special dimensions required. Refer to *Standard Sheet D-2* for more information.

4-602.40 Sampling and Testing

If the material to be used under Item 541.55 Mortar, Type I is not included on the Approved Products List, than the material should be sampled and tested by the Materials Unit before being incorporated in the work. Fine aggregates shall meet the requirements of *Subsection 704.13 Sand for Cement Mortar*.

4-602.50 Construction and Inspection

When Item 541.25 Concrete, Class B, and/or Item 501.34 Concrete, High Performance Class B is used on the project, the forms should be verified for proper size before the concrete is poured and the reinforcing bars and/or hook bolts verified for proper placement. Batch slips covering concrete paid under Item 602.15 Cement Masonry should be clearly marked to indicate that the concrete is being paid as this item.

Headers are normally constructed parallel to the centerline of the roadway. Headers within 6 m (20 ft) of the shoulder point shall be built with the tops parallel to the centerline grade of the road.

4-602.60 Measurement and Documentation

The work performed under Item *602.15 Cement Masonry* and Item *501.34 Concrete, High Performance Class B* is paid by volume of masonry placed on the project. These items shall be measured in the field and all measurements, with sketches when necessary, shall be entered in the permanent job record books.

Quantities for standard headwalls shall be taken directly from *Standard Sheet D-2* and noted as a plan quantity from *Standard Sheet D-2*.

4-604 DROP INLETS, CATCH BASINS, AND MANHOLES

4-604.10 General

► Reference: *Section 604 Drop Inlets, Catch Basins, and Manholes* of the Standard Specifications for Construction

These items consist of the construction or adjustment to grade of drop inlets, catch basins, and manholes, and furnishing and placing grates and covers.

4-604.20 Required Submittals

None.

4-604.30 Engineering

The Resident Engineer shall establish the line and grade for drop inlets, catch basins, and manholes throughout various stages of construction. Construction stakes shall be referenced to the catch basin or manhole location.

4-604.40 Sampling and Testing

All of the items in this section except Pay Item 604.40 Changing Elevation of Drop Inlets, Catch Basins, or Manholes require certification of one or more of their components.

4-604.50 Construction and Inspection

Prior to placing the footing for drop inlets, catch basins, or manholes, the bottom of the excavation may require compaction.

When adjusting the elevation of existing drop inlets, catch basins, or manholes, the old bricks should be removed and replaced with new brick meeting the requirements of *Subsection 705.01(c) Clay or Shale Sewer Brick*. The outside brick surface should be covered with a smooth coat of mortar to prevent undue frost action on the brick. The use of concrete bricks for this application should be prohibited.

Bars of Type A cast iron grates should be oriented parallel to the flow of water. If bicycle traffic is present, an appropriate grate should be selected to safely accommodate passage over it.

Particular care should be taken when backfilling installed drop inlets, catch basins, or manholes to keep vertical sections true to line and grade, to prevent damage to metal pipe studs, and to prevent sags from developing around the structure at a later date. Backfill should be made with the excavated material if at all possible, but if not, then material as similar to the excavated material as can be obtained should be used. Reinforced concrete pipe should be of the tongue and groove type.

Before starting any excavation in the immediate area where elevations of existing drop inlets, catch basins, or manholes will be changed, it is wise to observe the condition of these structures in their original position and configuration.

4-604.60 Measurement and Documentation

Work performed in the construction, rehabilitation, or adjustment to grade of drop inlets, catch basins, or manholes is covered under 22 Items in this section, and is paid by each item installed on the project. The project record drainage field book should include each item on the drainage design sheet and on the drainage summary sheet. The summary field book should only contain the item total unless a drainage summary sheet is not used. Pertinent notes verifying the installation should be entered in the drainage field book.

4-605 UNDERDRAINS

4-605.10 General

► Reference: *Section 605 Underdrains* of the Standard Specifications for Construction

An underdrain is used to collect water from beneath the ground surface while a carrier pipe is used to convey the water collected by the underdrain to a flushing basin. Perforated corrugated steel, perforated corrugated aluminum alloy, perforated corrugated polyethylene, or perforated PVC pipe may be used for underdrain and carrier piping.

A carrier pipe may also be used as a variable length vertical pipe, which is used in conjunction with an underdrain flushing basin. Flushing basins are generally installed along an underdrain system about every 150 m (400 ft) to allow access to the underdrain for future maintenance.

4-605.20 Required Submittals

None.

4-605.30 Engineering

The Resident Engineer shall locate, stake, and grade the underdrain. Underdrain stakes shall be offset from the line of work. The Resident Engineer shall consult with the Contractor to determine the schedule of operations to eliminate problems and the need to replace underdrain stakes.

4-605.40 Sampling and Testing

All materials in this section require certification, except granular backfill for structures and sand borrow, which require testing.

4-605.50 Construction and Inspection

Underdrain piping used to collect water shall be laid on a 150 mm (6 in) sand cushion with the pipe perforations located at the lower quarter points. Carrier pipe does not require a sand cushion beneath the pipe and may be laid with the pipe perforations facing up.

Backfill for underdrain piping shall be composed of material conforming to the specifications for Granular Backfill for Structures or Sand Borrow. Backfill for carrier piping should generally be the material excavated in order to lay the pipe. When backfilling in a rock cut area, the pipe should be protected with an approved material placed around the pipe.

During any backfill operations, care must be exercised to ensure that only proper material is allowed in the trench area. When underdrain piping crosses beneath the roadway, compaction shall be closely monitored. On lateral underdrain piping that is away from traveled roadway, compaction of backfill over the pipe is not as critical, but compaction shall be sufficient to prevent any noticeable settlement in the trench area. All completed underdrain piping runs shall be flushed with clean water prior to being accepted.

4-605.60 Measurement and Documentation

Work performed to construct drainage systems using underdrains, underdrain outlets, flushing basins, and risers is covered under four Items for underdrain pipe and five Items for underdrain carrier pipe, and is paid by the meter (linear foot) of installed piping on the project.

Underdrain piping should be plotted and designed on drainage sheets and recorded in one of the drainage books. All computations should be added to either the drainage sheet or in the permanent drainage books, with quantities transferred to the appropriate item in the summary books. Refer to the chart in *Section 7-130* for more information.

4-607 ROADWAY PATROL MAINTENANCE

This section is reserved for future development. Refer to *Section 607 – Roadway Patrol Maintenance* of the Standard Specifications for Construction for more information pertaining to this item.

4-608 EQUIPMENT RENTAL

4-608.10 General

► Reference: *Section 608 Equipment Rental* of the Standard Specifications for Construction

Generally, these items are used for work required, but not covered, by other contract items, and include the rental of such items as bulldozers, draglines, and loaders.

4-608.20 Required Submittals

None.

4-608.30 Engineering

None.

4-608.40 Sampling and Testing

None.

4-608.50 Construction and Inspection

When ordering equipment rental for the project, the Resident Engineer shall verify that the work being ordered is not covered by, or incidental to, some other Item.

4-608.60 Measurement and Documentation

Equipment rental is covered under 13 Items in this section, and is paid by the hour for each piece of equipment used on the project. A *Written Order* (Appendix A-3) is required to document these items.

4-609 DUST AND ICE CONTROL

4-609.10 General

► Reference: *Section 609 Dust and Ice Control* of the Standard Specifications for Construction

These items are to be used to reduce dust and ice nuisance and hazard to the traveling public moving over the project. The Resident Engineer shall issue a *Written Order* (Appendix A-3) for applying these materials, with special attention paid to accommodating safe passage of weekend and holiday traffic.

4-609.20 Required Submittals

None.

4-609.30 Engineering

None.

4-609.40 Sampling and Testing

None.

4-609.50 Construction and Inspection

The application of these items shall be in accordance with *Section 609 Dust and Ice Control* of the Standard Specifications for Construction.

4-609.60 Measurement and Documentation

The application of dust and ice control materials is covered under Item 609.10 Dust Control with Water and Item 609.15 Dust and Ice Control with Calcium Chloride and is paid by the cubic meter (thousand gallons) for water and metric ton (ton) for calcium chloride. When applying water, measurement should be made by weighing or metering the amount in the water tanker, with this information entered in the field book under this item.

4-612 GABION RETAINING WALL

This section is reserved for future development.

4-613 STONE FILL, RIPRAP, AND SLOPE PAVING

4-613.10 General

► Reference: *Section 613 Stone Fill, Riprap, and Slope Paving* of the Standard Specifications for Construction

Stone fill, riprap, and slope paving are used to protect excavation or embankment slopes from erosion.

4-613.20 Required Submittals

None.

4-613.30 Engineering

The areas to be protected should be constructed and graded to the lines shown on the plans, with control established for the limits of these items.

4-613.40 Sampling and Testing

Stone size should be checked for compliance with the guidelines specified in *Subsection 706.04 Stone for Stone Fill* of the Standard Specifications for Construction. Gravel backfill for slope stabilization and sand borrow should be sampled and tested. Concrete units used for slope paving require certification.

Stone that is to be used for culvert lining can be stockpiled and separated by size to more easily verify sizing requirements. Larger anchoring stones are typically placed first, with corresponding smaller sizes following. A limited supply of anchoring stone and infill material may be obtained from excavated stream crossings.

4-613.50 Construction and Inspection

Slopes should be shaped prior to placing these items. In the case of riprap or slope paving, the slope should be stable prior to placement of the item. Stone fill is usually dumped and then worked to yield a satisfactory slope within the neat lines before rip rap and slope paving are placed.

Voids should be chinked to provide a dense fill, except where concrete blocks are used for slope paving. Care should be taken to ensure that the entire slope receives the maximum protection necessary to prevent erosion.

4-613.60 Measurement and Documentation

Work performed to furnish and place protective materials is covered under four Items for stone fill, two Items for riprap, and one Item for stone paving, and is paid by the cubic meter (cubic yard) for stone fill and riprap and by the square meter (square yard) for slope paving. Preliminary and final cross-sections are required for all items except slope paving, which required field measurements of the completed work.

If the stone fill to be used comes from project excavation, it may have to be factored and deducted from borrow or granular borrow. Refer to *Subsection 104.06 Use of Materials Found in the Roadway; Authorization; and Payment* of the Standard Specifications for Construction for more information.

4-616 CURBS AND GUTTERS

4-616.10 General

► Reference: *Section 616 Curbs and Gutters* of the Standard Specifications for Construction

Granite slope edging is used extensively in interstate construction on single and two-way ramps wherever there is a dividing center island, on the low side of a banked ramp, and on entrance and exit terminals. It is less expensive than vertical curb, serves the same purpose, and is safer if hit by a car.

Vertical granite curb is used on outside edges of the traveled way on urban projects or other locations where it becomes necessary to keep traffic within confining limits. Vertical curbing presents a more effective barrier than slope edging because it presents a vertical surface to the traffic rather than a sloping surface. The engineering, construction and inspection are similar to granite slope edging. Changes in curb openings should not be made without consulting the Project Manager.

Precast reinforced cement concrete curb consists of furnishing and setting precast reinforced cement concrete curb to line and grade at the locations indicated on the plans or as directed by the Resident Engineer.

Bituminous concrete curb is used to control water on fills and at bridge ends and may occasionally be used for the construction of traffic islands.

While removing and resetting curb is not common to every project, it is needed whenever a change in the traffic islands, road, ramps, or entrances are made either during construction and more often when the old project is extended. Special care is needed to salvage all usable pieces of curb. When properly cleaned of mortar and foreign material, the installation will be the same as for the type of curb being removed and reset.

Treated timber curb provides a very satisfactory method for preventing the road water from eroding the slopes and for directing its flow into proper channels. It is used in conjunction with guardrail. Timber curb, when damaged, can be readily replaced.

Bituminous gutters have been used to some extent on road slopes, where slope pipes could not be installed and, to a larger extent, in deep cuts on the back slopes. In the latter case, the gutter is installed parallel to the centerline, half way up the slope or on top of the slope where there is a large amount of surface water. Thus, the water is directed away from the slope to prevent erosion of the banks.

Bituminous concrete surface for gutters and traffic islands is used to provide a surface for narrow traffic islands (where it would be impracticable to maintain grass) and for water courses. The material is normally placed and compacted by hand methods.

4-616.20 Required Submittals

None.

4-616.30 Engineering

Roadway curbs, not used in connection with guardrail, require a reference or offset line to be run and staked at 10 or 20 m (25 or 50 ft) intervals for line and grade. Roadway curbing used in connection with guardrail will normally use the guardrail as a reference for line and grade.

Bridge curbing is normally referenced to the chamfer strips on the fascia panels that have previously been aligned and graded. Median slope edging on bridges requires a separate reference line for line and grade.

The location and design of gutters should be indicated, and grade stakes are necessary for the excavation of the ditch.

4-616.40 Sampling and Testing

Granite products must come from an approved source and be inspected on the project for compliance with specifications.

Precast reinforced cement concrete curb requires certification.

Incidental materials requiring certification are preservative treatment for treated timber curb, joint sealer, expansion joint filler, liquid membrane-forming compound, and epoxy mortar.

Plant-mixed materials should be subject to inspection and tests at the plant for compliance with quality requirements. Emulsions, asphalt cement, cutback asphalt, refined tar, gravel for and sand borrow should be subject to sampling on the project.

4-616.50 Construction and Inspection

Granite slope edging, vertical granite curb, and precast concrete curb should be installed before any of the pavement is placed, otherwise considerable pavement material will be wasted and it will be difficult to obtain a good seal between the pavement and the curb. Once the curb has been set, it should be completely backfilled and tamped to hold its position.

Care should be taken when locating the terminal ends of “bull nosing” so that they do not project too far into the intersection road shoulder where they may be struck by snow plows. The space between the curb and the base course material should be filled with bituminous concrete.

Setting bridge curb requires more care and attention than any other type of curbing installation. Bridge curbing is shaped and sized to close tolerances for a precise fit. Proper curb height and alignment should be obtained by the use of steel wedges inserted under the curb and are installed after the slab has set. The joints between curb ends should not be mortared until the back safety walk is poured.

The curb should be held firmly in position to prevent any change in alignment after being approved by the Resident Engineer. Anchors should be grouted into the back of the curb with either Type IV mortar or an appropriate epoxy bonding compound. These anchors may be welded to the safety walk reinforcing steel if it is not epoxy coated and the welding procedure has been approved.

Wood blocks at the face of the curb may be tied with foam wire through curb joints to the fascia forms, but should not be attached with nails driven into the poured slab and braced to the curb. The Contractor should verify that the curb is protected and kept clean and free of discoloration until final inspection.

When road curb continues beyond the bridge, a square curb nose end should be substituted for a round curb nose end. The road curve should not extend onto the bridge.

When bituminous concrete curb is to be used to control water flow at the outer edge of the shoulder, the shoulder should be paved for its whole width, or at least at the locations where the curbing is to be constructed. The curb should be placed only where there is guardrail to protect it from snow plows.

The curb should be constructed as close to the front face of the guardrail post as is possible with the machine being used, with the back side of the curb located about 50 mm (1½ in) from the face of the guardrail post. Where the curb is used in conjunction with drop inlets, the curb should end at the lower edge of the last drop inlet. The Contractor should not carry the curb beyond the drop inlet, which would allow for the collection of enough water to wash out the slope at the end of the curb.

Bituminous concrete curb material should be maintained at the proper temperature between 140°C and 150°C (280°F and 300°F) to produce a satisfactory finished curb. Bituminous concrete curb material that is placed at too high a temperature will result in curbing that slumps out of its proper shape, and curb material that is placed at too low a temperature will result in curbing with an unacceptable porous surface. Bituminous concrete curb material should be supplied to the site only as fast as it can be placed to avoid excessive cooling.

The curb shall be inspected for good alignment as well as good appearance.

Refer to *Standards Sheet C-1* for details and dimensions of treated timber curb, including the warping and shaping of the shoulder material. If the shoulder is to be paved, the fillet should be constructed of bituminous concrete.

Refer to *Standard Sheet D-3* or *Standard Sheet D-3M* for guidance on the construction of gutters. The gutter excavation should be inspected for proper shaping and compaction. The use of gravel or sand under the pavement should be prohibited to prevent water flowing under the ditch with the resultant undercutting or frost heaving. If the soil has satisfactory compaction properties, the use of foundation material may be eliminated.

Headers or cut-off walls shall be constructed at the inlet of the ditch and at 8 to 15 m (25 to 50 ft) intervals along the length of the ditch to prevent water from flowing under the ditch. These cut-off walls should be constructed by digging a trench approximately 300 mm (1 ft) deep and 300 mm (1 ft) wide across the width of the ditch, and filling this trench with materials used in excavating the ditch. Cut-off walls are not necessary for traffic islands. A tight joint should be established between the ditch and the paved shoulder when a ditch is constructed to serve as a curb outlet.

4-616.60 Measurement and Documentation

Work performed to construct, reset, or remove curbs and gutters is covered under 17 Items in this section, and is paid by either meter (linear foot) or metric ton (ton) of curb or gutter installed on the project. Field measurements of items paid by meter (linear foot), including locations by stationing, and positions left or right of the roadway centerline should be entered in the summary field book.

Field measurement of bituminous concrete curbs and gutters, which is paid by the metric ton (ton), should be entered in the summary field book, with locations by stationing, positions left or right of the roadway centerline, and approximate tonnage used at each location. Payment should be determined from the weight slips.

Field measurements and sketches of bituminous gutters and Portland cement concrete gutters should also be entered in the miscellaneous field book with the gutters listed by station, located left or right of the roadway centerline and the area or volume of each entry shown. Invoices for bituminous material used on bituminous gutters are required and should be handled as is appropriate for each item involved.

4-617 MAILBOXES

This section is reserved for future development. Refer to *Section 617 Mailboxes* of the Standard Specifications for Construction for more information pertaining to this item.

4-618 SIDEWALKS

4-618.10 General

► Reference: *Section 618 Sidewalks* of the Standard Specifications for Construction

Sidewalks are normally constructed only in urban areas. Sidewalk location dimensions, line, and grade should be shown on the plans.

4-618.20 Required Submittals

None.

4-618.30 Engineering

Prior to the start of any sidewalk construction, a reference or offset line should be run, staked at 10 m to 20 m (25 ft to 50 ft) intervals, and graded. This reference line may be run in conjunction with any curbing to be set. This work shall be coordinated with the Contractor's superintendent.

4-618.40 Sampling and Testing

Portland cement and bituminous mixes shall be inspected and tested at the plant for compliance with *Section 406 Marshall Bituminous Concrete Pavement* and *Section 501 HPC Structural Concrete* of the Standard Specifications for Construction.

Joint filler materials to be used in sidewalk expansion joints require certification. Emulsified asphalt should be sampled on the project.

4-618.50 Construction and Inspection

The Resident Engineer should verify that all the plan and specification requirements are adhered to, particularly those concerning foundation, form alignment, finishing, and curing.

4-618.60 Measurement and Documentation

Work performed in the construction of bituminous or portland cement concrete sidewalks is covered under Item 618.10 Portland Cement Concrete Sidewalk, 125 mm (5 inch), Item 618.11 Portland Cement Concrete Sidewalk, 200 mm (8 inch), and Item 618.15 Bituminous Concrete Sidewalk, and is paid by square meter (square yard) of portland cement concrete sidewalk or by metric ton (ton) of bituminous concrete sidewalk installed on the project.

Payment for portland cement concrete sidewalk material shall be determined from concrete batch slips. Refer to *Section 501 HPC Structural Concrete* for more information regarding processing concrete batch slips.

Payment for bituminous concrete sidewalk material shall be determined from weight slips. Refer to *Section 406 Marshall Bituminous Concrete Pavement* or *Section 490 Superpave Bituminous Concrete Pavement* for more information regarding processing weight slips.

Work performed in the installation of detectable warning surfaces is covered under Item 618.30 Detectable Warning Surface, and is paid by square meter (square yard) of detectable warning surface installed on the project.

4-619 MARKERS

4-619.10 General

► Reference: *Section 619 Markers* of the Standard Specifications for Construction

Boundary markers shall be furnished and placed to define right-of-way (ROW) limits of the project. The locations of these markers are specified by station and offset on the ROW plans. Boundary markers are only required when the taking line changes direction; with changes to the offset distance.

Steel marker posts shall be used on primary and interstate roads, while wood marker posts may be used on secondary and state aid roads. Marker posts shall be used to designate the end of culverts, underdrains, flushing basins, drop inlets, etc.

Work performed under Item 619.20 Removing and Resetting Property Markers is usually for new construction projects, where right-of-way boundaries have changed or have temporally been removed. Extra effort shall be made to locate, tie into, and, when at all possible, preserve existing property markers.

4-619.20 Required Submittals

None.

4-619.30 Engineering

Boundary markers shall be accurately located by Resident Engineer with a suitable stake to mark the location for the Contractor. Once set, a boundary marker's stationing or offset values shall not be changed. Property markers to be removed and reset shall be tied in prior to their relocation.

4-619.40 Sampling and Testing

Certifications are required for steel marker posts and for the preservative treatment and delineators for wood marker posts.

Concrete for boundary markers shall meet the requirements of *Section 501 HPC Structural Concrete* of the Standard Specifications for Construction.

4-619.50 Construction and Inspection

Boundary markers are normally set with their tops 50 mm (2 in) above ground level. In cases where this would present a hazard, the tops shall be left flush with the ground. When setting boundary markers in ledge, steel rods shall be used in place of concrete posts.

4-619.60 Measurement and Documentation

Work performed in placing boundary markers, marker posts, bollards, and in the removing and resetting of property markers is covered under six Items, and is paid by each item set on the project.

These items shall all be counted in the field and listed in the appropriate summary field book or in the miscellaneous field book and cross-referenced to the summary field book. Listings shall include each marker's station, position left or right of the roadway centerline, offset distances, and specific use, as is appropriate.

4-620 FENCES

4-620.10 General

► Reference: *Section 620 Fences* of the Standard Specifications for Construction

Chain-link fencing shall be used instead of woven wire fence in urban areas. In some instances, galvanized fencing may also be used as a snow barrier.

4-620.20 Required Submittals

None.

4-620.30 Engineering

Refer to *Subsection 620.04 Erection of Woven Wire Fence* and *Subsection 620.05 Erection of Chain-Link Fence* for more information regarding fencing location and layout.

4-620.40 Sampling and Testing

All of the fencing items in this section require certification with the exception of Item 620.50 Removing and Resetting Fence, and Item 620.55 Removal of Existing Fence.

4-620.50 Construction and Inspection

All obstructions that interfere with the proper fencing alignment, including any dead trees or other vegetation, should be removed and disposed of by the fencing contractor. However, some modification of the alignment may be permitted in order to preserve any valuable trees.

During installation, the Contractor shall verify that the steel posts are set plumb, true to line and grade, and that the tops of the posts line up. The specific height of the fencing specified on the plans should be maintained, and gates should be set level.

4-620.60 Measurement and Documentation

Work performed in the construction, removal, or resetting of fences and gates is covered under 17 items in this section, and is paid by the meter (linear foot) of fencing installed, except for bracing and bracing assemblies, which is paid by each item.

Fencing should be measured along the top line of the fence excluding the space required for gates. In counting the number of required braces, each leg of a brace assembly should be considered as a separate brace for pay purposes. For example, a fence corner will require two braces, whereas a fence ending at a post will require only one brace.

Fencing items shall be measured in the field with stationing, position left or right, and the actual measurements or count entered in the field book.

4-621 TRAFFIC BARRIERS

4-621.10 General

► Reference: *Section 621 Traffic Barriers* of the Standard Specifications for Construction

This section covers the work involved in the construction of traffic barriers, including guardrail, median barriers, and guide posts. In general, guardrail should be installed during the later stages of construction. Good engineering practice mandates the installation of enough guardrail to ensure adequate safety, but since it does interfere with maintenance and winter plowing, the minimum amount of installed guardrail should be the objective.

Removing and resetting guardrail requires the same consideration and attention as for new guardrail installation.

4-621.20 Required Submittals

None.

4-621.30 Engineering

As early in the construction process as is possible, the Resident Engineer should inspect the areas in the field where the plans specify guardrail and note any areas that appear to require additional guardrail and areas where guardrail could be eliminated.

It may also be possible to eliminate guardrail on waste jobs where surplus material can be used to flatten slopes, or where, for short runs of guardrail, the slopes can be flattened to 1:4 or flatter. The Resident Engineer should verify that the plans indicate an increase in shoulder width to 1 m (3 ft) to allow for the installation of guide posts or guardrail, and at the end of a guardrail run.

The Resident Engineer should contact the Project Manager for guidance on the proper placement of traffic barriers prior to making any changes in their location. Refer to the AASHTO Guide for Selecting, Locating and Designing Barriers and its supplements for more information.

A reference centerline should be provided for locating the guardrail unless previously placed offset stakes are still in good condition or the guardrail can be located from the edge of the pavement. The Resident Engineer should stake out any guide post locations.

Guardrail posts and anchors should be installed before the top course of pavement is placed to prevent damage to the surface course. The Resident Engineer should work with the Contractor to schedule the installation of these items at the proper time.

4-621.40 Sampling and Testing

All of the various types of traffic barriers require certification, with the exception of Item *621.75 Remove and Reset Guardrail,* Item *621.80 Removal and Disposal of Guardrail,* Item *621.81 Removal and Disposal of Guideposts,* and Item *621.90 Temporary Traffic Barrier*. Cable guardrail shall be sampled on the project.

4-621.50 Construction and Inspection

The position, depth, and alignment of guardrail posts should be carefully monitored during installation. Backfill for the posts should be made in 150 mm (6 in) layers and thoroughly compacted with mechanical tampers. All excess material should be cleaned up with the shoulder area left in good condition.

When three-cable guardrail is installed, the post spacing should be decreased on sharp curves. Refer to *Standard Sheet G-10 Anchor for Cable Guardrail Openings* for more information. Posts should be driven rather than placed in augured holes.

Precast concrete temporary traffic barriers shall be compliant with the AASHTO Manual for Assessing Safety Hardware (MASH). Typically, precast concrete temporary traffic barriers are not anchored to the underlying surface. However, where they are used for phased bridge deck construction or in other areas where barrier movement due to a vehicle impact must be prevented to insure worker or public safety, the barriers should be securely pinned on the traffic side of the barrier per the manufacturer's specifications or guidance from the Project Designer.

Additionally, particular attention should be paid to the layout of beginning and ending runs of concrete barrier to ensure as safe a transition as the site allows. End sections should be designed to flare away from oncoming traffic, ideally to beyond the clear zone, and then buried in fill or protected with an appropriate energy absorption attenuator. Blunt-ended barriers exposed to traffic shall be prohibited.

The type of connection between barriers is not an indication of the acceptability of the barrier system. Barrier systems utilizing 'Pin & Loop' and 'J-J hook' type connections have been approved depending upon crash testing via standardized testing per the MASH standards.

The FHWA maintains a list of Temporary Concrete Barrier systems that have received approval, and this list may be found at the following URL:

http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/listing.cfm

Any modifications to temporary traffic barriers will be approved by VTrans prior to their use on the project.

4-621.60 Measurement and Documentation

Work performed in furnishing, assembling, removing and/or resetting of guardrail, median barriers, and guide posts is covered under 42 items, and is paid by the meter (linear foot) of traffic barrier installed or by each item for approach and terminal sections, energy absorption attenuators, anchors, and guide posts.

Guardrail shall be measured in the field while anchors and guide posts should be counted in the field in accordance with *Section 621 Traffic Barriers* of the Standard Specifications for Construction. This information should be listed in the appropriate field book together with stationing and position left or right.

4-622 INSULATION BOARD

4-622.10 General

► Reference: *Section 622 Insulation Board* of the Standard Specifications for Construction

Extruded expanded polystyrene insulation board shall be used to halt frost penetration in concrete boxes, problem subgrade areas, and water lines under roadways.

4-622.20 Required Submittals

None.

4-622.30 Engineering

The Resident Engineer shall specify the locations and limits of insulation board installation.

4-622.40 Sampling and Testing

Insulation board requires certification. Sand borrow, the surface that receives the insulation board, shall be sampled on the project.

4-622.50 Construction and Inspection

The location, bedding, placement, and back filling for insulation board installation shall be inspected for compliance with the Standard Specifications for Construction. Sand borrow should be spread and compacted to a minimum depth of 75 mm (3 in).

4-622.60 Measurement and Documentation

Work performed in installing insulation board is covered under Item 622.10 Insulation Board, and is paid by the cubic meter (thousand feet board measure) for insulation board installed on the project. Field measurements of this item shall be recorded in the appropriate field book.

4-625 SLEEVES FOR UTILITIES

This section is reserved for future development. Refer to *Section 625 Sleeves for Utilities* of the Standard Specifications for Construction for more information pertaining to this item.

4-626 WELLS AND CASINGS

This section is reserved for future development. Refer to *Section 626 Wells and Casings* of the Standard Specifications for Construction for more information pertaining to this item.

4-627 PUMP AND TANK INSTALLATION

This section is reserved for future development. Refer to *Section 627 Pump and Tank Installation* of the Standard Specifications for Construction for more information pertaining to this item.

4-628 SANITARY SEWER SYSTEMS

4-628.10 General

► Reference: *Section 628 Sanitary Sewer Systems* of the Standard Specifications for Construction

This section covers the construction or reconstruction of sanitary sewer lines and appurtenances. A sewer line should be completely tied in at all necessary points along its length. A copy of these ties should be plotted on a layout of the system and turned over to the individual or municipality for whom it was constructed.

4-628.20 Required Submittals

The Resident Engineer shall review the Contract Documents to confirm if there are required submittals.

4-628.30 Engineering

Begin the sanitary sewer piping layout by profiling the existing ground at the new pipe location and staking the centerline (or offset line), marking cut or fill on the stakes. Plot and design the sanitary sewer piping layout on drainage sheets.

4-628.40 Sampling and Testing

All materials used in sanitary sewer systems require certification, except for Item *628.30 Relaying Sewer Pipe* and Item *628.42 Transfer to New Systems, Sanitary Sewer*.

4-628.50 Construction and Inspection

All sanitary sewer pipes shall be checked for damage as soon as they are delivered to the project. Refer to *Section 628 Sanitary Sewer Systems* of the Standard Specifications for Construction for construction requirements.

4-628.60 Measurement and Documentation

Work performed to construct or reconstruct sanitary sewer lines is covered under 10 Items, and is paid by the meter (linear foot) of piping installed on the project, except for Item 628.42 Transfer to New System, Sanitary Sewer, which is paid by lump sum.

All sewer pipe lines shall be measured in place. These measurements along with stations and offsets shall be entered in Book #7 or directly in the summary book for small jobs.

4-629 WATER SYSTEMS

4-629.10 General

► Reference: *Section 629 Water Systems* of the Standard Specifications for Construction

This section covers the construction or reconstruction of water lines and appurtenances. The pipe design shall be checked for hydraulic gradient, which is a straight line from the head, or source of water to its terminal point. The hydraulic gradient governs the design of long pipe runs as well as relatively flat pipe runs.

The elevation of the hydraulic grade line of the inlet end of the pipe will occur somewhere between elevation of pipe inlet and elevation of water surface and will depend on head losses occurring in the pipe. The elevation of the water line at any point must not be higher than the hydraulic gradient at the same point.

Construction of underground copper pipe shall utilize flanged connections with brass fittings. Sweat joints shall be prohibited in this case. Valves that allow VTrans personnel to inspect the water line shall be placed at the right-of-way limit on each side of the right-of-way. These valves shall have a union type connection and be housed in an approved covered concrete box measuring at least 1.2 m by 1.2 m (4 ft x 4 ft).

4-629.20 Required Submittals

The Resident Engineer shall review the Contract Documents to confirm if there are required submittals.

4-629.30 Engineering

Begin the water piping layout by profiling the existing ground at the new pipe location, then verifying the elevations of the water source and the terminal point. Verify that the water line is located below the frost line. Plot the water line on culvert rolls or sheets.

Stake out the water line with an offset line and mark the cut or fill and offset on each stake. Tie in the location of the pipe for future reference. See *Subsection 3-200.50 Location of Water Supply Sleeve and/or Water Line* for directions and a sketch.

4-629.40 Sampling and Testing

The following items in this section require certification:

- Item 629.23 Seamless Copper Water Tube
- Item 629.24 Ductile Iron Pipe, Cement Lined
- Item 629.26 Gate Valve
- Item 629.27 Gate Valve with Valve Box
- Item 629.28 Hydrant
- Item 629.32 Plastic Water Pipe, Flexible
- Item 629.33 Plastic Water Pipe, Rigid
- Item 629.34 Steel Water Pipe, Galvanized
- Item 629.39 Corporation Stop
- Item 629.40 Expansion Assembly

The Resident Engineer should approve the rest of the items after consulting the latest *Approved Products List* and /or *Advanced Certification Lists* provided by the Materials Section. Water lines should be laid with Granular Backfill for Structures, Sand Borrow, or native materials, which may be subject to sampling on the project.

4-629.50 Construction and Inspection

All water pipes shall be checked for damage as soon as they are delivered to the project. Installed piping shall be connected and tested for leaks. Threaded connections shall be checked for proper threading, and joint compound shall be used to seal leaks and ease disassembly if repairs are necessary.

Backfilling with approved material shall be done without damage to the pipe. Stones that have a diameter of 150 mm (6 in) shall not be buried adjacent to the pipe.

4-629.60 Measurement and Documentation

Work performed in constructing or reconstructing water lines and appurtenances is covered under 20 Items, and is paid by the meter (linear foot) of piping installed on the project or by each item for boxes, valves, hydrants, and pits. The work for Item *629.42 Transfer to New System, Water System* is paid as a lump sum.

Pipe and sleeve measurements shall be entered in the appropriate field book. Curb stops, hydrants, meter pits, valve pits, tapping sleeves, gate valves, and valve box adjustments shall be counted and listed in the appropriate field book as well as their location by stationing and their position left or right.

4-630 UNIFORMED TRAFFIC OFFICERS AND FLAGGERS

4-630.10 General

► Reference: *Section 630 Uniformed Traffic Officers and Flaggers* of the Standard Specifications for Construction

The use of uniformed traffic officers or flaggers on the project is for the protection of the traveling public and to facilitate traffic movement where delays or bottlenecks are anticipated. Flaggers may be utilized in place of uniformed traffic officers where a uniformed traffic officer is not deemed necessary.

4-630.20 Engineering

The Resident Engineer shall designate the uniformed traffic officer or flagger stations.

4-630.30 Required Submittals

None.

4-630.40 Sampling and Testing

None.

4-630.50 Construction and Inspection

Refer to *Subsection 630.03 Clothing and Equipment* of the Standard Specifications for Construction and the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) from the Federal Highway Administration for requirements regarding clothing, certifications, equipment and procedures for flagging.

Flaggers shall be trained by certified flagger trainers. The Contractor shall provide a list of flaggers available to work on the project who have been properly trained. The Resident Engineer and/or Inspector shall verify that each flagger has a valid certification card before allowing them to work on the project.

Flaggers shall be removed from the project for conduct issues such as talking on cell phones, rude behavior, and failing to carry through on directions specific to flagging operations.

4-630.60 Measurement and Documentation

The work performed by uniformed traffic officers or flaggers is covered by Item 630.10 Uniformed Traffic Officers, Item 630.15 Flaggers, and Item 630.20 Flaggers, Railroad and is paid by the hour of service.

The use of uniformed traffic officers or flaggers shall be documented in a *Daily Work Report* (Appendix B-2), including the date of service, the number of uniformed traffic officers or flaggers on the project, the number of hours worked, and the traffic conditions that required their use.

4-631 FIELD OFFICE

4-631.10 General

► Reference: *Section 631 Field Office* of the Standard Specifications for Construction

The work in this section involves furnishing, erecting, equipping and maintaining field offices and testing equipment. Depending on the contract provisions, the field office for the project shall be furnished by the Contractor or by VTrans.

Refer to *Subsection 2-100.70 Project Field Office* for more information regarding the establishment of a field office and utility hook-up. Construction Section field offices shall be non-smoking areas per Vermont State Law *18 V.S.A. 142101427*.

4-631.20 Required Submittals

None.

4-631.30 Engineering

The Resident Engineer shall determine the field office site. The field office shall be located within the right-of-way owned by the State or on land that the Contractor has rented. Electrical power and telephone service shall be accessible as the field office is established. The field office shall be available for use from the day work is commenced by the Contractor and until thirty days after final acceptance of the project.

4-631.40 Sampling and Testing

None.

4-631.50 Construction and Inspection

The Resident Engineer shall verify that that all furnishings for the field office are included and that all supplies and equipment for the various testing stations are stocked and ready to be employed. The *Special Provisions* and supplemental specifications shall be checked to verify that the required equipment is up-to-date and approved for use on the project.

4-631.60 Measurement and Documentation

Work performed to establish a field office is covered under seven items, and is paid by lump sum for personnel to staff the office and for testing equipment items. Item 631.26 Field Office Telephone is paid by dollar amount for service.

Payments for field office staff and testing equipment shall be made periodically as outlined in *Subsection 631.08; Method of Measurement* of the Standard Specifications for Construction.

4-634 EMPLOYEE TRAINEESHIP

4-634.10 General

► Reference: *Section 634 Employee Traineeship* of the Standard Specifications for Construction

Employee traineeship is on-the-job training for qualified employees. The objective of employee traineeship is to train skilled workers for construction positions and to promote equal employment opportunity through employment and training of minorities and the disadvantaged.

4-634.20 Required Submittals

None.

4-634.30 Engineering

None.

4-634.40 Sampling and Testing

None.

4-634.50 Construction and Inspection

None.

4-634.60 Measurement and Documentation

The training conducted for employee traineeship is covered under Item 634.10 Employee Traineeship, and is paid by the hour of service.

The Contractor shall submit to the Resident Engineer, on a weekly basis, a form showing how the trainees' time was allocated. This form shall be approved by the Associated General Contractors of America (AGC), and shall be signed by the trainee and the supervisor, and retained in the project records as documentation for payment of this item.

The Resident Engineer shall keep a diary of periodic interviews with the trainee noting the trainee's progress, satisfaction, and comments, etc. If the trainee indicates that the training is unsatisfactory, the Resident Engineer shall try to resolve the issue by facilitating communication between the trainee and the Contractor. The VTrans office of Civil Rights and Compliance shall be notified if further action is necessary.

4-635 MOBILIZATION/DEMOBILIZATION

4-635.10 General

► Reference: *Section 635 Mobilization/Demobilization* of the Standard Specifications for Construction

The work in this section involves preparatory work and operations to allow for movement of personnel, equipment, and supplies to and from the project site before work is started, and for the demobilization and project clean-up once the work is completed. This item recognizes the expense to the Contractor of setting up their operations prior to the actual beginning of work and allows them to separate this expense from the normal bid items.

4-635.20 Required Submittals

None.

4-635.30 Engineering

None.

4-635.40 Sampling and Testing

None.

4-635.50 Construction and Inspection

None.

4-635.60 Measurement and Documentation

Work performed in mobilizing and demobilizing for the project is covered under Item *635.11 Mobilization/Demobilization* and paid by lump sum. The Resident Engineer shall enter standard comments for lump sum bid items in the summary field book.

4-641 TRAFFIC CONTROL

► Reference: *Section 641 Traffic Control* of the Standard Specifications for Construction

4-641.10 General

The work in this section involves the establishment and maintenance of traffic control measures to protect the traveling public, including pedestrians and bicyclists, and construction operations.

4-641.20 Required Submittals

The Resident Engineer shall review the Contract Documents to confirm if the Contractor shall be required to submit a *Traffic Control Plan* or a modified *Traffic Control Plan.* If the Contractor's plan proposes to modify the speed limit within the project limits, the Resident Engineer shall obtain approval from both the Project Manager and the Traffic Operations Section. A *Notification of Roadway Restrictions Form* (Appendix B-6) may be required as well.

4-641.30 Engineering

The Contractor shall verify that the deployment and layout of traffic control devices is conducted in accordance with the plans and the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) from the Federal Highway Administration.

4-641.40 Sampling and Testing

None.

4-641.50 Construction and Inspection

The Resident Engineer shall be responsible for verifying that the traffic control devices and measures are in place and are effective. The Resident Engineer shall conduct a daily review of the traffic control measures and may request a field audit (either daytime or nighttime) of the project from the Traffic Operations Section. As part of this audit, the Traffic Operations Section shall provide recommendations for improvements to the traffic control measures.

4-641.60 Measurement and Documentation

Work performed in conducting traffic control operations is covered under five Items, and is paid by lump sum for traffic control, by each unit for portable changeable message signs and portable arrow boards, and by the day for the rental of portable changeable message signs and portable arrow boards.

Entries should be made in the summary field book testifying that the traffic control measures were completed in accordance with plans and specifications.

4-646 REFLECTORIZED PAVEMENT MARKERS

4-646.10 General

► Reference: *Section 646 Reflectorized Pavement Markings* of the Standard Specifications for Construction

These items consist of furnishing and placing reflectorized pavement markings on roadway surfaces and curbs.

4-646.20 Required Submittals

None.

4-646.30 Engineering

Reflectorized pavement markings shall be laid out by the Engineer at the stations and/or locations indicated on the plans. Temporary markings shall be laid out by the Contractor.

4-646.40 Sampling and Testing

Paint used for final markings requires certification as well as sampling, unless it has been purchased directly from VTrans. The Resident Engineer shall submit a representative sample amount of 475 ml (1 US pint) of paint to the laboratory for sampling.

Paint used for temporary markings does not require certification. Refer to *Subsection 646.08 Temporary Pavement Markings* for information regarding materials used for temporary pavement markings.

Glass beads shall meet the requirements of AASHTO M247 Type 1. The Resident Engineer shall submit a representative sample amount of 475 ml (1 US pint) to the laboratory.

4-646.50 Construction and Inspection

The Inspector should confer with the paint crew foreman before any work begins and verify the proper procedures and methods for applying pavement markings, especially stop bars, lane tapers, and other special instances. Pavement markings are one of the most noticed highway construction features by the travelling public, and the Resident Engineer shall verify that the applied pavement markings are properly aligned with the roadway with the correct color tone. The Resident Engineer will suspend pavement marking operations if unsatisfactory results are exhibited and verify that corrective measures are taken by the Contractor to properly apply the pavement markings.

The application of thermoplastic pavement markings, which are extruded onto the pavement surface in a molten state, should be carefully monitored by the Resident Engineer. The proper application temperature range for thermoplastic pavement markings shall be between 205°C and 225°C (400°F and 435°F). Refer to *Subsection 646.07(c) Thermoplastic* for more information regarding thermoplastic pavement markings.

4-646.60 Measurement and Documentation

Payment for work conducted in the application or removal of reflectorized pavement marking is covered under twelve items for paint pavement markings, twelve items for durable pavement markings, fourteen items for temporary pavement markings, three items for other related marking items, and two items for marking removal.

Payment is made by meter (linear foot) of pavement marking applied on the project and by each item for individual letters and symbols. Payment for Item 646.82 Painted Island, Item 646.85 Removal of Existing Pavement Markings, and Item Pavement Marking Mask is made by square meter (square foot) of applied or removed area.

4-649 GEOTEXTILE FABRIC

4-649.10 General

► Reference: *Section 649 Geotextile Fabric* of the Standard Specifications for Construction

The work in this section consists of furnishing and placing geotextiles in underdrain trenches, embankments, and under stone fill and riprap. Geotextile fabrics deployed on a highway project are used in three different ways, as follows:

1. **Filter**: Geotextile fabric acts as a filter when placed between layers of material such as subgrade in excavated areas and as a lining in underdrain trenches and under stone fill.
2. **Silt Fence**: Geotextile fabric acts as a silt fence when it is used to trap sediment where sheet and rill erosion is expected in small drainage areas.
3. **Filter Curtain**: Geotextile fabric acts as a filter curtain when it is used to contain sediments or pollutants from a work area adjacent to or under water.

4-649.20 Required Submittals

None.

4-649.30 Engineering

None.

4-649.40 Sampling and Testing

The geotextile fabric furnished shall have a Type D certification. The Resident Engineer will present the lab with a representative sample for testing.

4-649.50 Construction and Inspection

The Resident Engineer shall specify the location and installation of the geotextile fabric. Refer to contract plan detail sheets for more information about specific applications.

Geotextile fabric used for a silt fence on a slope should be attached on the up-slope side of posts that have been placed to anchor the fabric. The geotextile at the bottom of the silt fence should be buried in a trench a minimum of 150 mm (6 in) below the ground surface.

The silt fence should be located along the contour of the slope to avoid concentrating the flow of water and sediment, which would result in the failure of the silt fence. Geotextile fabric should be backed with woven wire reinforcement in a silt fence application that is to be placed within 30 m (100 ft) upslope of receiving waters.

The geotextile fabric used for a filter curtain should be applied in contact with the banks of the body of water at both the upstream and downstream ends, anchored to withstand current and wave action, and sized to properly cover the required area. A filter curtain that is sized too small may allow turbid water to escape out the bottom and a filter curtain sized too large may balloon out, becoming unmanageable and potentially unsafe.

When working with filter curtains, the Resident Engineer should conduct an analysis of the prevalent soil types to determine the type of geotextile fabric to employ. Soils that have a high concentration of silt or clay produce a turbid water flow and require a filter curtain with properly sized apparent openings to work effectively.

The Construction Environmental Engineer should be consulted when it is necessary to use a filter curtain in a stream or river. Moving water presents a serious challenge to filter curtain placement, and the proper procedures must be employed for a successful installation.

Silt fences and filter curtains should be regularly inspected and any damaged material should be repaired or replaced as detailed in the Erosion Prevention and Sediment Control Plan. The Contractor should remove the sediment deposited behind the silt fence when it measures half the height of the fence. The removed sediment should be disposed of in an approved waste area. The silt fence should remain in place until all disturbed earth upslope of the fence is permanently stabilized. Once the silt fence is removed, the disturbed area should be seeded and mulched.

4-649.60 Measurement and Documentation

Work performed in the furnishing and placing of geotextile fabric is covered under seven Items, and is paid by the square meter (square yard) of material installed on the project.

4-651 TURF ESTABLISHMENT

4-651.10 General

► Reference: *Section 651 Turf Establishment* of the Standard Specifications for Construction

The work covered in this section involves the preparation of an area to receive a turf covering and the application of topsoil, sod, seed, and soil amendments as necessary. Turf is used for permanent erosion control and to enhance the aesthetics of the project. Contractors should complete slope grading and apply turf establishment items within 48 hours of obtaining final grade.

VTrans uses a grass seed formula that consists of several different varieties of grasses in order to meet most field conditions found in Vermont and is shown on the project detail sheets. Lime changes the pH factor of soil from acid to alkaline and should be used to control mosses that favor an acidic soil environment.

Fertilizer should be applied to improve the growth of seed or sod. Mulch should be applied to protect the seed through early growth and binder helps to keep mulch, and thus the seed, in place. As vegetation is established, mowing should be employed as an effective means of weed reduction.

4-651.20 Required Submittals

None.

4-651.30 Engineering

The Resident Engineer shall specify and approve the areas that are to receive a turf covering as well as the seed formula, and the application rates for seed and mulch, before the Contractor commences work. The Resident Engineer shall determine if a particular area is to be seeded or have sod laid instead.

4-651.40 Sampling and Testing

Seed, fertilizer, lime, and compost to be used on the project require certification. Hay mulch should to be inspected by the Resident Engineer for compliance with the *Subsection 651.08(b)1 Hay Mulch* of the Standard Specifications for Construction. Hydraulic mulches and mulch binder should be approved based on specifications from the *Materials Laboratories Approved Products List.*

If sod is specified for application, it should be inspected at the time of delivery on the project to verify its condition.

Topsoil that is used for turf establishment can be material excavated from on site or it can come from an offsite source. The Contractor should conduct laboratory testing on topsoil that comes from the project site or from topsoil stockpiled offsite for more than a year. Testing should determine which amendments may be needed to aid in establishing turf growth.

The Contractor will provide the Resident Engineer with a 0.45 kg (1 lb) topsoil sample for every 190 CM (250 CY) of topsoil to be used on the project at least 30 days prior to application. The Resident Engineer will submit the topsoil samples for testing.

The UVM Agricultural Extension Services or an equivalent approved facility is specified for testing, but the actual testing is done by the University of Maine. The UVM Agricultural Extension Services will accept submittals and forward them to University of Maine for testing and then supply the results and recommendations.

Call the UVM Agricultural Extension Services at (802) 656 – 3030 or (800) 244 – 6402 to request free sample bags. Regular zip-lock plastic bags may also be used for samples.

There is a *Soil Test Submission Form* from the UVM Agricultural Extension that must accompany the soil sample. The *Soil Test Submission Form* may be found at the following URL:

https://www.uvm.edu/pss/ag_testing/Garden_hort_questionnaire_10_28_2014.pdf

The Contractor should also send a copy of the related page from *Section 651 Turf Establishment* of the Standard Specifications for Construction with the soil sample. The form returned from UVM will have recommendations for additives or other requirements based on the soil tests.

The mailing address for soil samples is:

UVM Agricultural and Environmental Testing Lab
262 Jeffords Hall
Burlington, VT 05405-1737

4-651.50 Construction and Inspection

Grubbing material should not be stockpiled in an area that may cause material to become infested with invasive species. Grubbing material should only be placed within project limits, or in areas that have been cleared for cultural and natural resources.

The Inspector shall witness the loading of hydraulic power sprayers when hydroseeding is specified. Where power sprayers are not available, a mechanical hand seeder should be used. Winter rye should be used for temporary seeding of stockpiles and areas requiring future earth disturbance prior to final grading, but not as permanent seeding except when called for in typical seed mixtures.

Hay mulch should be spread at a rate of 4.5 metric tons (4.96 tons) per hectare (2.47 acres). In a uniform layer, this will allow for 25% of the ground surface to be visible through the hay mulch. Too heavy an application of hay mulch will smother the seed.

Mulch should not be used in urban areas between sidewalks and curbs or on lawns near roads or sidewalks as it can easily blow away. Mulch netting and tackifiers may be used to aide in holding down the mulch. If used, these two items are considered incidental to the mulch item.

Other options such as hydraulic mulch and erosion matting may be used as alternatives to mulch. Refer to *Subsection 651.08(b)2 Hydraulic Mulch* and *Subsection 653.05 Erosion Matting* of the Standard Specification for Construction for more information.

The Inspector shall witness the loading and application of hydraulic mulch to verify that the material is sprayed from multiple directions and adequate coverage is provided.

When placing sod, the ground surface's moisture content should closely match that of the sod to prevent the sod from drying out. Sod should be laid with staggered longitudinal joints.

The areas to receive topsoil should be inspected for proper grading and conformity with the typical sections, and the depth of topsoil spread should be periodically checked for compliance with the required depth. Topsoil should not be compacted after its application.

4-651.60 Measurement and Documentation

Work performed in the preparation and application of topsoil, sod, seed, and mulch is covered under 11 Items, and paid by the kilogram (pound) of seed and fertilizer, by the metric ton (ton) of limestone or mulch, by the liter (gallon) of hydraulic mulch, the square meter (square yard) of sod and grubbing material, and by the cubic meter (cubic yard) of topsoil.

Each quantity of mulch delivered to the project should be substantiated by a weight ticket. Each weight ticket should be identified by the project name, number, and contract number; show the gross, tare, and net weight; and be dated and signed by the Resident Engineer or their representative upon receipt.

An average weight for hay bales can also be taken and compared to the actual number of bales. Once delivered and accepted, any quantity of mulch removed for use elsewhere or for some other purpose should require a weight ticket to show that proper credit is received.

Daily invoice slips from the Contractor or Subcontractor showing the number of kilograms (pounds) of seed, lime, and fertilizer or liters (gallons) of hydraulic mulch furnished and used, the locations specified and areas covered should be kept. Each slip should be signed by the Contractor or Subcontractor and the Resident Engineer or Inspector

All of the sodded areas should be measured and all field dimensions should be entered in the proper field book.

The volume of topsoil to be paid should be computed from the typical sections for the roadway and from field measurements for irregular, non-typical areas. The Resident Engineer should verify that the topsoil does indeed conform to the typical sections by conducting field checks and should enter this information in the field book as shown in *Section V Sample Field Book.*

The volume of certain typical sections may be determined by a computer program. Field measurements taken for irregular areas should be entered in the miscellaneous field book.

Topsoil obtained from project excavation should be used and paid for as Item 651.35 Topsoil with the written permission of the Resident Engineer. Payment for topsoil testing should be made once the Resident Engineer receives an invoice from the testing facility. The Resident Engineer should sign off with an EA code and forward it on for payment processing.

4-652 EROSION PREVENTION AND SEDIMENT CONTROL (EPSC) PLAN

4-652.10 General

► References: *Section 653 Erosion Prevention and Sediment Control Measures* of the Standard Specifications for Construction and General Permit 3-9020 for Stormwater for Runoff from Construction Sites (As Amended February 2008), Vermont Agency of Natural Resources

For additional information you can visit the Agency's Environmental Section Erosion Prevention & Sediment Control webpage at the following URL:

https://www.vtransengineering.vermont.gov/bureaus/pdb/environmental/erosion-prevention

Inclusion of Erosion Prevention and Sediment Control Items: Construction projects that involve an area greater than one acre (0.4 hectare) of land disturbance require a permit for discharge of stormwater. An *Erosion Prevention and Sediment Control* (EPSC) Plan for the project shall be generated to address the issues of stormwater runoff. The Items for designing and furnishing, monitoring, and maintaining the EPSC Plan shall be added to contracts in accordance with the VTrans EPSC Protocol (Revised May 2009).

Projects with contracts that include a *National Pollutant Discharge Elimination System* (NPDES) Permit, an *Individual Construction Permit*, or a *General Permit 3-9020 for Stormwater Runoff from Construction Sites* from the Vermont Agency of Natural Resources (ANR) shall have the items.

Refer to the ANR's Watershed Management Division – *Stormwater Permit Information, Application & Fees* webpage at the following URL:

www.vtwaterquality.org/stormwater/htm/sw_permits.htm

Projects that disturb less than one acre (0.4 hectare) are considered "non-jurisdictional" under the VTrans EPSC Protocol. Contracts for non-jurisdictional projects with the potential to impact waters of the Sate shall include the erosion control plan items while contracts with little or no potential impact shall not.

Paving is considered "maintenance" and is an exempt activity under the NPDES regulations and shall not include the items. Paving projects still require EPSC measures to be implemented and maintained as necessary, but the items shall not be included in the Contract as Items.

Applying as Co-Permittee: If the contract documents include a copy of the NPDES *Individual Permit* or *General Permit 3-9020* the Contractor, as the Principal Operator, shall become a Co-Permittee by submitting and filing with the ANR a *Notice of Addition of Co-Permittee* listed on ANR's website.

This form shall be submitted by the Contractor directly to ANR with copies going to the Resident Engineer and Construction Environmental Engineer. The Contractor shall not begin work on the project until this form is filed with the ANR.

Appointing an On-Site Plan Coordinator: As stated in the regulation, a project authorized as "low risk" under the *General Permit* does not require an On-Site Plan Coordinator (OSPC) but a "moderate risk" project does. However, regardless of the risk authorized, any contract including these items and thus the *Special Provision*, EPSC Plan, will require the Contractor to name an OSPC.

"Moderate risk" projects shall also require submittal of a *Notification of On-Site Plan Coordinator* to ANR. This form, along with others requiring completion and submittal by the OSPC, shall be included in an OSPC Binder provided by ANR with the project authorization. Additional responsibilities of the OSPC are described in the *Special Provision*.

4-652.20 Required Submittals

An *Erosion Prevention and Sediment Control Plan* (EPSC Plan) shall be submitted as outlined in the contract.

4-652.30 Engineering

Contract EPSC Plans shall be prepared by a Vermont-registered Professional Engineer (PE) or a Certified Professional in Erosion and Sediment Control (CPESC), and in accordance with the appropriate checklist (for non-jurisdictional or low risk projects) or permit requirements (for moderate risk projects).

Proposed modifications to the EPSC Plan for projects authorized under a *Construction General Permit* shall be evaluated to determine if they constitute a minor or major amendment. Minor amendments require a *Minor Amendment Record* form which shall be completed and kept on-site. Major amendments require a new Notice of Intent (*NOI)* to be filed. Modifications to projects with an *Individual Construction Permit* must be submitted as required by the specific conditions of that permit.

4-652.40 Sampling and Testing

There are no materials requiring certification or approval from the VTrans Material and Research Section for these items. However, there are general monitoring and discharge reporting requirements as outlined below.

The On-Site Plan Coordinator (OSPC) is responsible for all monitoring and reporting, whether it is done by them, authorized staff personnel, or a Consultant. Each report shall be signed by the OSPC.

Inspections shall be conducted as required by *Special Provision, Erosion Prevention and Sediment Control Plan*, or *Construction Permit*. *General Permit 3-9020* does not require a report for non-jurisdictional and low-risk projects, but projects that do fall into these categories shall require the use of the *VTrans EPSC Plan Inspection Report (Non-Jurisdictional and Low Risk projects).*

All stormwater discharges shall be noted and reported as described on the monitoring forms and as required by *General Permit 3-9020* with corrective actions implemented immediately. If those corrective actions do not eliminate the discharge at a low risk project, a *Low Risk Discharge Report* must be filed with ANR. For moderate risk projects there is a more elaborate protocol involving turbidity sampling. Refer to *General Permit 3-9020 Section 6.3 Discharge Inspection, Sampling, and Corrective Action Requirements at Moderate Risk Sites* for specific requirements for discharges on moderate risk projects.

4-652.50 Construction and Inspection

The Construction Environmental Engineer shall approve all plans and modifications submitted per the requirements of Special Provisions, *Erosion Prevention and Sediment Control Plan*, before implementation.

The Resident Engineer or Inspector shall ensure that inspections are done properly and in a timely manner, using the appropriate forms as specified. The Resident Engineer or Inspector shall also ensure that all measures of the *EPSC* Plan are installed properly. Improperly installed *EPSC* measures, with a greater potential for failure and requiring more maintenance, shall not be accepted.

4-652.60 Measurement and Documentation

Payment for an *EPSC* Plan shall only be made once it is considered completed and accepted. The Contractor shall not be paid for any additional amendments. The Contractor may be paid for monitoring, reviewing and reporting on all *EPSC* Plan measures, including those at waste areas. The Resident Engineer shall approve, upon submission of the proper reports, payment to the Contractor for this type of work. Travel time to the site shall not be paid.

Maintenance required due to the failure of an improperly installed measure shall not be paid for. The contractor may be paid for maintenance of the *EPSC* Plan within the project limits, but may not be paid for maintenance of measures at waste areas.

4-653 EROSION PREVENTION AND SEDIMENT CONTROL MEASURES

4-653.10 General

► Reference: *Section 653 Erosion Prevention and Sediment Control Measures* of the Standard Specifications for Construction

The work in this section involves furnishing, installing, maintaining, removing, and disposing of erosion prevention and sediment control measures.

4-653.20 Required Submittals

None.

4-653.30 Engineering

The Resident Engineer or Inspector shall verify that the erosion prevention and sediment control measures are applied properly and in a timely manner according to the *EPSC* Plan.

The Contractor shall not be limited to the items described in this section, but if the Contractor wants to use products or methods that are not included in the *EPSC* Plan, the Resident Engineer should consult with the Construction Environmental Engineer to determine if the products or methods are appropriate to be employed. A written record of the product's effectiveness will be included in the inspection report.

4-653.40 Sampling and Testing

Seed, fertilizer, lime, and compost to be used on the project require certification. Hay mulch shall to be inspected by the Resident Engineer for compliance with *Subsection 651.08(b)1 Hay Mulch* of the Standard Specifications for Construction.

The geotextile fabric and aggregate furnished for erosion prevention and sediment control shall be listed in the contract as being acceptable for the project. The Resident Engineer shall obtain a sample of the geotextile and send it to the testing lab.

The remaining items that are used for erosion prevention and sediment control must be listed on the *Materials Approved Products List.*

4-653.50 Construction and Inspection

Areas disturbed by construction activities should not be left exposed. Temporary soil stabilization methods should be applied to exposed earth within 48 hours. If vegetation is not established within 21 days, seed and mulch and/or other stabilization measures required by the EPSC Plan should be applied at the Contractor's expense.

The manufacturer's recommendations for application rates, pre-wetting, and cleaning of equipment should be followed when applying soil binder. The soil should have sufficient moisture to assist the soil binding agent in achieving uniform distribution. Soil binder should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 4°C (40°F).

Appropriate erosion matting that meets the requirements of the EPSC Plan should be chosen according to the manufacturer's recommendations. The area that will receive erosion matting should be graded and free of sticks, rocks, or eroded areas.

The Resident Engineer should verify that the erosion matting is keyed-in and stapled properly so that the material remains in full contact with the soil surface. Properly installed matting sheets should be overlapped as detailed in the EPSC Plan detail sheets and be conFigured to prevent any infiltration of runoff and resulting erosion beneath the matting.

Temporary check dams installed for erosion prevention should be constructed in such a way that the material extends up the side slopes of the channel, directing the flow through the center of the structure and not around the ends. If undermining is a problem; geotextile should be installed under the material or the material should be trenched into the ground.

Stone check dams should be constructed with adequately sized stone to prevent the dam from being blown out. Additional structures may be necessary to provide proper stability to the dam area. Accumulated sediment that reaches one half the height of the dam should be removed and disposed of properly.

The Contractor should construct vehicle tracking pads at each access point between the construction area and public or private roads with a minimum length of 15 m (50 ft), a minimum width of 3.6 m (12 ft), and a minimum depth of 200 mm (8 in).

Inlet protection devices should be specified to filter pond water to allow sediment to settle out. This water should not be diverted as it may cause adjacent areas to become flooded or adjacent inlets to be overwhelmed.

Filter bags should only be placed within the project limits or in areas that have been cleared for cultural and natural resources and approved in the EPSC Plan. The Resident engineer should verify that water is flowing through the fabric and not where the discharge hose is connected.

Archaeologically sensitive areas, wetlands, trees, or any other resources to be protected should be enclosed in a barrier fence to ensure that the Contractor and project personnel have no impact on them.

Project demarcation fencing, if necessary, should be placed according to the EPSC Plan. However, in urban areas, this fencing should not be used if there are property owner objections.

The location and installation of barrier and project demarcation fencing should be approved by the Resident Engineer. The Contractor should immediately repair any damaged fence posts. Any apparent damage caused to protected areas should be reported to the Construction Environmental Engineer.

4-653.60 Measurement and Documentation

Work performed in furnishing, installing, maintaining, removing, and disposing of erosion prevention and sediment control measures is covered under 17 Items, and is paid by the liter (gallon) of tackifier, by each item for hay bales, prefabricated check dams, inlet protection devices, filter bags, and live stakes, by square meter (square yard) of erosion matting, by cubic meter (cubic yard) of stone check dams and vehicle tracking pads, and by the meter (linear foot) for fencing, logs, fascine, and brush layering.

The Contractor should not be compensated for any erosion prevention and sediment control measures that are not installed properly. Time, labor, and equipment should not be compensated for more than once, unless the items need to be re-installed at no fault of the Contractor.

4-656 PLANTING TREES, SHRUBS, AND VINES

4-656.10 General

► Reference: *Section 656 Planting Trees, Shrubs, and Vines* of the Standard Specifications for Construction

The work in this section involves furnishing, transporting, planting, and transplanting trees, shrubs, vines, and ground cover plants. All landscaping materials shall meet the qualifications outlined in *Section 755 Landscaping Materials* of the Standard Specifications for Construction.

The VTrans Landscape Coordinator from the Operations Division and the VTrans Landscape Architect from the Program Development Division should be contacted for assistance with the following activities:

- Inspection
- Coordination with the Contractor
- Coordination with the landscape contractor
- Adjustments or substitutions to the landscape design
- Review of Contractor's compliance with specifications
- Training for Environmental Inspectors

The Landscape Coordinator and Landscape Architect should be involved in the early planning stages of the project to better coordinate their work.

4-656.20 Required Submittals

None.

4-656.30 Engineering

The Contractor shall stake out all plant material locations with the Resident Engineer's approval.

4-656.40 Sampling and Testing

Landscape backfill shall consist of:

- 50% topsoil
- 25% compost
- 25% native soil

The topsoil should be tested as described in *Section 4-651 Turf Establishment*. The compost should come from one of the approved sources with a Type A certification ensuring that it meets the specification, otherwise it should be tested and meet the specification. The native soil material is what exists in the planting area and does not need to be tested.

4-656.50 Construction and Inspection

The VTrans Landscape Coordinator and the VTrans Landscape Architect may inspect the following:

- Site conditions
- Plant materials
- Seed types and mixes
- Topsoil
- Backfill
- Grubbing
- Planting methods
- Watering methods
- Tree protection methods

Larger landscaping projects may require a full-time landscape contractor to oversee operations and conduct inspections at the following times:

- At delivery of planting material to the project
- Four to six months after the first planting (with a second planting to occur no later than 30 days after the first inspection)
- Four to six months after the second planting (with a final planting to occur no later than 30 days after the second inspection)

4-656.60 Measurement and Documentation

Work performed in furnishing, transporting, planting, and transplanting trees, shrubs, vines, and ground cover plants is covered under 15 items, and is paid by each item for individual plants, by the square meter (square yard) for transplanting ground cover, by the cubic meter (thousand gallons) of water, by the cubic meter (cubic yard) for backfill, and by lump sum for tree protection.

Landscape watering will be paid with a submittal and acceptance of the required weekly log.

4-675 TRAFFIC SIGNS

4-675.10 General

► Reference: *Section 675 Traffic Signs* of the Standard Specifications for Construction

The work in the section involves furnishing and installing traffic signs, removing existing signs, installing salvaged signs, and overlaying existing signs. Traffic signs are used to guide, regulate, and warn traffic.

4-675.20 Required Submittals

Refer to the Specifications and contract documents.

4-675.30 Engineering

Traffic signs shall be located based on travelling speed, sight distance, and reaction time. The Resident Engineer will have discretion in sign location and not necessarily place them exactly as indicated on the plans if conditions indicate otherwise. The Resident Engineer should confer with the Project Manager if major changes are made to the sign layout.

For the safety of the travelling public and construction personnel, highway signs should be positioned behind guardrail runs whenever possible.

4-675.40 Sampling and Testing

New signs and posts require certification while concrete foundation materials are subject to testing.

4-675.50 Construction and Inspection

The Resident Engineer shall verify that the width and depth for sign posts and footings are correct. Refer to the *Standard Sheets* from the Traffic and Safety Section for details regarding signs and signage.

Where aluminum alloys come in contact with other metals, a neoprene gasket or aluminum impregnated caulking compound should be used to separate them to prevent electrolytic action and corrosion. Bolts connecting the sign to its post should be properly tightened to prevent bolt hole enlargement. 5.21 kg/m (3.5 lb/ft) flanged channel posts may be substituted for 2.98 kg/m (2.0 lb/ft) or 3.72 kg/m (2.5 lb/ft) flanged channel posts if payment is made for the lighter post.

Larger sign support installations with W-shaped flange posts installed per *Standard Sheet E-161* require careful monitoring and inspection of the torque applied to the nuts at the base of the support. There is a specified range in which these nuts must be installed to perform adequately as a breakaway type support. The Construction Section has a smaller torque wrench for use in inspection of these installations.

4-675.60 Measurement and Documentation

The work performed in furnishing and installing traffic signs, removing existing signs, installing salvaged signs, and overlaying existing signs is covered under 15 Items, and is paid by the square meter (square foot) for signs, by the meter (linear foot) for flanged channel and square tube posts, by the kilogram (pound) for steel and aluminum posts, and by each item for post foundations, and removing, resetting, and modifying sign posts.

Field measurements of sign dimensions and new sign post lengths shall be entered in the appropriate field book, and the required areas and weights calculated. These listings shall also show locations by stations, position left or right, and sign designation or description.

The item for removing signs requires the standard statement for lump sum items.

Foundations and setting salvaged posts require field counts listed in the appropriate field book; including locations by stations, position left and right, and the sign width designation.

4-676 DELINEATORS

4-676.10 General

► Reference: *Section 676 Delineators* of the Standard Specifications for Construction

The work in this section involves removing or furnishing and installing reflector units or delineators. Delineators are generally used on limited access highways as a guide for the shoulder of the mainline, ramps, rest areas, and weigh stations. They also contain kilometer (mile) marker plaques when required. Delineators shall be installed as indicated on *Standard Design Sheet T-40*.

4-676.20 Required Submittals

None.

4-676.30 Engineering

The Resident Engineer shall designate the location of Type I delineators and mileposts. Type II and Type III delineators shall be installed at the stations indicated on the plans.

4-676.40 Sampling and Testing

Delineator, reflector units, and post items must be certified.

4-676.50 Construction and Inspection

Delineators and reflective units are some of the last items to be installed on the project. These items are vulnerable to theft and damage, and they shall be installed with properly set posts and fastened with secured vandal-resistant nuts.

4-676.60 Measurement and Documentation

Work performed in removing or furnishing and installing reflector units or delineators is covered under four Items, and is paid by each unit installed on the project. A field count of these items shall be entered in the appropriate field book, grouped by their location (i.e., northbound lane, southbound lane, ramps, etc.).

4-677 OVERHEAD TRAFFIC SIGN SUPPORTS

4-677.10 General

► Reference: *Section 677 Overhead Traffic Sign Supports* of the Standard Specifications for Construction

Work in this section involves furnishing and installing overhead traffic sign supports and their concrete footings. Overhead traffic signs are generally used in areas of high traffic volume where lane designations and directions are necessary to aid in traffic flow.

4-677.20 Required Submittals

The shop drawings for the design and fabrication of overhead traffic sign supports shall be prepared per *Subsection 105.03 Plans and Working Drawings*. The shop drawing shall be forwarded to the Structures Engineer for approval.

The Contractor shall submit procedures for the shop welding of overhead traffic sign supports and any field welding for the Structures Engineer's approval before work begins.

4-677.30 Engineering

These items will be laid out by the Resident Engineer. Bolt alignment must be exact for proper installation of the framing.

The Resident Engineer will lay out the anchor bolt pattern, with attention paid to the proper bolt alignment to ensure proper installation of the framing.

4-677.40 Sampling and Testing

These items require certification. All design details shall be in accordance with AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals. Structural concrete and steel reinforcement bars will be tested.

4-677.50 Construction and Inspection

Since each overhead traffic sign support has its own characteristics, the plans shall be followed explicitly to ensure that the support is constructed properly.

4-677.60 Measurement and Documentation

Work performed in furnishing and installing overhead traffic sign supports and their concrete footings is covered under five items, and is paid by each item installed on the project. The Resident Engineer will make entries in the summary field book testifying that the overhead traffic sign supports were completed in accordance with plans and specifications.

4-678 TRAFFIC CONTROL SIGNS

This section is reserved for future development. Refer to *Section 678 Traffic Control Signals* of the Standard Specifications for Construction for more information pertaining to this item.

4-679 STREET LIGHTING

This section is reserved for future development. Refer to *Section 679 Street Lighting* of the Standard Specifications for Construction for more information pertaining to this item.

4-680 TRAVEL INFORMATION SIGNS

This section is reserved for future development. Refer to *Section 680 Travel Information Signs* of the Standard Specifications for Construction for more information pertaining to this item.

STATE OF VERMONT

AGENCY OF TRANSPORTATION

CONSTRUCTION DIVISION

2015

ENGLISH/METRIC

CONSTRUCTION MANUAL

SECTION V

SAMPLE FIELD BOOK

5-100 INTRODUCTION

This section of the Construction Manual details the accepted methods of record keeping in the field books. These instructions are compiled in order to standardize the procedures used by all Resident Engineers. A complete review of the project and its complexities must be accomplished before work is started on the field books. Blank field books are available for pick-up at Construction Headquarters or the Regional Construction Offices.

5-110 GENERAL NOTES

Field books shall contain all relevant project information, including, but not limited to the following items:

1. Field book covers shall be marked with the following information:
    - Project name
    - Project number
    - Contract ID number
    - Project code
    - Book title
    - Book number

    Temporary markings with black marker pen are to be made on masking tape only. Self-adhesive computer-generated labels are also acceptable.

2. All entries should be made in pencil. Use a lead hardness that will not smudge on the paper.

3. All item documentation shall show locations, elevation, sketches, and dimensions where applicable. Where options are allowed, document what was actually used. Reference any and all documentation that resides outside of the field books.

4. All quantities, measurements, and changes made in the field books should be dated and signed. Original entries shall be made in pencil. Checked entries should be recorded with red pencil. Any changes made in red should also be checked and the verification written in another color, such as blue or green pencil.

5. Items for which the quantity is determined by computations based on typical sections or plan dimensions should be checked in the field to assure the work conforms to the plans and/or typical section. This check log will necessitate one extra sheet allotted for the appropriate items in the summary book.

DATE	ITEM	STATION	INSPECTOR	REMARKS
6/1/2015	501.25	S.A. 12 S.B. Pier #1	A.B.C.	Dimensions Acceptable

6. As much as is practical, all notes (except final section notes, borrow pit, cut, and fill notes) shall be in bound field books. Reference any and all documentation that resides outside of the field books.

7. Each heading shown on the plan quantity sheet should have a separate area in the summary books. For example, roadway items might occupy Summary Book #1 and #1A, while landscaping, erosion control, training, and utilities might occupy Summary Book #1B. A separate summary book shall be set up for all bridge items. Refer to *Subsection 5-130.30 Book #3 – Bridge* for more information. All items shall be listed in sections corresponding to the breakdown on the *Initial Estimate* (Appendix E-1) or *Contract Item Summary Report* (Appendix B-20).

8. Four sheets should be sufficient for each item in the Roadway Summary Book. The Bridge Summary Book shall have sufficient space allotted with each item to include all detailing in the line with the items.

9. The breakdown required for each item is similar to the breakdown shown on a *Contract Item Placement Report* (Appendix E-2). Refer to *Subsection 5-150, Field Book Item Related Entries* for related field book examples.

10. All books should have the pages "Property of [Resident Engineer]" and "Contract Information" fully and accurately filled out.

11. All books should be completely indexed. Book #1 should contain an index of the project books in addition to an index of the material to be found in Book #1. When setting up the indices, provide enough room for expansion, as material may need to be added to the book.

5-120 BOOK NUMBERING

All books should be numbered consecutively according to the following parameters:

Book #1 Summary (Roadway, Erosion Control, Utilities, etc…)

Book #2 Drainage

Book #3 Bridge

Book #4 Control

Book #5 Job Diary

Book #6 Excavation

When more than one book is required in a particular category, the additional book(s) should carry the same number followed with the letter(s) A, B, C, etc.

Book #2A Drainage

Book #2B Drainage

The number of summary books required shall depend on the size and complexity of each project. The plans, quantity sheets, and specifications shall be thoroughly studied before the project books are set up. Ample room shall be allowed for each item as well as space at the end of each category for the addition of items not originally included in the contract; such as items added by *Change Order* (Appendix A-1).

5-130 BOOK CONTENTS – GENERAL

5-130.10 Book #1 - Summary

Index – A list of the project books to be used for the project in addition to an index of the contents to be found in Book #1.

Engineering Work Force – Names and appropriate information for each VTrans employee and/or Consultant involved with project management and/or inspection on the project.

Individual Item Summaries – Each item must be specified as shown on the *Contract Item Placement Report* (Appendix E-2), including items that may have been added during construction.

5-130.20 Book #2 – Drainage

Index – Lists material found in this book.

Drainage Systems – Document station-to-station drainage systems, instead of listing each drainage item individually. Applicable cross-referencing to the item quantities in the summary books shall be noted.

Underdrain –Recorded as a separate section in the back of the last drainage book, or in a separate drainage book if the amount is great enough.

Drainage Summary – This shall be set up in the front of the first drainage book. In the case of many drainage items, a separate *Drainage Summary Sheet* shall be set up and kept as part of the final project records. The drainage summary shall contain all drainage items not summarized in detail in Summary Book #1.

5-130.30 Book #3 – Bridge

Index – Lists material found in this book.

Items - All bridge items, as well as detailed information pertaining to each item, should be recorded in the bridge book.

Sections – Entire structure sections should be recorded in the bridge book or on separate note paper kept with the finals' records. A second book may be necessary for a large number of structure sections. All sketches and computations should be shown with each applicable item. 8 ½ in x 11 in computation sheets may be used.

Layout and Control - The layout and control data should be included this book, if there is enough space.

Separate bridge books should be set up for each bridge location.

5-130.40 Book #4 – Control

Index - Lists material found in book.

Content – All line control for the project should be entered in this book, including curve data and corresponding field control data, bench mark elevations and locations, banking information, offset staking notes, and grades. Final control, tied in with concrete markers, such as Point of Curvature (PC), Point of Tangent (PT), and Point on Tangent (POT) should be noted. On projects that use one, project control data may also be entered and stored in an electronic data collector for use with total station survey equipment.

5-130.50 Book #5 – Job Diary

The Resident Engineer should keep a job diary as a brief and factual record of the major decisions and actions of the day. Every entry should be made in ink. However, if the Resident Engineer submits a *Daily Work Report* (Appendix B-2) as a complete and accurate document containing all relevant project information, keeping a separate job diary is unnecessary. Regardless, information entered in the job diary or *Daily Work Report* may be subject to judicial subpoena; the Resident Engineer should be able to present any of this information under oath in a court of law.

5-130.60 Book #6 – Excavation (Summary and Detail)

Index – Lists material found in this book.

Summary – Summarizes the quantities outlined in this book.

Detail – Muck and channel sections shall be recorded in this book, as well as all structure sections other than bridge structure sections. Also, excavation and removal of road surface measurements and/or sections and/or measurements of excavation beyond neat lines shall be recorded in this book.

This book shall be carefully organized to allow project personnel to easily find relevant information. All field notes shall be properly documented with the names of the personnel doing the work and the date that the work was performed.

5-130.70 Book #7 – Item Detail

Index - Lists all material found in this book.

Content – All necessary information pertaining to all items except excavation (i.e., paving notes and computations, seeding measurements, boundary marker notes and ties, etc.).

5-140 FIELD BOOK – SET UP

Refer to the following examples to see how to set up the contract management portion of a Field Book, which typically covers the first six pages.

5-140.10 Resident Engineer Information

Enter the project name, number, and contract ID as shown on either the *Initial Estimate* (Appendix E-1) or *Contract Item Placement Report* (Appendix E-2), which is generated in *SiteManager*. The Regional Technician will provide the *Initial Estimate* and *Contract Item Summary Report* reports.

Enter the contact information for the Resident Engineer in charge of the project. Specify either the regional construction office or Construction Headquarters in Montpelier for the Resident Engineer's address, depending on the Resident Engineer's preference. Enter the Resident Engineer's direct landline or cell phone number. Pager numbers shall not be specified as a form of contact.

This contact information shall be entered inside the front cover of the field book or the adjacent page.

5-140.20 Resident Engineer Information Detail

The following is an example of the Resident Engineer contact information sheet:

This Book is the Property of: The State of Vermont **Agency of Transportation (VTrans)** Montpelier, VT	
Project Name:	East Montpelier Highway Bridge
Project Number:	ST 001-1(01)
Contract ID:	12345 - 6
Resident Engineer:	Resident Engineer #1
Address:	One National Life Drive Montpelier, VT 05633-5001
Phone Number:	(802) 123-4567
Cell Phone Number:	(802) 456-7890

5-140.30 Index Summary

The Resident Engineer shall determine which type of field books are appropriate to use for the project. For smaller projects, such as those that only involve paving, crack filling, line striping, signage, and Park and Ride lots, the use of a single field book, with a title such as "Book 1 – Roadway" may be sufficient. The Resident Engineer shall start a new book, "Book 1A – Roadway" if additional space is required to document the project.

Larger and more complex projects shall require the use of all seven of the field book types in some form. The index typically follows the Resident Engineer information in Book #1.

5-140.40 Index Detail

The following table shows an index of field books.

Index of Books		
Book Number	**Book Title**	**Contents**
1	Roadway	Item 202.10 – 609.15
1A	Summary	Roadway – 613.10 – 636.12
		Landscaping and Erosion
1B	Summary	Rest Area and Utilities
2	Drainage	
2A	Drainage	NB
2B	Drainage	SB and TH 6
2C	Drainage	Sections and Underdrains
3	Bridge	I-91 over TH 6
4	Controls	Ties and Benches
5	Diary	
6	Excavation	
7	Item Details	

5-140.50 Contractor Information Summary

Enter the Contractor and Subcontractor information following the index in Field Book #1. The Regional Construction Office or Construction Headquarters has this contract information as well. Information pertaining to the project superintendent and any approved Subcontractors shall be found in the proceedings of the Preconstruction Conference held at the Regional Construction Office.

The Resident Engineer should receive copies of the *Subcontractor Approval Letter* (Appendix B-13a) and *Subcontractor Approval Memo* (Appendix B-14) forms from the Regional Administration Services Technician as approved Subcontractors are added to a project.

5-140.60 Contractor Information Detail

The following table shows information about contractors, subcontractors, and construction dates:

Contractors, Subcontractors & Construction Dates	
Contractor	Contractor #1
Address	125 Main Street, Montpelier, VT
Phone Number	(802) 123 - 4567
Superintendent	Superintendent #1
Address	456 Main Street, Montpelier, VT
Phone Number	(802) 234 - 5678
Subcontractor	Subcontractor #1
Subcontractor	Subcontractor #2
Subcontractor	Subcontractor #3
Contract Date	January 1, 2015
Construction Begun Date	March 1, 2015
Construction Suspended Date	June 15, 2015
Construction Resumed Date	July 1, 2015
Construction Completed Date	September 1, 2015

5-140.70 Project Work Force Summary

Enter information for each VTrans employee and/or Consultant involved with management and/or inspection on the project. List any employee or Consultant actively working on the project for longer than one day. The full name of the employee or Consultant should be entered, along with any common nickname.

Enter the employee classification (i.e., Tech V); the employee's pay grade need not be included. Each person should sign with their own initials. Enter the start and finish dates for each individual working on the project. For example, an individual from the Finals Unit checking the field books would enter their information in red pencil or ink, with the word "Finals" in the dates of service.

5-140.80 Project Work Force Detail

The following table shows an example of a project work force detail:

Project Work Force				
			Service Dates	
Name	**Grade**	**Initials**	**From**	**To**
Employee #1	Eng III	ABC	3/15/15	6/15/2015
Employee #2	Tech III	DEF	4/1/15	8/1/2015
Employee #3	Tech II	GHI	5/15/15	9/15/2015

5-150 FIELD BOOK ITEM RELATED ENTRIES

Refer to the following examples to see how to enter item-related installments and calculations in the various Field Books.

5-150.10 Example #1 – Summary

Example #1 shows *Item 490.30, Superpave Bituminous Concrete Pavement* of the Standard Specifications for Construction. There is a detailed summary of the original estimated pavement quantities on the right page. The summary of estimated quantities shall match the "Detailed Summary of Quantities" outlined on the *Quantity Summary Sheet* in the Contract plans.

The final quantity numbers shall be summarized in similar fashion as the estimated quantities, with a grand total placed above the summary space labeled "Final". Reference shall be made to the calculations binder or folder and the individually dated paving envelopes made up by the Resident Engineer. The "Final" quantity shown in the summary document used shall correspond with the final quantity shown on the *Comparative Quantities Report* (Appendix F-5) or the *Contract Item Summary Report* (Appendix B-20) which is supplied by the Regional Technician.

There are two numbers in the second left-hand column of the first sample page, *0050* and *$83.99*. The first number, 0050, is the SiteManager item code commonly referred to as the "line item." This line item number shall be included on the item summary pages; it is a convenient method to verify that the proper item is being referenced. The second number, $83.99, is the unit price for the item being summarized and shall also be included in the summary. This number may be found on the *Contract Item Summary Report* supplied by the Regional Technician.

Additionally, the *Bituminous Pay Adjustments Calculations Spreadsheet* (Appendix E-3) may be used to tabulate pavement quantities. This spreadsheet also calculates adjustment factors as represented by the following Items:

- Item 490.31 Air Voids Pay Adjustment
- Item 490.32 Mat Density Pay Adjustment
- Item 490.33 Surface Tolerance Pay Adjustment
- Item 490.34 Longitudinal Joint Compaction Pay Adjustment

The *Bituminous Pay Adjustments Spreadsheet* should be printed and included in the calculations binders.

5-150.20 Example #1 – Detail

The following table shows an item summary for Superpave bituminous concrete pavement, left page, for example #1:

Item 490.30, Superpave Bituminous Concrete Pavement			
	Original (tons)	**Final (tons)**	
	1350.0	1398.2	
		ABC 3/15/15	
Line Number	0055		
Unit Price	$89.99		
Units	ton		
Note #1: Refer to the Calculation binder for an itemized summary of all payment details			
Note #2: Refer to the individually dated paving envelopes for more information			
			ABC 3/15/15

The following table shows an item summary for Superpave bituminous concrete pavement, right page, for example #1:

Summary	**Original Quantity (tons)**	**Final Quantity (tons)**	**Remarks**
M/L – Type I	412.0	397.2	
M/L – Type II	260.0	384.0	
M/L – Type III	257.0	276.1	
TH 35	39.0	36.5	
Approaches	151.0	176.8	Extended to Sta. 49+05
Bridge – Type III	43.0	0.0	Used Type IV
Bridge – Type IV	86.0	127.6	
Rounding	45.0	0.0	
Total:	**1,350.0**	**1,398.2**	

5-150.30 Example #2 – Summary

Example #2 shows how to specify excavation and borrow items in the field book. This example is for Item 203.15 Common Excavation of the Standard Specifications for Construction and is from a larger roadway project. There is a detailed summary of the original estimated excavation quantities on the left page. The summary of estimated quantities should match the "Detailed Summary of Quantities" shown on the *Quantity Summary Sheet*s in the Contract Plans.

The detailed summary of any excavation or borrow quantities should be entered in either Field Book #6, the earthworks summary sheet(s), or in a separately maintained spreadsheet format. The "Final" quantity numbers should be summarized in similar fashion to the estimated quantities, with a grand total placed above the summary space labeled "Final." Added remarks should refer to the source and location of these calculations.

5-150.40 Example #2 – Detail

The following table shows an item summary for common excavation, left page, for example #2:

Item 203.15, Common Excavation					
		Original (CY)		**Final (CY)**	
		100,000			
Line Number	0010				
Unit Price	$30.00				
Units	CY				
		Original (CY)	**Final (CY)**		**Remarks**
M/L	SB	80,000			
	NB	7,800			
Ramps		12,000			
Undercut			600		
Rounding		200			
	Total:	**100,000**			

An itemized breakdown shall be shown on either a plan summary sheet or an earthworks spreadsheet with any necessary field additions and any measurements, cross-sections, etc., carried in either Book #6 or in a spreadsheet format. This example applies also to solid rock as well as unclassified excavation.

5-150.50 Example #3 – Summary

Example #3 shows how to summarize items that require a simple area measurement. There are columns for beginning and ending stations, length, width, area, initials, and date. The "measured by" column refers to field measurements done by the Resident Engineer or Inspector and the date the item was measured. The Resident Engineer shall determine which contract items may be summarized in this manner.

5-150.60 Example #3 – Detail

The following table shows an item summary for reclaimed stabilized base, left page, for example #3:

Item 310.15, Reclaimed Stabilized Base		
	Original (SY)	**Final (SY)**
	10,000	
Line Number	0100	
Unit Price	$5.00	
Units	SY	

The following table shows an item summary for reclaimed stabilized base, right page, for example #3:

Beginning Station	**Ending Station**	**Length (ft)**	**Width (ft)**	**Area (yd^2)**	**Measured By / Date:**
10+00	15+65	565	20	1,255.5	ABC / 2/15/15
20+00	38+00	1,800	20	4,000.0	DEF / 3/1/15

Computations with diagrams should be recorded in Book #7 or in spreadsheet format, and should be included in the calculations binder or folder.

5-150.70 Example #4 – Summary

Example #4 shows how to summarize items that require a simple linear measurement. There are columns for beginning and ending stations, length, initials, date and the location of any detailed sketches or dimensions. The "measured by" column refers to field measurements done by the Resident Engineer or Inspector and the date the item was measured. The Resident Engineer shall determine which contract items may be summarized in this manner.

5-150.80 Example #4 – Detail

The following table shows an item summary for granite slope edging, left page, for example #4:

Item 616.20, Granite Slope Edging		
	Original (m)	**Final (m)**
	10,000	
Line Number	0110	
Unit Price	$10.00	
Units	m	

The following table shows an item summary for granite slope edging, right page, for example #4.

Beginning Station	**Ending Station**	**Length (m)**	**Measured By / Date:**	**Detail Book/Page**
9+500 LT	9+520 LT	20	ABC / 2/15/15	

If there is a large quantity of material involved, the detail may be sketched and recorded in Book #7, a calculations binder or folder, or in spreadsheet format.

5-150.90 Example #5 – Summary

Example #5 illustrates a method of summarizing items that require price adjustment. The example used is for Item 690.50 Price Adjustment – Fuel (NABI) as found in the *Supplemental Specifications*. This example can also be used for Item 406.50 Price Adjustment – Asphalt Cement (NABI). The NABI stands for "Not a Bid Item". A unit price of $1.00 per lump unit (LU) is assigned by the Project Manager during the design phase. Refer to the *Bituminous Pay Adjustments Calculations Sheet* (Appendix E-3) and the *Fuel Price Adjustment Calculations Sheet* (Appendix E-4) for example spreadsheets used for calculating both asphalt and fuel adjustments.

The monthly posted price for gasoline fuel (PPG) and posted price for diesel fuel (PPD) may be obtained from the Fuel Price Adjustment web page which is maintained by the Contract Administration Section at the following URL:

http://vtranscontracts.vermont.gov/construction-contracting/fuel-price-adjustment

The index price for gasoline (IPG) and index price for diesel (IPD) may be obtained from the *Special Provision* titled *Section 690 – Fuel Price Adjustment* which can be found in the contract.

The monthly posted price for asphalt may be obtained from the Asphalt Price Adjustment (APA) web page which is maintained by the Contract Administration Section at the following URL:

http://vtranscontracts.vermont.gov/construction-contracting/2008-2010-asphalt-adjustment-specification

The index price for asphalt cement may be found in the *Supplemental Specification* titled *Asphalt Price Adjustment* found in the contract. The index price for asphalt cement is listed per metric ton (ton).

The Resident Engineer shall maintain a spreadsheet of daily paving operations that contains the following items:

- Pavement mix type placed
- Asphalt plant
- Location of paving project
- Daily mix tonnage
- Daily asphalt cement tonnage
- Date of paving project

5-150.100 Example #5 – Detail

The following table shows an item summary for fuel price adjustment, left page, for example #5:

Item 690.50, Price Adjustment – Fuel (NABI)			
	Original	**Final**	
	1 LU	3,151.870	ABC / 5/15/15
Line Number	0280		
Unit Price	$1.00		
Units	LU		

The following table shows an item summary for fuel price adjustment, righty page, for example #5:

Date	EST #	QTY	ACCUM QTY	Inspector	Remarks
8/1/2015	4	2,146.510	2,146.510	ABC	July 2015
8/15/2015	7	706.670	2,853.180	ABC	July 2015
9/1/2015	9	298.690	3,151.870	ABC	August 2015

Copies of the calculation spreadsheets should be included in the calculations binder or folder.

5-150.110 Example #6 – Summary

Example #6 shows how to summarize traffic signs. This method shall also be used to handle items from *Section 675, Traffic Signs* of the Standard Specifications for Construction. Sign summary sheets are provided in the plans, and all tabulations shall be made directly on those sheets, in red, and referred to in summary books. These summary sheets are an excellent way to keep track of work done, and changes made. Additionally, by performing record keeping directly on these sheets also completes necessary record plan requirements for signs and related items.

5-150.120 Example #6 – Detail

The following table shows an item summary for traffic signs for example #6:

Item 675.20, Traffic Sign, Type A		
	Original (ft^2)	**Final (ft^2)**
	390	385
Line Number	0340	
Unit Price	$13.80	
Units	ft^2	

Refer to the Sign Summary Sheets in the Contract Plans for more information.

5-150.130 Utilizing the Contract Item Placement Report for Final Quantities

For simple items, it shall be sufficient to set up the left page as shown in the previous examples (with the Original and Final Quantities shown, as well as the Line Number, Unit Price, and Unit), with reference to the *Contract Item Placement Report* (Appendix E-2) for the specific item.

Reference shall also be made to the *Contract Item Placement Report* with a copy placed in the calculations binder or folder. This procedure may be used for items placed or used on a daily basis, such as Uniformed Traffic Officers and Flaggers, rental items, lump sum items, field measured items, and items with low quantities.

When using this method, detailed locations in the *SiteManager Daily Reports* shall be indicated to make tracking of the exact item locations easy to red-check and verify. Complex items require a report with potentially confusing adjustments and shall not be referenced to the *Contract Item Placement Report*.

5-160 CONCRETE POUR RECORD

5-160.10 Concrete Pour Record Summary

A record of all concrete placements or "pours," even small ones, shall be entered in Field Book #7. Another location in the project records may be specified, but Field Book #7 is the standard location for concrete pour record summaries. The Materials Inspector on-site at the concrete plant shall complete a batch slip for the Resident Engineer, to be delivered by the concrete delivery driver and included as part of the concrete pour record.

5-160.20 Concrete Pour Record Detail

The following table shows an item summary for a concrete pour, left page.

Record of All Concrete					
Date	**Location**	**Design (yd^3)**	**Deliver (yd^3)**	**Pour Return (yd^3)**	**Slump / % Air**
6/1/2015	SA 3 – Pier #1	28	30	2	8 in / 5.8

The following table shows an item summary for a concrete pour, right page.

Pours (Book #7)					
Time		**Inspector**	**Cylinder Number**	**Break 1st --- 2nd**	**Remarks**
Start	**Finish**				
09:00	10:25	ABC	3-1	10/24.67 ---	Field Cured

In the “Break” column, list how many days the break represents as well as the Laboratory results.

STATE OF VERMONT

AGENCY OF TRANSPORTATION

CONSTRUCTION SECTION

2015

ENGLISH/METRIC

CONSTRUCTION MANUAL

SECTION VI

FINALS UNIT PROCEDURES

6-100 GENERAL

For several years after the construction work is completed, project records are subject to detailed review and scrutiny by engineers and auditors of both the State and Federal Highway Administration. Federal Regulations state the following:

> *"Each State Transportation Agency shall maintain or cause to be maintained all records and documents relating to the undertaking, carrying out, and maintaining of each project in such form and manner as will enable the State to make available to the Administrator (Federal) such information and data as they may require and shall be retained for a period of not less than three years from the date of final payment of Federal Funds to the State with respect to the particular project."*

The date of final payment by the Federal Highway Administration may be quite some time after acceptance of the contract by the State and completion of the Final Estimate and Records by the Resident Engineer. Since reimbursement of the Federal portion of the total contract amount is dependent upon documented quantities, it is mandatory that these documents be recoverable for verification by Federal Auditors, or if requested. Project books and records shall be scanned after payment of the Final Estimate, and prints made from the scanned files shall constitute acceptable documentation.

Complete and uniform records and documentation are necessary for justification of the monies paid to the Contractor for work performed. They can also be used as a basis for possible future repair and maintenance, as well as a ready reference for locating constructed facilities; such as underdrain, underdrain flushing basins, water shutoffs, and utility or pipe sleeves. They also serve as a reference for possible reasons for failures, such as embankment slides and culvert failures, which might aid in determining what corrective measures should be taken.

The Finals Unit is responsible for ensuring that all quantities on a project have been calculated and verified. The Finals Unit may assist in the verification of the calculations of quantities, but it is ultimately the responsibility of the Resident Engineer and the project staff to calculate and check project quantities.

In order to accomplish this, all field information must be presented to the Construction Section Finals Engineer in a complete, neat, and uniform manner.

Section VI Finals Unit Procedures is set up to explain the Finals Unit procedures in sequence from the time a project is brought into the office until the record plans are complete, and the project records are stored. Examples of the various forms that are used in the Finals Unit are included with explanations of how to complete them.

6-110 PROJECT REVIEW

6-110.10 Preparation and Delivery of Field Records

Project boxes will be delivered to the Finals Unit in a timely manner, with project boxes delivered no later than March 31st following project acceptance. Many projects may be substantially completed in the fall, but acceptance may not be made until following construction season due to lack of vegetation. For projects of this type, project boxes will be prepared and a labeled "99% complete" by the end of the first winter. Once the project is accepted, project boxes shall be completed and turned in within one month after the acceptance date.

Following project acceptance, the Resident Engineer will deliver a labeled project box, containing all project records, to the Finals Room Supervisor of the Finals Unit. Prior to delivery of the project box, the Resident Engineer shall do the following:

1. Finalize all the quantities in the summary books and have them "red-checked" by field personnel. The Regional Engineer shall assist with assigning field personnel if necessary.
2. Enter a final daily into *SiteManager*, adjusting all quantities to match the summary books.
3. Generate an estimate to adjust for any quantity or other payment discrepancies such as stockpiles, liquidated damages, material adjustments, or other types of adjustments. The resulting estimate shall be checked to ensure that the "Total to Date" amount for "stockpiled materials" and "other adjustments" is $0.00. Additionally, the "liquidated damages" amount shall be judged appropriate.
4. Complete any required explanations of overruns and underruns. Refer to *Subsection 6-130.70 Explanations of Overruns and Underruns Sheet* for more information.
5. Complete and distribute the *Project Manager Closeout Comments Memo* (Appendix F-1) the following parties as applicable:
    a. Regional Construction Engineer
    b. Regional Administrative Technician
    c. Quality Assurance Engineer
    d. Contract and Specifications Engineer
    e. Construction Environmental Engineer
    f. Construction Paving Engineer
    g. Construction Structures Engineer
    h. Environmental Specialists

6. The Resident Engineer will also place the Project Manager Closeout Comments Memo in the project file.
7. The Resident Engineer will submit explanations for any material failures, certification failures, or omissions to the Materials Unit.
8. The Resident Engineer will contact the Regional Office to have the Regional Files pulled and "weeded" to remove duplicate copies of documents already in the Resident Engineer's project boxes. Original Regional Files will be added to the project box.
9. The Resident Engineer will organize field records into neatly labeled envelopes or folders. All "Computation Binders" will be bound before being placed in the project folders.
10. The Resident Engineer will print and complete a Project Box Checklist (Appendix F-2). This checklist outlines documentation that shall reside in the project box and shall be discussed with the Finals Unit when the project box is brought into finals.

6-110.20 Review of Field Records

The Resident Engineer will set up a meeting with the Finals Room Supervisor. The Finals Room Supervisor will conduct an interview with the Resident Engineer to review the project box contents, using the *Project Box Checklist.*

The Finals Room Supervisor will do the following:

1. Verify that all items in Subsection 6-110.10 Preparation and Delivery of Field Records have been completed properly.

2. Spot check the summary books to ensure that entries are complete and have been properly red-checked and referenced. Verify that the books have been checked against SiteManager paid-to-date quantities.

3. Verify that the documentation necessary to complete the Finals process has been provided, or is forthcoming, including explanations for materials testing discrepancies, overruns and/or underruns, and extension of time days.

4. Notate any feedback from the Resident Engineer regarding any known Contractor disputes with quantities, claims by the Contractor and/or other information that might be important to the Finals Unit.

5. Log the date of delivery of the project box into the "Project Box Accepted" field on the Project Records Tab of Construction Tracking System (CTS), and assign a location to the box. Note that CTS will automatically set the project status to "C" (complete).

6. Place any full size sheets in a file drawer, and log into CTS.

7. Verify that all boxes are properly labeled with project name and number.
8. Verify that hand drawn record plans are complete.
9. Deliver the box to the Finals Engineer, and discuss any important project issues which may need to be addressed.

6-120 DETERMINATION OF FINAL QUANTITIES

6-120.10 General

The determination of Final Quantities is broken down into the following parts: Structures, Earthworks, Drainage, Paving, Utilities, Rest Areas, and all other items.

Unless the basis of payment for an item states otherwise, the policy for rounding final quantities is as follows:

Unit Price	Final Quantity
$0.01 to $10.00	Round to nearest whole number
$10.00 to $100.00	Round to nearest tenth
$100 or greater	Round to nearest hundredth

All final quantities and red-checking will be performed by field personnel. The Finals Unit will randomly select projects for audit, and double-check quantities.

6-120.20 Structures

A structure is defined as having a 1.83 m (6 ft) or greater clear span measured along its centerline. Each separate bridge or box location will be finaled separately, including the following requirements:

1. Verify that all original source data has been entered in the Bridge Book Series #3, or on standard form sheets.
2. Verify that all sketches required to show the basis of figures used in computations to arrive at final pay quantities are complete, neat, and accurate.
3. Verify that all final quantities entered in the Bridge Book Summary have been checked, dated, and initialed by the person doing the checking, as well as the person doing the original calculations. All final quantities must be easily traced back through computations and sketches to original source data.

6-120.30 Earthworks

Earthworks will be finaled by fulfilling these requirements:

1. Reduce all section notes (revised original, stripped ledge, muck, undercut, and final) or verify that they have been reduced by computer or by others qualified to make the calculations. The reduction of level notes, bench mark to bench mark, shall be verified to confirm that the Height of Instrument (HI) for each section is correct. Earthworks quantities may also be obtained through the use of a total station setup with a data collector to conduct a 3D survey.
2. Plot sections on the original design section sheets using the following color code:
    - Finals – Red
    - Original Ledge – Green
    - Undercut – Blue
    - Muck - Brown
3. The Resident Engineer should verify all plotted sections for accuracy and mark on all sections "Authorized" or "Unauthorized" for those areas where excavation was carried out beyond the neat lines or where embankments exceeded the neat lines.
4. The Resident Engineer will be present when plotted, checked, and marked sections are reviewed by the Finals Engineer, and/or Finals Unit staff.
5. The end areas of each plotted section will be determined by digital planimeter, and then entered and verified in a Microsoft Excel® spreadsheet. The end areas should be calculated for each station, usually every 20 m (50 ft), using the average end area method for determining the total authorized excavation (earth and rock together), the total authorized rock excavation, and for the unauthorized over-breakage area beyond the allowed over-breakage limit. End areas for undercut, muck, stone fill, and sand should be determined and recorded separately.
6. *Earthwork Quantity Sheets* will be set up and the volumes computed using the average end area method and verified. Volumes may also be calculated in a Microsoft Excel spreadsheet.
7. *Earthwork Summary Sheets* will be set up showing the original and final volumes, and the difference between the two, for total excavation, rock, over-breakage, unauthorized embankment areas, muck, undercut, stone, and sand areas. This sheet is shall be checked by comparing the column totals with the column summary on the right hand side of the sheet.
8. The total rock excavation will then be subtracted from the total excavation figures to determine the total earth excavation volumes.

9 Deductible and non-deductible boulder quantities will then be added to the rock quantity to obtain the total rock excavation to be paid.

10 Deductible boulder quantities will be subtracted from the earth excavation quantity and all undercut volumes will be added to obtain the total earth excavation quantity to be paid.

11 The Resident Engineer and Finals Engineer will then review the differences between the original and final quantities to verify that all differences are explainable and documented. This comparison study will also serve as a check against any large errors that may have occurred.

12 The final quantity figures for each pay item will then be transferred to the summary books with the proper cross reference notations being made on both the *Earthwork Summary Sheet* and in the summary books.

13 The Resident Engineer will review all borrow pit quantities and plotted sections generated by Microsoft Excel, Bentley MicroStation®, or Bentley InRoads® for completeness and accuracy. Individual pits shall be listed by name in the summary books under the proper item and the final quantities pertaining to each pit listed and totaled. All deductions will be made, properly documented, and cross-referenced, and the final pay quantity listed under final for the particular item.

14 All work will be checked, dated, and initialed by all personnel doing both the original work, as well as the checking. The initials of anyone working on the project will appear in the project work force list in the front of summary book #1.

6-120.40 Drainage

Drainage will be finaled by fulfilling these requirements:

1. The drainage books and cross-section sheets will be checked for the following:
    a. Proper setup and indexing.
    b. Verification that all individual station drainage facilities are cross-referenced between the drainage books, drainage sheets, and summary sheets.
    c. Verification that all cross-section notes and/or drainage pipe profile notes are recorded, properly cross-referenced, and initialed by the person making the entry and dated.
    d. Verification that field measured lengths of installed drainage pipe are recorded, dated, and initialed by the person making the entries.

e. Verification that either field measurements or a statement confirms that such items as concrete and steel for drop inlets, concrete catch basins, drop inlet grates, headwalls, etc., were furnished and installed, or constructed as per plans, and are entered, dated, and initialed.

f. Verification that a statement confirms that the type of backfill materials placed and the quality of work is recorded in the drainage books.

g. Verification that a record of the dates worked was made with particular note as to beginning and completion, as well as when it was dated and initialed by the Inspector.

2 Verify that all final quantity figures listed in the individual drainage summaries of the drainage books, as well as on the drainage sheets, show the initials and date of the person who did the original work and of the person who did the checking.

a. If the original work has not been done, then the Resident Engineer, or some other field personnel designated by the Resident Engineer, will do the original work, and a different field person will check the work.

b. If the original work has been done, but not been checked, field personnel will check quantities. If the Resident needs additional field personnel, the Regional Engineer will be contacted.

c. If the original work has been done and checked, "spot checks" will be done by the Finals Unit to ensure that the proper procedures are followed. For example, verification shall be made that the total trench quantity to be paid at the contract unit bid price for trench excavation is measured by multiplying the quantity of trench excavation below 1.5 m (5 ft) in depth by a factor of 1.5, with the resulting amount added to the quantity of trench excavation above 1.5 m (5 ft) to yield the total volume.

d. The transfer of figures from the individual drainage books and drainage sheets to the drainage summary sheets should be verified.

e. All transfers from the drainage summary sheets to the individual project item summaries in summary book #1 should be made and verified.

f. If the amount of drainage work is small, the drainage summary may be set up in the back of drainage book #2. If the drainage work is extensive, the drainage summary should be set up on separate drainage sheets

g. All final quantities should be easily followed back from the final quantity figure through the computations to the original source data.

6-120.50 Paving

Paving will be finaled by fulfilling these requirements:

1 Sort all hot mix weight tickets, or slips, and verify that they display the paving date, the pay item, and where it was used, i.e., mainline, ramps, drives, TH #__, islands, curbs, gutters, etc.

2 Organize the hot mix slips into separately labeled envelopes for each day of paving and/or pay item.

3 Verify that the first and last hot mix slip of each day is signed by the Inspector (with initials) and that the remaining slips for that day are initialed by the same person who signed the first slip, unless another Inspector replaces the first Inspector. Notes should also be made on the hot mix slips of the hot mix temperatures (load and mat), the stationing or landmark paved by, the time of day, whether the load was "dumped" or not, how much tonnage remained on a load, and any other pertinent information.

4 Verify that the ticket has the weight at the hot mix plant properly recorded.

5 The Finals Unit will total, check, initial, date, and then record each day's run under the proper item in summary book #1. The total may be taken off of the last slip, provided slips for every load have been accounted for and accepted by the Resident Engineer. The Resident Engineer will spot check totals to verify that there are no errors within the computer-produced weight slips.

Note: For projects that involve night paving operations, verify the date and time stamp on the ticket against the accumulated daily tonnage for the project. For projects starting before midnight (12:00 AM) and scheduled to continue past midnight, verify that the hot mix plant computers that manage material usage in real time do not automatically "reset" at midnight and begin recording a new daily project total at 12:01 AM.

6 Field Personnel will conduct the finaling operations for these five paving requirements in the field and present their results to the Finals Section in that condition.

7 All test result sheets shall be checked and all failed material samples with associated statements as to their disposition shall be filed with the project records.

6-120.60 Utilities, Rest Area, and All Other Remaining Items

To determine final quantities for the utility and rest area categories, as well as the right-of-way, ensure that the original source data used to compute the final quantities is for only that portion of the work which pertains to each category and that these quantities are not also included under some other category, such as roadway. Verify that the documentation and basis of payment requirements, as stated in the Standard Specifications for Construction, have been fulfilled for each item being finaled.

Many items require special types of original source data for documenting authorization to do work, as well as stating the basis of payments, and in some cases, stating the exact quantity to be paid. Examples include *Written Orders* (Appendix A-3), invoices, weight slips, and *Changes Orders* (Appendix A-1).

All original source data, resulting computations, and final quantity entries must be clearly labeled and accurately recorded, cross-referenced, initialed, and dated by the person and/or persons doing the original work and the check work.

6-130 FINALS PROCESSES AND FORMS

6-130.10 Sequential Steps of the Finals Process

Once the project box and summary books are received, the Finals Unit begins the Finals process, which has three major steps:

1. **Final Quantities to Contractor**: The final calculated quantities will be sent to the Contractor for their concurrence. An *Extension of Time*, if necessary, shall also be sent to the Contractor along with the final calculated quantities. Refer to the *Sending Final Quantities Checklist* (Appendix F-3) for more information.
2. **Final Estimate to Contractor**: The *Final Estimate* to the Contractor consists of a signature page which will be signed by all responsible parties. The *Final Estimate* is usually sent with the *Final Quantities*.
3. **Final Estimate Routing and Approval**: The Final Estimate Routing and Approval process involves sending a package with all relevant project close-out information to the appropriate Agency personnel and having them sign the *Final Estimate*, which will then be processed by the Business Office

Step 1: Final Quantities to Contractor

1. Verify that quantities for every contract item have been completed and checked in the summary books.
2. Generate an estimate, if appropriate, to clean up any outstanding quantity adjustments, liquidated damages, materials, or any other adjustments.
3. Determine if it is necessary to complete a *Request for Extension of Time* (Appendix B-11). Refer to *Subsection 108.11, Determination of Extension of Contract Time for Completion* for more information. Check for automatic overruns in time, such as rain days, holidays not in the contract, and contract overages. The Resident Engineer shall provide a list of days for which the Contractor was credited. This shall be documented by a *Written Order* (Appendix A-3) to the Contractor.

4 Verify that the *Material Certification Memo* (Appendix F-4) is complete and that there are no outstanding certification issues. Verify that there are no "other adjustments" in the most recent estimate.

5 The Contractor should be presented with the final quantities, via certified mail, in the form of a *Comparative Quantities Report* (Appendix F-5) and any *Request for Extension of Time* forms detailing the automatic overruns, if applicable.

6 The Contractor has 60 days to respond with the completed *Request for Extension of Time* forms and six months to respond with any discrepancies in the final quantities.

7 Failure on the Contractor's part to respond to either of these conditions within the indicated time frames shall result in the final estimate being processed with the final quantities as presented, and extension of time limited to those automatic credit days only.

8 Process any *Request for Extension of Time* forms, when applicable, for VTrans and FHWA approvals.

Step 2: Final Estimate to Contractor

1 Check the status of all claims against the Contractor. The Finals Engineer will keep a log of these claims, which may be in the form of either a damage or a personal injury claim against the Contractor or a non-payment claim from a Subcontractor or supplier against the Contractor.

2 The *Final Estimate* will be sent to the Contractor along with one copy of the *Comparative Quantities Report*, three signature sheets, and a *Contractor Certificate of Claims Form* (Appendix F-6) form. The Contractor will complete these forms and return them to VTrans for processing.

3 The Contractor has 20 days to respond to the *Final Estimate* by signing the signature sheets and the *Contractor Certificate of Claims* form. If the Contractor fails to respond, the final estimate will be processed without the Contractor's signature. If this is the case, a *Final Estimate Routing Summary Report* (Appendix F-7) form will be generated and sent to the Project Delivery Bureau Director indicating that the *Final Estimate* is being processed without the Contractor's signature per the specifications.

4 The final quantities and *Final Estimate* may be sent simultaneously if the balance is $0.00 and no liquidated damages are being assessed.

Step 3: Final Estimate Routing and Approval

1 Verify that the *Material Certification Memo* (Appendix F-4) is complete.

2 Once the Finals Engineer and the Construction Engineer have signed the *Final Estimate*, the *Final Estimate* packet will be sent with a *Final Estimate Routing Sheet* (Appendix F-8) sheet to the Project Delivery Bureau Director.

3 The Construction Engineer will also include a memo to the Project Delivery Bureau Director in the *Final Estimate* packet that indicates the final dollar amount of the contract, the percentage over or under, the total number of *Change Orders* (Appendix A-1) processed, and the total value of the *Change Orders.*

4 Include a copy of the *Comparative Quantities Report*, with a cover sheet and explanations for overruns and/or underruns, in the *Final Estimate* packet for the Project Manager. If the project is subject to FHWA oversight, these documents shall also be sent to FHWA for review.

5 The original contract shall be pulled from the construction file, signed by the Finals Engineer, the Construction Engineer, and the Project Delivery Bureau Director, and then returned to the file.

6 Once the *Final Estimate* has completed the series on the routing sheet, and has been signed off by all individuals, the Finals Engineer shall enter the specific date into the Construction Tracking System (CTS) as the Construction sign off date, and changes the Contract Status in CTS from "C" (Complete) to "F" (Final). Refer to *Subsection 6-130.100, Assembly of Final Estimate Package for Presentation to the Director of Program Development* for information about tabularized assembly of the *Final Estimate Package*.

Final Estimate Process Overview

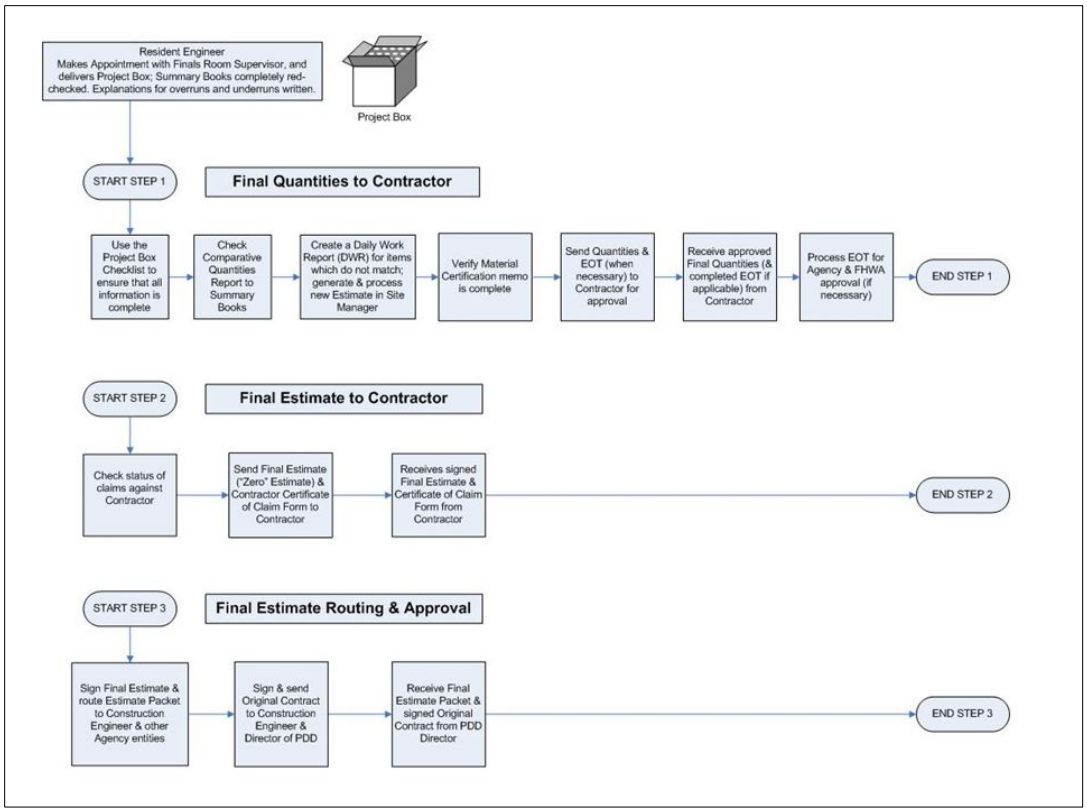


Figure 6-1: Final Estimate Process Overview Flow Chart

6-130.20 Extension of Time (EOT)

When the Contractor fails to substantially complete the project by the anticipated completion date established by the contract, a *Request for Extension of Time* (Appendix B-11) form shall be sent by the Finals Unit. The Contractor shall use this form to state the reasons for requiring extra time to complete the project. The *Request for Extension of Time* form shall be signed by the Contractor or an authorized representative.

The Contractor shall forward the finalized version of the *Request for Extension of Time* form to their bonding company. The forms shall be sent with the final quantities, and shall indicate days that can be automatically granted under *Subsection 108.11, Determination of Extension of Contract Time for Completion* of the Standard Specifications for Construction. Days added by *Change Orders* are contract changes and do not require a formal request.

The Finals Engineer, when determining extensions of time, shall refer to the *Written Orders* in the project file that indicate the days when work on the project was shut down due to weather or other reasons.

The Resident Engineer may be requested to draft an initial extension of time (EOT) analysis to assist the Finals Engineer with understanding the specifics of why the project did not meet its original or adjusted completion date.

When the anticipated project completion date is amended via a *Change Order*, then a new adjusted completion date is established. If substantial completion is reached prior to the adjusted completion date, then an extension of time is not required.

Upon receiving the signed extension of time request form from the Contractor, the Finals Engineer shall complete an *Extension of Time Memo* (Appendix F-9) indicating the number of days the project overran and the days to be credited towards an extension. This completed *Extension of Time Memo* shall be presented to the Construction Engineer, who shall then present it to the Chief Engineer.

Refer to *Subsection 108.10, Suspension of Work Ordered by the Engineer, Subsection 108.11, Determination of Extension of Contract Time for Completion*, and *Subsection 108.12, Failure to Complete Work on Time* of the Standard Specifications of Construction for explanations of the various reasons for granting an extension, and liquidated damage amounts to be charged if an extension is not granted for all the time the Contractor ran over. If the project is subject to FHWA oversight, FHWA shall sign the finalized extension of time application.

Upon final approval of the extension of time request, a copy shall be sent back to the Contractor and to the Contractor's bonding company.

6-130.30 Routing of Final Estimate Form

The *Final Estimate Routing Sheet* (Appendix F-8) is part of the final estimate package. This form indicates the order of routing of final estimates and is a checklist verifying that all authorized personnel have seen the final estimate.

6-130.40 Comparative Quantities Report

The *Comparative Quantities Report* (Appendix F-5) compares the original quantities; as modified by *Change Orders*, the final quantities, and costs. The items should be grouped by category such as roadway, bridge, erosion control, landscaping, etc., exactly as they appear on both the estimate and contract item summary report. In addition, items may be further sorted by government participation and non-government participation categories.

The final quantity shown for each item should be the amount paid as of the latest estimate. The *Comparative Quantities Report* should be used to notify the Contractor of Final Quantities that have been computed and checked. This report should be a detailed breakdown of the original quantities (as modified by *Change Orders*), the final quantities amounts paid, and the difference and the percent difference between the original (as modified) and final amounts.

6-130.50 Final Estimate Memo to the Chief Engineer from the Construction Engineer

The Finals Unit runs the *Final Estimate Routing Summary Report* (Appendix F-7), which is an automated report found in CTS. The *Final Estimate Routing Summary Report* contains pertinent schedule and expenditure data and serves as the cover memo for the *Final Estimate* package. This report is also available in Query DB, but only for contracts that have already been finalled.

6-130.60 Explanations of Overruns and Underruns Sheet

The Resident Engineer will provide written explanations for any differences between the Design Quantity, as modified by *Change Orders*, and the Final Quantity. In addition to providing quality control feedback, these explanations are required by Federal Regulations. The Resident Engineer will complete these explanations prior to turning over the project box to the Finals Section.

Explanations should to be provided for quantity differences for items meeting specific thresholds as shown in the following table:

Project Value Range	Justification Guidelines
a. $0 - $100,000	(1) All overruns or underruns of $1,000 or more. (2) For Items having an individual Original Total Value of $4,000 and under, overruns or underruns of 25% or more shall be explained with a minimum of $250.
b. $100,000 - $500,000	(1) All overruns or underruns of $2,500 or more. (2) For Items having an individual Original Total Value of $10,000 and under, overruns or underruns of 25% or more shall be explained with a minimum of $500.
c. $500,000 - $1,000,000	(1) All overruns or underruns of $4,000 or more. (2) For Items having an individual Original Total Value of $8,000 and under, overruns or underruns of 50% or more shall be explained with a minimum of $750.
d. Over $1,000,000	(1) All overruns or underruns of $6,000 or more. (2) For Items having an individual Original Total Value of $12,000 and under, overruns or underruns of 50% or more shall be explained with a minimum of $1,000.

The Resident Engineer will use the *Explanations Report for Contract Overruns and Underruns* (Appendix F-10).from *SiteManager* to generate a Microsoft Word® document that automatically compares threshold values from the table above to SiteManager quantities and determines which items need explanation. The report shows all pertinent payment and quantity information to which the Resident Engineer will add explanations for the overrun or underrun.

Using the *Explanations Report:*

1 Prior to running the *Explanations Report for Contract Overruns and Underruns*, the quantities shall be finalized. This is necessary to ensure that the quantities shown on the *Explanations Report for Contract Overruns and Underruns* are up to date.

a. All Quantities will be entered and red-checked in the summary book.

b. The summary books will then be compared to SiteManager Payments to date from the *Comparative Quantities Report* (Appendix F-5). The Regional Technician will run a "dummy" estimate to ensure that all SiteManager quantities (including any that have been entered but are unpaid) have been taken into account. After the *Comparative Quantities Report* has been run and printed, the Regional Technician will delete the "dummy" estimate.

c. After comparing the summary books to the SiteManager payment to date, the Resident Engineer will generate a *Daily Work Report* in *SiteManager* to adjust *SiteManager* Payments to match the summary books.

d. The Regional Technician will run an Estimate to pay the adjusted quantities.

e. Once the estimate is run, all SiteManager quantities should match the summary books, and thus the *Explanations Report* can be generated.

2 Explanations Report Procedure:

a. Detailed instructions for the generation and use of the *Explanations Report* may be found on the "Z:/" drive in the *Field Forms/Finals* folder. All quantities will be paid and checked before this report is run, or else the data will be incorrect. If any changes are made to quantities after the *Explanations Report for Contract Overruns and Underruns* is run, it will be re-run.

b. Once the Word document is complete, the Resident Engineer will send electronic copies to the Finals Engineer, Regional Engineer, Regional Technician, Regional Administrative Services Technician, Quality Assurance Engineer, and Project Manager. The Regional staff will review the Word document with any necessary modifications made by the Resident Engineer.

c. The Regional Administrative Services Technician will save the electronic document on the "Z:/" drive in Project Correspondence/(Project Name) in the *Finals* subfolder and send copies to the Finals Engineer, Quality Assurance Engineer, and Project Manager.

d. The Resident Engineer will print a hardcopy of the *Explanations Report for Contract Overruns and Underruns* and place it in the

project records box in a *Finals* folder, prior to delivery of the box to Finals.

If any quantities are adjusted in Finals which results in a change to the explanations, the Finals Engineer will contact the Resident Engineer to discuss resulting changes to the *Explanations Report.*

No explanation is required for items for which the original quantity was "estimated." Since there is no way to capture this electronically, however, these types of items shall appear on the *Explanations Report for Contract Overruns and Underruns*. It is acceptable to indicate that such an item is "estimated," but any feedback which can be provided that will help avoid miscalculations in the future is the primary intent of providing these explanations. For example, if an Equipment Rental Item has a large overrun, information regarding the use of the particular piece of equipment should be provided.

The design calculations are provided by Project Managers at the preconstruction conference, and these shall be used as the basis of computation to generate explanations.

6-130.70 Contractor's Certificate of Claims

The Contractor's *Certificate of Claims Form* (Appendix F-6) should be mailed to the Contractor with the *Final Estimate* signature sheets to be signed. The *Certificate of Claims Form* has information on any claims that may have been made against the Contractor of which VTrans personnel are unaware.

6-130.80 Claims Against Contractors

There at two types of claims that may be filed against the Contractor. Subcontractors and suppliers may file a claim for non-payment under the Contractor's Labor & Material bond. Damage claims, which are typically property damage or personal injury, are covered by the Contractor's Performance Bond.

If a Subcontractor or supplier wishes to file a claim against the Contractor, the Resident Engineer will provide them with a *Subcontractor-Supplier Claim Form* (Appendix F-11). If a member of general public wishes to file a claim against the Contractor, the Resident Engineer will provide them with a *Damage Claim Form* (Appendix F-12). The Resident Engineer may assist in filling out either form by providing project-specific information found at the top of the forms.

The *Subcontractor-Supplier Claim Form* or *Damage Claim Form* will be completed by the appropriate recipient and mailed the Finals Engineer for processing. The Finals Engineer shall administer all claims against the Contractor. The Finals Engineer's shall receive these claims, notify Contractors and bonding companies, and maintain a record of the claims process by completing a *Claims Status Report.*

The Finals Engineer is responsible for administering labor and materials claims against the Contractor by suppliers and Subcontractors, as well as damage claims which typically involve cases of property damage or personal injury. The Finals Engineer's will receive these claims, notify Contractors and bonding companies, and maintain a record via a *Claims Status Report.*

Prior to sending the *Final Estimate* to the Contractor for signature, the Finals Engineer should verify that there are no outstanding claims against the Contractor. If there are claims, the Finals Engineer should determine what actions shall be taken by convening the VTrans' Claims Committee. Refer to *Procedures for Claims Against Contractors*, dated July 31, 2007, for more information.

6-130.90 Assembly of Final Estimate Package for Presentation to the Project Delivery Bureau Director

After the signed *Final Estimate* is returned by the Contractor, the *Final Estimate* package shall be assembled for presentation to the Project Delivery Bureau Director.

The *Final Estimate* package shall contain the following documents:

1. The *Final Estimate Routing Sheet* (Appendix F-8).
2. The *Final Estimate Routing Summary Report* (Appendix F-7) to the Project Delivery Bureau Director from the Regional Construction Engineer, with the original, and one copy for the Project Manager via the Program Manager.
3. The *Final "Zero" Estimate,* with three copies signed by Contractor pending VTrans' signature.
4. The *Status of Claims* form, with one copy as returned from the Contractor.
5. The *Comparative Quantities Report* (Appendix F-5), with four copies (labeled "Finals," "Budget & Financial Operations," "Utilities," and "Project Manager") and the computer printout.
6. The *Explanations Report for Contract Overruns and Underruns* (Appendix F-10), if these have not been sent electronically, to the Project Manager via the Program Manager and/or FHWA if subject to FHWA oversight.

The Finals Engineer and Construction Engineer will sign the original contract and hand-carry it (separate from the Routing Package) to the Project Delivery Bureau Director for their signature. The original contract shall be returned to the Finals Engineer and kept in the Construction Files until the Final Estimate Routing Package completes its routing through VTrans.

Note: If the Contractor does not sign the "Zero" estimate within 20 days of presentation, the Routing Package will be assembled and sent without the Contractor's signature. In this case, and unsigned "Zero" estimate will be sent, but no *Status of Claims* form will be sent. The Finals Engineer will confirm that that no claims exist against the contract.

The Finals Engineer and the Construction Engineer will review the package when it is assembled. When they are satisfied that the contents are correct, they shall sign the *Final Estimate* signature sheets and the contract, initial the routing sheet, and forward it to the next entity on the routing sheet.

The routing package will be channeled (as indicated on the routing sheet) through VTrans and returned to the Finals Engineer.

6-140 FINAL DISPOSITION OF PROJECT FILES

6-140.10 General

After the *Final Estimate* has been approved and Record Plans are complete, the project records will be "weeded" according to the *Project Weeding Procedures Checklist* (Appendix F-13), sorted, and boxed up for scanning by Central Files or in-house staff. Necessary forms will be sent to the appropriate sections. Some information may be stored, rather than being scanned, for a period of time following FHWA audit guidelines. Items will be placed in properly marked envelopes and boxes for warehouse storage.

6-140.20 Daily Reports

One *Daily Work Report* (Appendix B-2) should be complied for every day of work on the project. The *Daily Work Reports* (DWR) shall be maintained in *SiteManager* for the life of the contract and kept for the purpose of audits and lawsuits. Any paper copies of *SiteManager* DWRs that are not retained should be recycled. Hand written DWRs should be saved, as they may have been utilized for calculation of certain pay items and are not currently saved electronically. Hand written DWRs should be packaged and labeled for scanning.

6-140.30 Written Orders

Verify that field copies of *Written Orders* (Appendix A-3) match office copies. Whenever possible, the "signed" originals should be kept and copies recycled. *Written Orders* should be packaged and labeled for scanning.

6-140.40 Material and Compaction Reports

All failing material reports shall have an attached statement as to their disposition or a passing resample. These reports should be stored in properly marked envelopes with the project records, and all other passing reports recycled. The *Materials Sample Summary Report* will contain the lab numbers and sample results of all samples processed for the project. The *Materials Sample Summary Report* will be labeled for scanning.

6-140.50 Invoices, Weight Slips and Computer Sheets

Invoices, weight slips and printed computer output serve as original source data and/or backup data for computations from which final payments are determined. Invoices, weight slips and printed computer output will be sorted and placed in properly marked envelopes in the project box for warehouse storage.

6-140.60 Borrow Pit Data

All borrow pit notes, sections, and computations will be sorted and stored in properly marked envelopes in the project box for warehouse storage.

6-140.70 Miscellaneous Field Notes

Miscellaneous field notes serve as original source data for final pay quantities. Miscellaneous field notes will be stored in properly marked envelopes in the project box for warehouse storage.

6-140.80 Original Correspondence

Copies of all project correspondence in the Resident Engineer's file for which there is no duplicate copy in Central Files will be placed in a properly marked envelope and labeled for scanning.

6-140.90 Water Pipe and/or Utility Sleeve Diagrams

Original water pipe and/or utility sleeve diagrams shall be stored with the project records. Copies of water pipe and/or utility sleeve diagrams shall be sent to all appropriate parties including the following:

- Property owner
- District Transportation Administrator
- Water district or other utility representative
- Town or city clerk (if utility sleeves are to be installed within their municipality)

6-140.100 Field Prints

All of the information written on field prints pertaining to record plans shall be transferred to original prints. Field prints should then be recycled.

6-140.110 All Remaining Material

Any other type of project documentation that serves as original source data, or as substantiating data for computations from which final pay quantities are determined, shall be placed in properly marked envelopes in the project box for warehouse storage.

6-140.120 Permanent Bench Mark Information Sheets

Permanent Bench Mark Information Sheets shall be turned over to the VTrans Survey Section.

6-150 PREPARATION OF RECORD PLANS

6-150.10 General

The Record Plans consist of the original drawings on which all construction details which differ appreciably from the original design are shown in the color red. Generally, the Resident Engineer marks a field set of plans in red, and this is then transferred to CADD by the Finals Room Supervisor, or their designee. The purpose is to provide a permanent record of how the project was actually constructed for future reference and information for District Transportation Administrators, and VTrans Engineers, and the general public.

6-150.20 Preparation of Title Page

1. Mark the title page with "Record Plans" and the Resident Engineer's name.
2. Check mark or correct the length of roadways, bridges, and other project entities as follows:
    a. Length (in Metric or English units)
    b. Stationing at beginning and ending of roadway
    c. Stationing at beginning and ending of bridges
    d. Changes in equations due to field changes
3. A CADD technician shall label the title page with the following:
    a. Contractor's name
    b. Resident Engineer's name
    c. Project start date
    d. Project completion date
    e. Person responsible for documenting plan changes.

6-150.30 Typical Sheet

No changes shall be made to a typical sheet unless there has been a major change of design in the project's surface type, subbase type or depth, or pavement and/or shoulder width or slope. When there are no major design changes, a notation indicating the "roadway was built as designed" shall be added to the typical sheet.

6.150.40 Quantity Sheets and Summary Sheets

The Resident Engineer shall compare the contract quantities to the final quantities. However, for record plans, no changes shall be made on the quantity sheets. Refer to the field books, SiteManager, and the *Comparative Quantities Report* (Appendix F-5) for final quantities.

6.150.50 Layout

For record plans, layout sheets shall have the following information:

1. Check all specified pay items and equations and show any and all changes on the layout sheets. Place a check mark next to items installed per plan.
2. Show station locations for all guide posts in a table at the top of the layout sheet, except single posts at culverts.

3. Show station locations and type for all guardrail, right and left, at the top of the layout sheet.
4. Show location and stationing of all underdrains on layout sheets. Plot underdrains on profile sheets and specify elevations of grade breaks or gradients. Note the underdrain size and any special features.
5. Show stationing of the beginning and the ending of the project.
6. Verify tree removal items by putting a cross through each tree removed and indicate all trees removed which were not shown on original layout. Indicate existing trees that remain which did not appear on the original plans.
7. Plot all culverts as actually constructed. Indicate the actual size, length, and skew angle of the pipe. Indicate the location of headwalls, inlet and outlet ditches, and any other pertinent information.
8. Verify the correctness of curve data with a check mark. Show any line or curve changes by drawing in the new centerline in red, and listing the revised data. Checkmark any original ties which are still valid, and plot any ties.
9. Verify the correctness of all grades. Plot all changes and other pertinent information.
10. Plot all boundary markers by station and offset.
11. Note any pertinent changes in topography, relocated or newly constructed buildings, and other changes in the property which might affect the right-of-way or adjacent properties.
12. Plot any constructed items including wells, walls, traffic islands, sidewalks, curbs, gutters, catch basins, manholes, drop inlets, junction boxes, and any special features of drainage not already noted.
13. Plot any changes or additions and the approximate location of urban or other water systems, underground utility conduits, etc., and make appropriate notations. Any sleeves for utilities other than water shall be properly tied to buildings or landmarks with sufficient information shown so as to provide the property owner with a permanent record. Include the full names and the mailing addresses of all property owners.
14. Plot the locations and ties of domestic or commercial water pipes, and show the type, length, and size of sleeves. Make a sketch of water pipe sleeves and give ties to buildings with sufficient information so as to provide the property owner with a permanent record. Include the full names and the mailing addresses of all property owners.
15. Plot and identify all storm and/or sanitary sewers.
16. Plot and notate all stone fill, rip-rap, new channels, and drainage ditches, with their station limits.
17. Indicate all driveway locations by stationing and right or left in a table at the top of each layout sheet.

18. Indicate all approach locations either by drawing or by stationing. Use Town Road or Highway numbers or names if available.
19. Verify all bench marks. Cross out those which are invalid, and add any new supplementary bench data.

6-150.60 Structure and Bridge Sheet

Record plans shall include all structure and bridge sheets as follows:

1. Indicate all changes in quantities, dimensions, stationing, and elevations.
2. Indicate the length of steel and/or timber piling, depth of drilled shafts, or other foundation types in place.
3. Indicate any additional features not on original plans.
4. Include all approved structure and bridge shop drawings.

6-150.70 Finals Disposition of Record Plans

Record plans shall be finalled, scanned, archived, and stored by the following procedure:

1. The record plans process begins once a project has been awarded to a specific Contractor and the contract plans have been distributed throughout the agency.
2. A full size set and a half size set of original contract plans will be submitted to the Construction Section. The half size set should be hung on the plans rack for quick reference and the full size set should be stored in a flat file for future use with the record plans.
3. An electronic set of plans shall be created and stored on the "M:/" drive under the project PPMS number, then in the construction subfolder, for example, *M:/98e049/const/001.tif*. Automated Services will provide access to the "M:/" drive for each project.
4. For any project designed through the Pavement Management Unit of the Roadway Section, CADD files may be utilized. For any other section, the most efficient method for creating electronic record plans is by creating scanned images with a *.tif* file extension. Scanned *.tif* files may also be generated from the "Contract Plans" stored by VTRANS IT for permanent record. The VTrans Reprographic Unit has the equipment and the trained personnel to scan a full-size set of plans.
5. Pavement Management Unit projects usually have a project number with the following format: STP #### (##) S. The most efficient manor for creating CADD archive files is to open a new CADD drawing file *(*.dgn* seed file), and then saving the file in the correct folder with the proper PIN number, for example, *98b064.dgn*. Open the **.dgn* file, and then attach the original file as a reference file for editing. All CADD corrections should be in red, with a single red line through the original, incorrect data.

The title page of the record plans shall be marked in red with "RECORD PLANS" and "RECORDED BY:" with the date. Full size sheets shall be stored in the flat files with the original full size plans. Half size record plans may be stored inside the project box or in the flat files. For inventory purposes, the location of the record plans and the project box shall be noted in CTS under the *Record Plan* tab.

6. Upon completion of a project, hand edited, original record plans shall be stored temporarily at Construction Headquarters. Full size sheets should be stored in flat files with the original full size plans. Half size record plans may be stored inside the project box. Plans submitted as the record plans should be clearly marked in red, "RECORD PLANS" and "RECORDED BY:" with the date.
7. All record plan information shall be converted to CADD drawings or shall be scanned into a computerized storage folder and stored on the "M:/" drive and mapped as "CADDWRK$" on "AOTCADD."
8. The record plan set shall include the title sheet, the typical sheet, all layout sheets, and any structure sheets, including approved shop drawings. The shop drawings should be numbered and scanned to create electronic copies. The shop drawings should be filed in the order the items were built on the project. An example for a bridge would be the following: Bridge Bearings, Structural Steel, Precast Concrete Deck members, and then Aluminum Bridge Rail.
9. All resulting Electronic Record Plan Sheets shall be transferred as a group into an electronic archive also known as the DPR (Digital Print Room). The DPR is the final electronic archive and includes a viewing utility to allow for review of all project plans via the Intranet.
10. After an electronic archive has been made, all sheets shall be bound together, with the cross-sections and shop drawings bound separately.
11. The bound Record Plan originals shall then be sent to the appropriate District Transportation Administrator for hardcopy storage

STATE OF VERMONT

AGENCY OF TRANSPORTATION

CONSTRUCTION SECTION

2015

ENGLISH/METRIC

CONSTRUCTION MANUAL

SECTION VII

TABLES AND CHARTS

SECTION VII

TABLES AND CHARTS

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Charts, tables and information included in this section provide general information to reduce the amount of field computations and to provide a reference to standard industry notation and symbols. Information is included in both Metric and English units as the Highway Division continues to advertise plans in either system, although there will be a phasing out of Metric design plans in the future.

7-100 GENERAL CONVERSION TABLES

Dietzgen General Conversion Tables

(Numbers shown in parentheses are exponents)

MULTIPLY	BY	TO OBTAIN
ACRES	43,560	SQUARE FEET
ACRES	4047	SQUARE METERS
ACRES	1.562x10(-3)	SQUARE MILES
ACRES	4840	SQUARE YARDS
AMPERES	1/10	ABAMPERES
ATMOSPHERES	76.0	CENTIMETERS OF MERCURY
ATMOSPHERES	29.92	INCHES OF MERCURY
ATMOSPHERES	33.90	FEET OF WATER
ATMOSPHERES	14.70	POUNDS PER SQUARE INCH
BRITISH THERMAL UNITS	0.252	KILOGRAM-CALORIES
BRITISH THERMAL UNITS	777.5	FOOT POUNDS
BRITISH THERMAL UNITS	3.927x10(-4)	HORSEPOWER-HOURS
BRITISH THERMAL UNITS	1054	JOULES
BRITISH THERMAL UNITS	107.5	KILOGRAM-METERS
BRITISH THERMAL UNITS	2.928x10(-4)	KILOWATT-HOURS
BTU'S PER MINUTE	12.96	FOOT POUNDS PER SECOND
BTU'S PER MINUTE	0.02356	HORSEPOWER
BTU'S PER MINUTE	0.01757	KILOWATTS
BTU'S PER MINUTE	17.57	WATTS
BTU'S PER SQ FOOT/MIN	0.1220	WATTS PER SQUARE INCH
BUSHELS	1.244	CUBIC FEET
BUSHELS	2150	CUBIC INCHES
CENTIMETERS	0.3937	INCHES
CENTIMETERS	0.01	METERS
CENTIMETER-GRAMS	980.7	CENTIMETER-DYNES
CENTIMETERS OF MERCURY	0.01316	ATMOSPHERES
CENTIMETERS OF MERCURY	0.4461	FEET OF WATER
CENTIMETERS PER SECOND	1.969	FEET PER MINUTE
CENTIMETERS PER SECOND	0.03281	FEET PER SECOND
CUBIC CENTIMETERS	3.531x10(-5)	CUBIC FEET
CUBIC CENTIMETERS	6.102x10(-2)	CUBIC INCHES
CUBIC FEET	2.832x10(4)	CUBIC CENTIMETERS
CUBIC FEET	1728	CUBIC INCHES
CUBIC FEET	0.02832	CUBIC METERS
CUBIC FEET	0.03704	CUBIC YARDS
CUBIC FEET	7.481	GALLONS
CUBIC FEET	62.43	POUNDS OF WATER
CUBIC FEET PER MINUTE	472.0	CUBIC CENTIMETERS/SEC
CUBIC FEET PER MINUTE	0.1247	GALLONS PER SECOND
CUBIC FEET PER MINUTE	0.4720	LITERS PER SECOND
CUBIC FEET PER MINUTE	62.4	POUNDS OF WATER PER MIN
CUBIC INCHES	16.39	CUBIC CENTIMETERS
CUBIC INCHES	5.787x10(-4)	CUBIC FEET
CUBIC YARDS	27	CUBIC FEET
CUBIC YARDS	0.7646	CUBIC METERS
CUBIC YARDS PER SECOND	0.45	CUBIC FEET PER SECOND

MULTIPLY	BY	TO OBTAIN
DEGREES(ANGLE)	60	MINUTES
DEGREES(ANGLE)	0.01745	RADIANS
DEGREES(ANGLE)	3600	SECONDS
DYNES	7.233x10(-5)	POUNDALS
ERGS	2.390x10(-11)	KILOGRAM-CALORIES
FEET	30.48	CENTIMETERS
FEET	12	INCHES
FEET	0.3048	METERS
FEET	.36	VARAS
FEET	1/3	YARDS
FEET OF WATER	0.0295	ATMOSPHERES
FEET OF WATER	0.8826	INCHES OF MERCURY
FEET OF WATER	304.8	KILOGRAMS/SQUARE METER
FEET OF WATER	62.43	POUNDS PER SQUARE FOOT
FEET OF WATER	0.4335	POUNDS PER SQUARE INCH
FOOT POUNDS	1.286x10(-3)	BRITISH THERMAL UNITS
FOOT POUNDS	1.356x10(7)	ERGS
FOOT POUNDS	5.050x10(-7)	HORSEPOWER-HOURS
FOOT POUNDS	1.356	JOULES
FOOT POUNDS PER MIN	1.286x10(-3)	BTU'S PER MINUTE
FOOT POUNDS PER MIN	0.01667	FOOT POUNDS PER SECOND
FOOT POUNDS PER MIN	3.030x10(-5)	HORSEPOWER
FOOT POUNDS PER MIN	2.260x10(-5)	KILOWATTS
FOOT POUNDS PER SECOND	7.717x10(-2)	BTU'S PER MINUTE
GALLONS	8.345	POUNDS OF WATER
GALLONS	231	CUBIC INCHES
GALLONS	3.785	LITERS
GALLONS PER MIN	2.228x10(-3)	CUBIC FEET PER SECOND
GRAINS(TROY)	0.06480	GRAMS
GRAMS	980.7	DYNES
GRAMS	0.03527	OUNCES
HORSEPOWER	42.44	BTU'S PER MINUTE
HORSEPOWER	33,000	FOOT POUNDS PER MINUTE
HORSEPOWER	550	FOOT POUNDS PER SECOND
HORSEPOWER	1.014	HORSEPOWER(METRIC)
HORSEPOWER	10.70	KILOGRAM-CALORIES/MIN
HORSEPOWER	0.7457	KILOWATTS
HORSEPOWER	745.7	WATTS
HORSEPOWER(BOILER)	33,520	BTU'S PER HOUR
HORSEPOWER(BOILER)	9.804	KILOWATTS
HORSEPOWER-HOURS	2547	BRITISH THERMAL UNITS
HORSEPOWER-HOURS	1.980x10(6)	FOOT POUNDS
INCHES	2.540	CENTIMETERS
INCHES OF MERCURY	0.03342	ATMOSPHERES
INCHES OF MERCURY	1.1330	FEET OF WATER
INCHES OF WATER	0.002458	ATMOSPHERES
INCHES OF WATER	0.03613	POUNDS PER SQUARE INCH
KILOGRAMS	980,665	DYNES
KILOGRAMS	2.2046	POUNDS
KILOGRAM-CALORIES	3.968	BRITISH THERMAL UNITS
KILOGRAM-CALORIES	3086	FOOT POUNDS
KILOGRAM-CALORIES/MIN	51.43	FOOT POUNDS PER SECOND
KILOGRAM-CALORIES/MIN	0.06972	KILOWATTS

MULTIPLY	BY	TO OBTAIN
KILOMETERS	10(5)	CENTIMETERS
KILOMETERS	3281	FEET
KILOMETERS	10(3)	METERS
KILOMETERS	0.6214	MILES
KILOMETERS	1093.6	YARDS
KILOWATTS	56.92	BTU'S PER MINUTE
KILOWATTS	4.425x10(4)	FOOT POUNDS PER MINUTE
KILOWATTS	737.6	FOOT POUNDS PER SECOND
KILOWATTS	1.341	HORSEPOWER
KILOWATTS	14.34	KILOGRAM-CALORIES/MIN
KILOWATTS	10(3)	WATTS
KILOWATT-HOURS	3415	BRITISH THERMAL UNITS
KILOWATT-HOURS	2.655x10(6)	FOOT POUNDS
KILOWATT-HOURS	1.341	HORSEPOWER-HOURS
KILOWATT-HOURS	3.600x10(6)	JOULES
KILOWATT-HOURS	860.5	KILOGRAM-CALORIES
KILOWATT-HOURS	3.671x10(5)	KILOGRAM-METERS
LOG(10) N	2.303	LOG(6) N or In N
LOG(6) N or In N	0.4343	LOG(10) N
METERS	100	CENTIMETERS
METERS	3.2808	FEET
METERS	39.37	INCHES
MILES	5280	FEET
MILES	1.6093	KILOMETERS
MILES PER HOUR	88	FEET PER MINUTE
OUNCES	28.35	GRAMS
OUNCES PER SQUARE INCH	0.0625	POUNDS PER SQUARE INCH
PINTS(DRY)	33.60	CUBIC INCHES
PINTS(LIQ)	28.87	CUBIC INCHES
POUNDS	453.6	GRAMS
POUNDS	16	OUNCES
POUNDS OF WATER	0.01602	CUBIC FEET
POUNDS OF WATER	27.68	CUBIC INCHES
POUNDS OF WATER	0.1198	GALLONS
POUNDS OF WATER PER MIN	2.669x10(-4)	CUBIC FEET PER SECOND
POUNDS PER CUBIC FOOT	5.787x10(-4)	POUNDS PER CUBIC INCH
POUNDS PER SQUARE FOOT	0.01602	FEET OF WATER
POUNDS PER SQUARE INCH	0.06804	ATMOSPHERES
POUNDS PER SQUARE INCH	2.307	FEET OF WATER
QUARTS	32	FLUID OUNCES
QUARTS(DRY)	67.20	CUBIC INCHES
QUARTS(LIQ)	57.75	CUBIC INCHES
RODS	16.5	FEET
SQUARE CENTIMETERS	0.1550	SQUARE INCHES
SQUARE INCHES	6.452	SQUARE CENTIMETERS
SQUARE MILES	640	ACRES
SQUARE MILES	27.880x10(6)	SQUARE FEET
SQUARE YARDS	0.8361	SQUARE METERS
TEMP(DEGREES C)+17.8	1.8	TEMP(DEGREES F)
TEMP(DEGREES F)-32	5/9	TEMP(DEGREES C)
YARDS	.9144	METERS

7-110 INCHES AND FRACTIONS DECIMAL VALUES

Table1-1: Decimals of a foot for each 1/16 of an inch

Inch	0”	1”	2”	3”	4”	5”	6”	7”	8”	9”	10”	11”
0”	.0000	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167
1/16”	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219
1/8”	0.104	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271
3/16”	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323
1/4”	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375
5/16”	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427
3/8”	.0313	.1146	.1979	.2813	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479
7/16”	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531
1/2”	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583
9/16”	.0469	.1302	.2135	.2969	.3820	.4635	.5469	.6302	.7135	.7969	.8802	.9635
5/8”	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688
11/16”	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8904	.9740
3/4”	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792
13/16”	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844
7/8”	.0729	.1563	.2396	.3229	.4063	.4896	.5729	.6563	.7396	.8229	.9063	.9896
15/16”	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7748	.8281	.9115	.9948

Table 1.2: Decimals of an inch for each 1/16 of an inch

Fraction	Decimal	Fraction	Decimal	Fraction	Decimal	Fraction	Decimal
1/16”	.0625”	5/16”	.3125	9/16”	.5625	13/16	.8125
1/8”	.1250”	3/8”	.3750”	5/8”	.6250”	7/8”	.8750”
3/16”	.1875”	7.16	.4375”	11/16”	.6875”	15/16”	.9375”
1/4”	.2500”	1/2"	.5000”	3/4”	.7500”	1”	1.0000”

7-120 TRENCH EXCAVATION FOR SLOPE PIPES

Use the following sketch to calculate trench excavations for slope pipes.

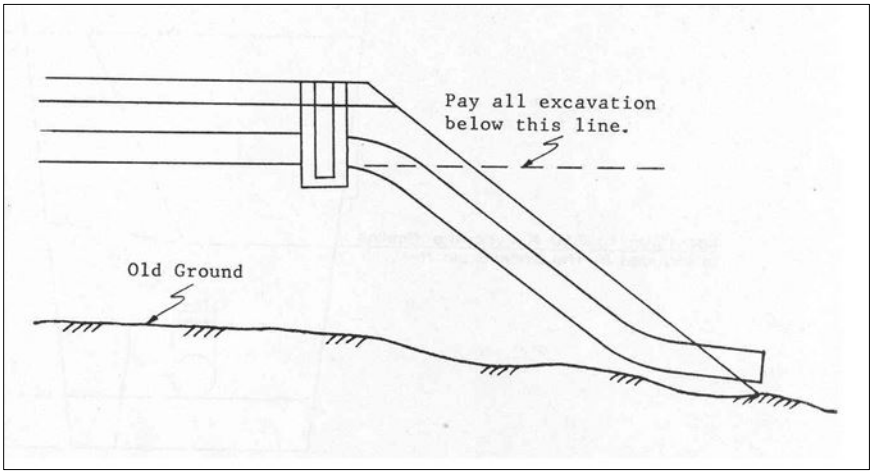


Figure 7-1: Trench Excavation for Slope Pipes

7-130 TRENCH EXCAVATION FOR UNDERDRAIN CARRIER PIPES

Use the following sketch to calculate trench excavations for underdrain carrier pipes.

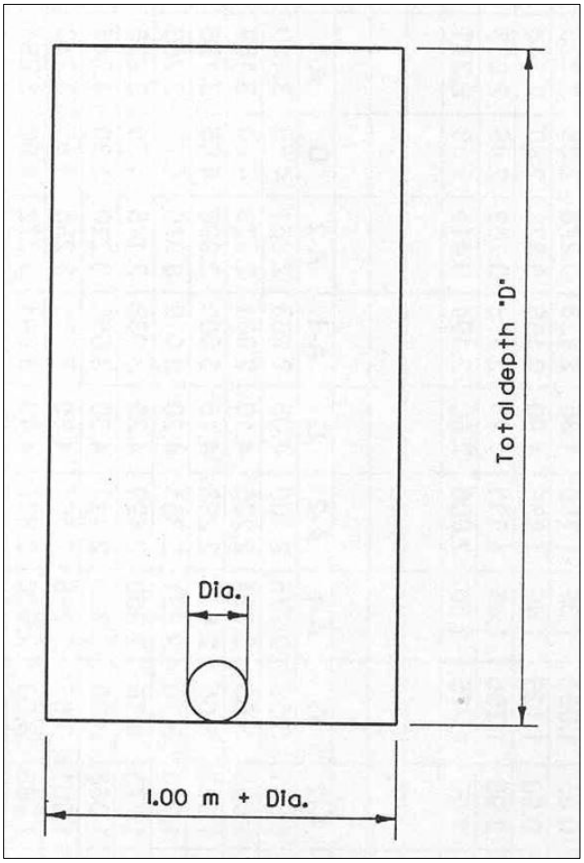


Figure 7-2: Trench Excavation for Underdrain Carrier Pipes

Note: All backfill material is included in the four Underdrain Carrier Pipe items.

7-140 UNIFIED SOIL CLASSIFICATION

The following table shows the Unified Soil Classification system.

Major divisions			Group symbol	Group name
Coarse grained soils more than 50% retained on No.200 (0.075 mm) sieve	gravel > 50% of coarse fraction retained on No.4 (4.75 mm) sieve	clean gravel	GW	well graded gravel, fine to coarse gravel
			GP	poorly graded gravel
		gravel with >12% fines	GM	silty gravel
			GC	clayey gravel
	sand ≥ 50% of coarse fraction passes No.4 sieve	clean sand	SW	well graded sand, fine to coarse sand
			SP	poorly-graded sand
		sand with >12% fines	SM	silty sand
			SC	clayey sand
Fine grained soils more than 50% passes No.200 sieve	silt and clay liquid limit < 50	inorganic	ML	silt
			CL	clay
		organic	OL	organic silt, organic clay
	silt and clay liquid limit ≥ 50	inorganic	MH	silt of high plasticity, elastic silt
			CH	clay of high plasticity, fat clay
		organic	OH	organic clay, organic silt
Highly organic soils			Pt	peat

7-150 AASHTO SOIL TERMINOLOGY

AASHTO soil terminology comes from AASHTO M 145, "Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes." Aggregate terminology comes from AASHTO M 147, "Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses."

Basic AASHTO soil terminology terms include:

Boulders & Cobbles: Material retained on a 75 mm (3 in) sieve.

Gravel: Material passing a 75 mm (3 in) sieve and retained on a 2.00 mm (No. 10) sieve.

Coarse Sand: Material passing a 2.00 mm sieve (No. 10) and retained on a 0.475 mm (No. 40) sieve.

Fine Sand: Material passing a 0.475 mm (No. 40) sieve and retained on a 0.075 mm (No. 200) sieve.

Silt-Clay: Material passing a 0.075 mm (No. 200) sieve.

Silt Fraction: Material passing the 0.075 mm (No. 200) sieve and larger than 0.002 mm.

Clay Fraction: Material smaller than 0.002 mm.

Silty: Material passing a 4.75 mm (No. 4) sieve with a PI $\leq$ 10.

Clayey: Material passing a 4.75-mm (No. 4) sieve with a PI $\leq$ 11.

Coarse Aggregate: Aggregate retained on the 2.00 mm sieve and consisting of hard, durable particles, or fragments of stone, gravel, or slag. A wear requirement (AASHTO T 96) is normally required.

Fine Aggregate: Aggregate passing the 2.00 mm (No. 10) sieve and consisting of natural or crushed sand, and fine material particles passing the 0.075 mm (No. 200) sieve. The fraction passing the 0.075 mm (No. 200) sieve shall not be greater than two-thirds of the fraction passing the 0.425 mm (No. 40) sieve. The portion passing the 0.425 mm (No. 40) sieve shall have a LL $\leq$ 25 and a PI $\leq$ 6. Fine aggregate shall be free from vegetable matter and lumps or balls of clay.

Note: These definitions are AASHTO definitions and are slightly different than those of the Unified Soil Classification system (ASTM).

The following table shows the AASHTO soil classification system (from AASHTO M 145).

AASHTO Soil Classification System (from ASTM M 145)

General Classification	Granular Materials 35% or less passing the 0.075 mm sieve							Silt-Clay Materials >35% passing the 0.075 mm sieve			
Group Classification	A-1		A-3	A-2				A-4	A-5	A-6	A-7
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5 A-7-6
Sieve Analysis, % passing											
2.00 mm (No. 10)	50 max	---	---	---	---	---	---	---	---	---	---
0.425 (No. 40)	30 max	50 max	51 max	---	---	---	---	---	---	---	---
0.075 (No. 200)	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing 0.425 mm (No. 40)											
Liquid limit	---		---	40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min
Plasticity index	6 max		N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11 min[a]
Usual types of significant constituent materials	stone fragments, gravel and sand		fine sand	silty or clayey gravel and sand				silty soils		clayey soils	
General rating as a subgrade	excellent to good							fair to poor			

[a]Plasticity index of A-7-5 subgroup is equal to or less than the LL - 30. Plasticity index of A-7-6 subgroup is greater than LL - 30

7-160 BOLT IDENTIFICATION MARKINGS

Material Notes

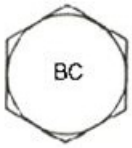
1. Low or Medium Carbon Steel
2. Medium Carbon Steel
3. Low Carbon
4. Low Carbon Martensite
5. Weathering Steel
6. Alloy Steel
7. Medium Carbon Alloy

Treatment

1. Cold drawn
2. Quenched and tempered

SAE & ASTM Bolt Grade Identification Marks and Mechanical Properties

Bolt Grade Identification Marking	Specs	Nominal Size (inch)	Proof Load Stress (ksi)	Tensile Strength (min ksi)	Material Notes
	SAE Grade 1	1/4 to 1 1/2	33	60	
	SAE Grade 2	1/4 thru 3/4	55	74	1
		over 3/4 thru 1-1/2	33	60	
	ASTM A307	1/4 to 1 1/2	33	60	3
	SAE Grade 4	1/4 to 1 1/2	65	115	2,a
	SAE - Grade 5	1/4 thru 1	85	120	
	ASTM A449 - Type 1	1 1/8 thru 1-1/2	74	105	2, b
		1 3/4 thru 3	55	90	
	SAE - Grade 5.2	1/4 thru 1	85	120	4, b
	ASTM A325 - Type 1	1/2 thru 1	85	120	2, b
		1 1/8 to 1-1/2	74	105	
	ASTM A325 - Type 2	1/2 thru 1	85	120	4,b

	ASTM A325 - Type 3	1/2 thru 1	85	120	5,b
		1 1/8 to 1-1/2	74	105	
	ASTM A354 - Grade BC	1/4 thru 2-1/2	105	125	5,b
		2-3/4 thru 4	95	115	
	SAE Grade 7	1/4 to 1 1/2	105	133	7,b
	SAE - Grade 8	1/4 thru 1-1/2	120	150	7,b
	ASTM A354 - Grade BD	1/4 thru 1-1/2	120	150	6,b
	SAE - Grade 8.2	1/4 thru 1	120	150	4,b
	ASTM A490 - Type 1	1/2 thru 1-1/2	120	150	6,b
	ASTM A490 - Type 3	1/2 thru 1-1/2	120	150	5,b

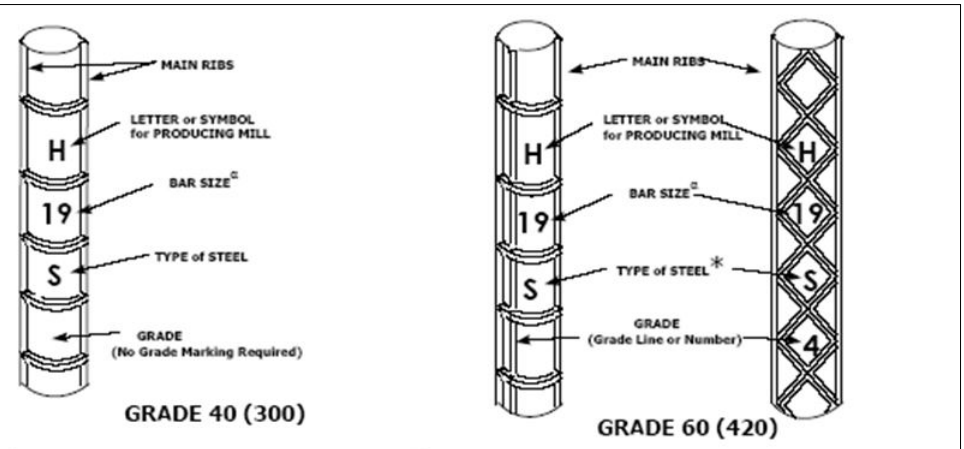
7-170 REINFORCING STEEL BAR MARKINGS

Bar identification markers on deformed reinforcing steel bars may be oriented as illustrated or rotated 90° and consist of:

- Letter or symbol for the Producing Mill
- Bar Size
- Type of Steel
- Grade

Grade marking may be placed within a deformation space or may be a "Grade Line" placed along the length of the bar on the front or back. "Grade Lines" should not be confused with the "Main Ribs," which are also found on reinforcing bars.

Typical examples of deformed reinforcing steel bars identification are shown in the following illustration.



BAR SIZE [a]		
ENGLISH BAR SIZE	METRIC BAR SIZE	DIAMETER (in.)
#3	#10	0.375
#4	#13	0.500
#5	#16	0.625
#6	#19	0.750
#7	#22	0.875
#8	#25	1.000
#9	#29	1.128
#10	#32	1.270
#11	#36	1.410
#14	#43	1.693
#18	#57	2.257

[a] Most bar mills use metric bar size markings.

GRADE			
English		Metric	
Grade	Marking	Grade	Marking
40	None	300	None
60	60 [Δ]	420	4 [Δ]

[Δ] If this number is not shown on bar, then the grade is represented by a grade line on the bar. When a number is shown, most bar mills use the metric grade marking of "4".

TYPE of STEEL	
S	A 615 (Billet)
R	A 996, Type R (Rail)
A	A 996, Type A (Axle)
W	A 706 (Weldable)

* Grade 60 (420) Billet Steel "S" might also show a "W" if the mill certifies it to meet both ASTM A 615 and ASTM A 706.

Figure 7-3: Identifying Deformed Reinforcing Steel Bars

7-180 REINFORCING STEEL UNIT WEIGHTS

Rebar is sized nominally in eighths of an inch of the bar's diameter. For example, a #3 bar has a diameter of ⅜ in and a #6 bar has a diameter of ¾ in. A #10 bar has a diameter of 10/8 in, which equals 1 ¼ in.

The following chart shows Imperial and metric deformed reinforcing steel bars sizes, diameters, and weights.

Imperial Bar Size	Diameter (in)	lbs/ lineal ft	Diameter (mm)	Metric Bar Size
No. 2	0.250	0.167	6.35	No. 6
No. 3	0.375	0.376	9.52	No. 10
No. 4	0.500	0.668	12.7	No. 13
No. 5	0.625	1.043	15.8	No. 16
No. 6	0.750	1.502	19.05	No. 19
No. 7	0.875	2.044	22.22	No. 22
No. 8	1.000	2.670	25.4	No. 25
No. 9	1.128	3.400	28.65	No. 29
No. 10	1.270	4.303	32.25	No. 32
No. 11	1.410	5.313	35.81	No. 36
No. 14	1.693	7.650	43.0	No. 43
No. 18	2.257	13.60	57.33	No. 57

7-190 WELDED WIRE MESH

Welded wire mesh is designated by its mesh size. For example, a 6 in x 6 in mesh size is designated as **6x6 W1.4/1.4**. The "6x6" is the horizontal and vertical spacing of the strands in inches. "1.4/1.4" is the "W" number, which is the wire size (longitudinal/transverse) in cross sectional area measured in 1/100's of a square inch. A "W" value of 1.4 is 1.4 hundredths of a square inch.

The equivalent welded wire mesh size in metric units is 152 x 152 mm with a "MW" value (Metric W) of 9.1 mm^2.

Previously, woven wire mesh wire size was expressed by wire gauge, rather than by cross sectional area in hundredths of a square inch. What currently is designated as **6x6 W1.4/1.4** woven wire mesh was designated as **6x6 W10/10** wire gauge.

The following chart shows Imperial and metric woven wire mesh sizes, with equivalent wire gauge sizes for 2x2, 3x3, and 4x4 sizes.

Imperial Mesh Size(in)	Gauge Mesh Size(Wire Gauge)	Metric Mesh Size(mm)
2x2 W4.0/4.0	2x2 - 4/4	50x50 MW25.8/25.8
2x2 W2.9/2.9	2x2 - 6/6	50x50 MW18.7/18.7
2x2 W2.1/2.1	2x2 - 8/8	50x50 MW13.3/13.3
2x2 W1.4/1.4	2x2 - 10/10	50x50 MW9.1/9.1
2x2 W0.9/0.9	2x2 - 12/12	50x50 MW5.6/5.6
2x2 W0.5/0.5	2x2 - 14/14	50x50 MW3.2/3.2
2x2 W0.3/0.3	2x2 - 16/16	50x50 MW2.0/2.0
3x3 W2.1/2.1	3x3 - 8/8	76x76 MW13.3/13.3
3x3 W1.4/1.4	3x3 - 10/10	76x76 MW9.1/9.1
3x3 W0.9/0.9	3x3 - 12/12	76x76 MW5.6/5.6
3x3 W0.5/0.5	3x3 - 14/14	76x76 MW3.2/3.2
4x4 W4.0/4.0	4x4 -4/4	102x102 MW25.8/25.8
4x4 W2.9/2.9	4x4 - 6/6	102x102 MW18.7/18.7
4x4 W2.1/2.1	4x4 - 8/8	102x102 MW13.3/13.3
4x4 W1.7/1.7	4x4 - 9/9	102x102 MW11.1/11.1
4x4 W1.4/1.4	4x4 - 10/10	102x102 MW9.1/9.1
4x4 W0.9/0.9	4x4 - 12/12	102x102 MW5.6/5.6
4x4 W0.7/0.7	4x4 - 13/13	102x102 MW4.2/4.2
4x4 W0.5/0.5	4x4 - 14/14	102x102 MW3.2/3.2

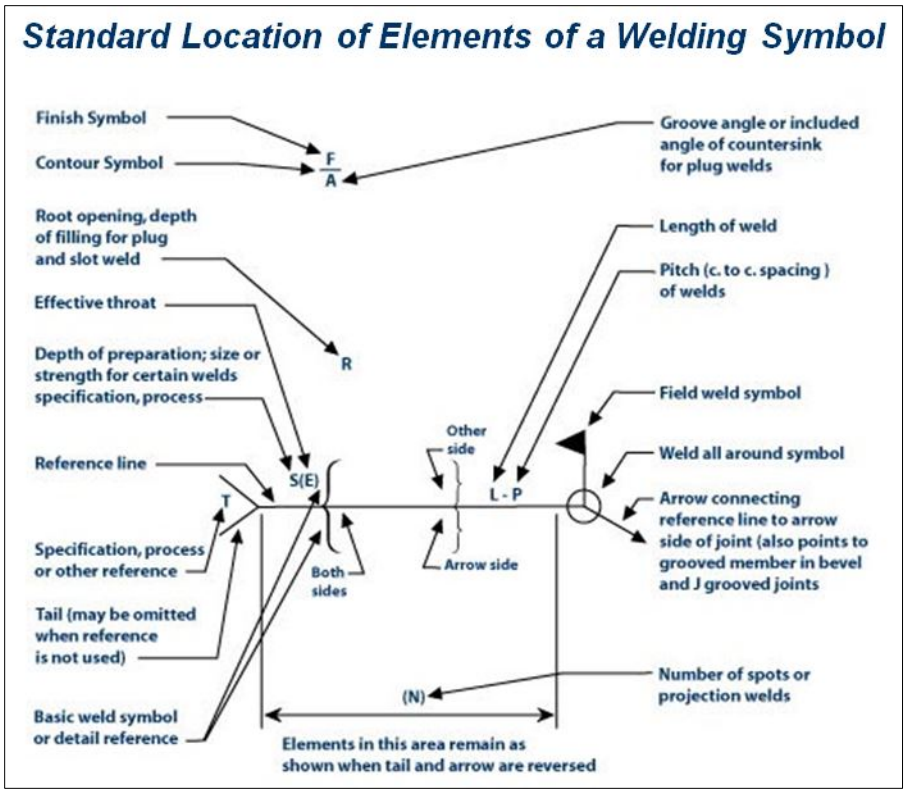
The following chart shows Imperial and metric woven wire mesh sizes, with equivalent wire gauge sizes for 6x6 and 12x12 sizes.

Imperial Mesh Size (in)	**Gauge Mesh Size(Wire Gauge)**	**Metric Mesh Size (mm)**
6x6 W7.4/7.4	6x6 - 0/0	152x152 MW47.6/47.6
6x6 W6.3/6.3	6x6 - 1/1	152x152 MW40.6/40.6
6x6 W5.4/5.4	6x6 - 2/2	152x152 MW34.9/34.9
6x6 W4.7/4.7	6x6 - 3/3	152x152 MW30.1/30.1
6x6 W4.0/4.0	6x6 - 4/4	152x152 MW25.8/25.8
6x6 W4.0/2.9	6x6 - 4/6	152x152 MW25.8/18.7
6x6 W3.4/3.4	6x6 - 5/5	152x152 MW21.7/21.7
6x6 W2.9/2.9	6x6 - 6/6	152x152 MW18.7/18.7
6x6 W2.5/2.5	6x6 - 7/7	152x152 MW15.9/15.9
6x6 W2.1/2.1	6x6 - 8/8	152x152 MW13.3/13.3
6x6 W1.7/1.7	6x6 - 9/9	52x152 MW11.1/11.1
6x6 W1.4/1.4	6x6 - 10/10	152x152 MW9.1/9.1
12x12 W5.4/5.4	12x12 - 2/2	305x305 MW34.9/34.9

7-200 WELD SYMBOLS

Basic Weld Symbols				
SEAM	BACK	FILLET	PLUG OR SLOT	
Groove or Butt Weld				
SQUARE	V	BEVEL	U	J
FLARE V	FLARE BEVEL	SURFACING		
Flange Weld				
EDGE	CORNER			

Supplementary Weld Symbols				
MELT THROUGH	WELD ALL AROUND	FIELD WELD	FLUSH	
Supplementary Weld Symbols				
CONVEX	CONCAVE			


Standard Location of Elements of a Welding Symbol
Finish Symbol
Contour Symbol
F
A
Groove angle or included angle of countersink for plug welds
Root opening, depth of filling for plug and slot weld
Length of weld
Pitch (c. to c. spacing) of welds
Effective throat
R
Depth of preparation; size or strength for certain welds specification, process
Field weld symbol
Other side
Weld all around symbol
Reference line
S(E)
L - P
T
Arrow connecting reference line to arrow side of joint (also points to grooved member in bevel and J grooved joints
Specification, process or other reference
Both sides
Arrow side
Tail (may be omitted when reference is not used)
Number of spots or projection welds
(N)
Basic weld symbol or detail reference
Elements in this area remain as shown when tail and arrow are reversed

7-210 BOARD-FEET MEASURE

Lumber is measured in board-feet. The following chart shows nominal lumber sizes and the number of board-feet in a representative segment of lumber 1 ft long.

Lumber Size (in)	Board-feet per linear foot of lumber
1x1	0.083
1x2	0.167
1x3	0.250
1x4	0.333
1x6	0.500
1x8	0.667
1x10	0.833
1x12	1.000
2x2	0.333
2x4	0.667
2x6	1.000
2x8	1.333
2x10	1.667
2x12	2.000
4x4	1.333
4x6	2.000
4x8	2.667
4x10	3.333
4x12	4.000
6x6	3.000
6x8	4.000
6x10	5.000
6x12	6.000
8x8	5.333
8x10	6.667
8x12	8.000
10x10	8.333
10x12	10.000
12x12	12.000

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SECTION VIII

EVALUATIONS

8-100 GENERAL

8-100.10 Employee Evaluations

The VTrans employee evaluation process is an opportunity to provide the employee with feedback of their performance as prescribed in the performance expectations section of their *Annual Performance Evaluation* and to detail new duties and expectations for the next evaluation period. Constructive feedback for areas requiring improvement or recognition of exemplary performance shall be clearly documented.

Employee evaluations will be completed annually by each employee's supervisor, submitted to the Division Administration for review and signature, reviewed with the supervisor, and then reviewed with the employee as spelled out in the *Vermont State Employee's Contract*.

The *Vermont State Employee's Contract* is available online at the following URL:

http://humanresources.vermont.gov/policy/labor_relations/collective_bargaining_agreements

Each supervisor will keep track of when employee evaluations are due. Further guidance on completing employee evaluations can be found in *A Guide to the State Performance Management System* and is available at the following URL:

http://humanresources.vermont.gov/forms

8-100.20 Temporary Employee Evaluations

The Resident Engineer will conduct temporary employee evaluations and submit them to the Regional Construction Engineer for review. The Resident Engineer will present the evaluation to the employee and issue an employee rating. The final version of the employee's rating, with the appropriate signatures, will be forwarded to the Construction Executive Services Coordinator.

8-100.30 Consultant Performance Evaluations

The Construction Section supplements its full-time inspection staff with Consultant Inspectors. The evaluation of each Consultant Inspector is an essential piece in the selection of consultant firms that supply construction inspection services.

For each Consultant Inspector that is assigned to the Resident Engineer, the *Consultant Performance Evaluation* (Appendix H-1) form should be completed on a project-by-project basis at the end of each construction season, but no later than January 15th of the following year. However, if the Resident Engineer is experiencing performance issues with a specific Consultant Inspector, it should be documented immediately in a *Consultant Performance Evaluation*. The Resident Engineer should solicit comments and/or feedback from other VTrans employees who may have first-hand knowledge of the Consultant's performance.

The following list is a step-by-step procedure for preparing, distributing, and processing *Consultant Performance Evaluations* at the end of the construction season.

Preparation of the *Consultant Performance Evaluation*:

1. The Resident Engineer will complete the evaluation form electronically with added comments and/or feedback from VTrans employees who have worked directly with the Consultant Inspector, if appropriate.
2. The Resident Engineer will email the completed *Consultant Performance Evaluation* form to Regional Construction Engineer for review and comment. A copy of the form will also be emailed to the Regional Administrative Services Technician.
3. The Regional Construction Engineer will review the *Consultant Performance Evaluation* form and respond via email to Resident Engineer, and Regional Administrative Services Technician, with their comments and/or approval.
4. The Resident Engineer will make any adjustments to the *Consultant Performance Evaluation* form if necessary.

If no adjustments to the *Consultant Performance Evaluation* form are necessary, the evaluation shall be distributed as outlined in the following sections.

Distribution of the *Consultant Performance Evaluation*:

1. If adjustments to the *Consultant Performance Evaluation* form are required, the Resident Engineer will make them to the final electronic document and forward it to the Regional Administrative Services Technician.
2. The Regional Administrative Services Technician will save the completed *Consultant Performance Evaluation* form on the Z:/" drive file as a *.pdf* file in an appropriate folder.

3. The Regional Administrative Services Technician will email copy of the *Consultant Performance Evaluation* form along with a completed *Consultant Cover Letter* (Appendix H-2) to the Consultant Inspector's firm for their review.
4. The Regional Administrative Services Technician will forward an electronic copy of the *Consultant Performance Evaluation* form to the Construction Executive Assistant for filing in the appropriate Consultant Inspector's firm file.

Assessment of the *Consultant Performance Evaluation* by the Consultant Inspector's Firm:

1 When the Consultant Inspector's firm receives the *Consultant Performance Evaluation* form and the *Consultant Cover Letter* cover letter, they shall be forwarded to the appropriate Consultant Inspector for their review and/or comment.

2 If either the Consultant Inspector or the firm has any objections to the evaluation, they have thirty days to respond to Regional Construction Engineer.

Consultant Inspector's Appeal Process:

1. If the Consultant Inspector or the Consultant Inspector's firm appeals the evaluation, the Regional Construction Engineer shall meet with the Resident Engineer to conduct a thorough review of the evaluation and develop a response to the Consultant's objections.

Consultant Inspector Evaluation Tracking Process:

1. The Regional Administrative Services Technician will track the Consultant Inspector evaluation process and maintain a record of the status of all Consultant Inspector evaluations within their region. This method for tracking the status of these evaluations should be available for review by their Regional Construction Engineer.
2. The Regional Construction Engineer will ensure that each Consultant Inspector receives an evaluation.

8-100.40 Prime Contractor Performance Evaluations

The Prime Contractor performance evaluation process is an opportunity to provide the Prime Contractor valuable feedback on their performance. Prime Contractor evaluations also play an important role during the project prequalification process. These evaluations are included in the information packet used by the Prequalification Committee in forming their decisions to accept, deny, or modify the number of projects a Contractor is able to work on at any given time.

The Resident Engineer will complete the *Prime Contractor Performance Evaluation* (Appendix H-3) form upon the completion and acceptance of the project contract. When a project is held over a construction season for minor issues (such as vegetation growth, landscape plantings, etc.), the Resident Engineer will prepare the *Prime Contractor Performance Evaluation* as soon as possible after the Final Inspection is held.

However, the *Prime Contractor Performance Evaluation* may be completed at any time to document specific performance issues of the Prime Contractor that may be taking place on the project. The Construction Specialists (Environmental Engineer, Paving Engineer, and/or Structures Engineer) may request that the Resident Engineer complete a *Prime Contractor Performance Evaluation* form at any time to document any apparent performance problems.

The following process outlines the procedure that should be followed for Prime Contractor evaluations.

1. The Resident Engineer will complete all sections of the *Prime Contractor Performance Evaluation* including those sections that cover work performed by Subcontractors. The Prime Contractor is responsible for the quality of the work performed by their forces as well as all Subcontractors. The Subcontractor's name will be included in the *Prime Contractor Performance Evaluation* if they worked on the project.
2. The Resident Engineer will include an explanation in the *Prime Contractor Performance Evaluation* for all unsatisfactory work that elicits a "No" response.
3. If any of the Construction Specialists have any concerns, they will present their comments to the Resident Engineer by the Final Inspection for consideration to be included in the Resident Engineer's evaluation.

4. The Resident Engineer will email the *Prime Contractor Performance Evaluation* to the Regional Construction Engineer for review and comments, as well as to the appropriate Construction Specialists and Regional Administrative Services Technician.
5. The Regional Construction Engineer and Construction Specialists will review the *Prime Contractor Performance Evaluation* and respond to the Resident Engineer with their comments or approval.
6. The Resident Engineer will incorporate any necessary comments. If no revisions to the *Prime Contractor Performance Evaluation* are required, the Regional Construction Engineer will notify the Resident Engineer by email that they are satisfied with the evaluation. The Regional Administrative Services Technician will then forward the *Prime Contractor Performance Evaluation* to the Prime Contractor.

The following is the distribution process for a *Prime Contractor Performance Evaluation* with an overall evaluation of 80% or above:

1. The Resident Engineer will make any required adjustments to the *Prime Contractor Performance Evaluation* and email copies to the Regional Construction Engineer and Regional Administrative Services Technician for distribution.
2. The Regional Administrative Services Technician will save the *Prime Contractor Performance Evaluation* on the "Z:/" drive as a *.pdf* file in the appropriate folder.
3. The Regional Administrative Services Technician will email the *Prime Contractor Performance Evaluation* with a *Contractor Cover Letter* (Appendix H-4) to the appropriate Prime Contractor, as well as to the Construction Engineer, the Construction Services Engineer, the Administrative Services Technician in Construction's Headquarters, and the Prequalification Technician in Contract Administration.

The following is the distribution process for a *Prime Contractor Performance Evaluation* with an overall evaluation of less than 80% (or when 50% or more of the questions are answered "No" in any section):

1. The Resident Engineer will make any required adjustments to the *Prime Contractor Performance Evaluation* and email copies to the Regional Construction Engineer and Regional Administrative Services Technician.

2. The Regional Administrative Services Technician will save the *Prime Contractor Performance Evaluation* on the "Z:/" drive as a *.pdf* file in the appropriate folder.
3. Regional Administrative Services Technician will email the *Prime Contractor Performance Evaluation* with a *Contractor Concern Cover Letter* (Appendix H-5) to the appropriate Prime Contractor, as well as to the Construction Engineer, the Construction Services Engineer, the Administrative Services Technician in Construction's Headquarters, and the Prequalification Technician in Contract Administration.

The following is the *Prime Contractor Performance Evaluation* appeal process:

1. If the Prime Contractor appeals the findings of the *Prime Contractor Performance Evaluation*, the Regional Construction Engineer and Resident Engineer shall meet to review the evaluation together and discuss whether any changes shall be considered.
2. The Regional Construction Engineer shall respond to the Prime Contractor's appeal after a thorough review, and inform the Prime Contractor that they may extend their appeal to the Construction Engineer.
3. Prime Contractor has thirty days to appeal to the Construction Engineer.
4. The Regional Administrative Services Technician will send a response letter to the Prime Contractor and save a copy of the letter on the "Z:/" drive in the appropriate folder.

The following is the *Prime Contractor Performance Evaluation* tracking process:

1. The Regional Administrative Services Technician will track the Prime Contractor evaluation process and maintain a record of the status of all Prime Contractor evaluations within their region. This method for tracking the status of these evaluations should be available for review by their Regional Construction Engineer.
2. The Regional Construction Engineer will ensure that each Prime Contractor receives an evaluation.
3. The Regional Administrative Services Technician will notify the Regional Construction Engineer if the Prime Contractor has not received an evaluation within 90 days of the *Completion and Acceptance* issuance date. The Regional Construction Engineer will follow up with the Resident Engineer to complete the *Prime Contractor Performance Evaluation*.

4. The Regional Administrative Services Technician will enter the "Contractor Evaluation Completion Date" and "Evaluation to Contractor Date" into CTS under the *Finals* tab.

8-100.50 Subcontractor Performance Evaluation

Subcontractor performance evaluations provide important information regarding a specific Subcontractor's performance to Construction Management and to the Prequalification Committee.

The Resident Engineer will complete the *Subcontractor Performance Rating* (Appendix H-6) form once the Subcontractor has finished their work on the project or upon issuance of the project's *Completion and Acceptance*, whichever occurs last.

The following process outlines the procedure that should be followed for Subcontractor evaluations.

1. The Resident Engineer will complete the *Subcontractor Performance Rating* as soon as the Subcontractor has completed their work. However, if this is not possible, the very latest that the evaluation will be completed is 90 days after the project's *Completion and Acceptance* has been issued.
2. The Resident Engineer will email the *Subcontractor Performance Rating* to the Regional Construction Engineer for review and comments, as well as to the Regional Administrative Services Technician.
3. The Regional Construction Engineer will review the *Subcontractor Performance Rating* and respond to the Resident Engineer with their comments or approval. If no adjustments need to be made to the *Subcontractor Performance Rating*, than it is ready for distribution.

The following is the *Subcontractor Performance Rating* distribution process:

1. The Regional Administrative Services Technician will save the *Subcontractor Performance Rating* on the "Z:/" drive as a *.pdf* file in the appropriate folder.
2. The Regional Administrative Services Technician will email the *Subcontractor Performance Rating* with a *Contractor Cover Letter* to the appropriate Prime Contractor, with a copy going to the Subcontractor, as well as to the Administrative Services Technician in Construction's Headquarters and the Prequalification Technician in Contract Administration.

The following is the *Subcontractor Performance Rating* tracking process:

1. The Regional Administrative Services Technician will track the Subcontractor evaluation process and maintain a record of the status of all Subcontractor evaluations within their region. This method for tracking the status of these evaluations shall be available for review by their Regional Construction Engineer
2. The Regional Construction Engineer shall ensure that each Subcontractor receives an evaluation.
3. The Regional Administrative Services Technician will notify the Regional Construction Engineer if the Subcontractor has not received an evaluation within ninety days of the Completion and Acceptance issuance date. The Regional Construction Engineer will follow up with the Resident Engineer to complete the *Subcontractor Performance Rating* and to verify that a copy is sent to the Prime Contractor.

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SECTION IX

SITEMANAGER

9-100 SITEMANAGER

9-100.10 General

The SiteManager User Manual is a reference document for users of the AASHTO *SiteManager* application. The user should refer to this manual when they have a question related to the use of *SiteManager*; or they may contact their Construction Regional Technician. The manual describes all of the *SiteManager* components, including their purpose, functions, and how to use them. The manual may be found at Z:\Manuals*SiteManager* 3.9 Users Reference.

By using the SiteManager User Manual, it is assumed that the user is authorized to use every function provided by the application. In actual usage, some *SiteManager* functions can only be used by the System Administrator, Project Manager, or Headquarters personnel with global contract authority. Some users will only be permitted to view certain panels. In most cases, this manual does not identify the VTrans personnel who will have the authority to use each function.

Guidance on the use of *SiteManager* specifically for VTrans has been subdivided amongst the three manuals. *SiteManager* guidance for Resident Engineers and Inspectors is located in the Construction Manual. The Regional Office Staff will find guidance for their needs listed in the Regional Process Manual (RPM), and Headquarters Staff located in Montpelier will be guided by the Headquarters Manual (HM).

Note: The Headquarters Manual is under development and the first edition is expected to be published in the near future.

The following is a brief description of the *SiteManager* sections under each of the other two VTrans manuals.

Regional Process Manual (RPM): Each section addresses a specific procedure related to duties of the Regional Technician or Regional Administrative Services Technician.

Activating a Project: This section outlines the necessary steps to activate a contract in *SiteManager*. The process involves verifying project title and number, vendor information, contract dollar amounts, liquidated damage rates, and other project information.

Subcontracts: The Subcontractor section describes the process of adding a Subcontractor to a contract. It describes the process of adding all of the available vendor equipment, personnel, and supervisor information.

Estimates: The Estimates section describes the process of generating a *Bi-weekly Estimate*, as well as what reports need to be printed and distributed.

Change Orders: The *Change Orders* section is limited to the procedures utilized by the Regional Technician, only. This describes the process of how an approved *Change Order* (Appendix A-1) is entered into a contract and illustrates where information is obtained from for the different steps of the *Change Order* process.

Stockpiles: The Stockpiles section describes the process of entering a stockpile payment into *SiteManager* for a paid invoice and how to close out a stockpile payment.

Liquidated Damages: The Liquidated Damages section describes the process of determining and assessing liquidated damages on a contract, how to determine the dollar amount of liquidated damages, the amount of days for liquidated damages, and the distribution of liquidated damages.

Headquarters Manual (HM): Each section addresses a specific procedure related to duties of the IT Support Technician and Finals Engineer.

Passing a Contract into *SiteManager:* This section describes the process of loading a contract into *SiteManager* from LAS.

Adding New Equipment/Personnel/Supervisor to Master List: The Adding New Equipment/Personnel/Supervisor to Master List section describes the process of adding any new equipment/personnel/supervisor that is not in the Vendor Master List. It indicates what information is needed and entered into the master list for vendor equipment/personnel/supervisors.

Final Quantities: The Final Quantities section describes the process of applying appropriate quantity adjustments so that the final quantities in *SiteManager* are correct. It also outlines the paperwork that needs to be sent to the Contractor for final quantities.

Final Estimate: The Final Estimate section describes the process for creating and sending the final estimate to the Contractor for signing. It also details the appropriate paperwork needed.

9-100.20 Subcontractors

This Subcontractor section is limited to the procedure utilized by the Resident Engineer to view the current approved Subcontractors for their project.

To view the current approved Subcontractors for your project:

1. Log into *SiteManager*
2. Double click on Contract Administration(+)
3. Double click on Contract Management(+)
4. Double click on Subcontracts

5. Choose your contract

6. You can now see the list of approved Subcontractors for your project.

Another way to view the approved Subcontractors for your project is to:

1. Log into Citrix

2. Click on Network Windows Explorer

3. Select My Computer

4. Double click on constrct$ (gwyfs01)'(G:) for the G:\

5. Double click on Project Correspondence

6. Find your project folder (filed by CES year, Region, CES number and Project Name)

7. Double click on the folder Subcontracts

8. Open the latest *Subcontractor Approval Memo* (Appendix B-14) as this memo will list all the approved Subcontractors for your project.

The Resident Engineer may also email the Regional Technician or Program Services Clerk for the latest Subcontractor list.

9-100.30 Daily Work Report

This section describes the process of filling out and approving a *Daily Work Report* (Appendix B-2). The process includes entering project comments, Contractor equipment, personnel, staff, and item quantities. A complete step-by-step guide on drafting and entering a *Daily Work Report* into *SiteManager* can be found under *Daily Work Report – Guidance and Procedures* (Appendix B – 17).

9-100.40 Adding Equipment, Supervisors, and Personnel

To add or remove equipment from your contract, select Daily Work Reports from the Main Panel in *SiteManager*.

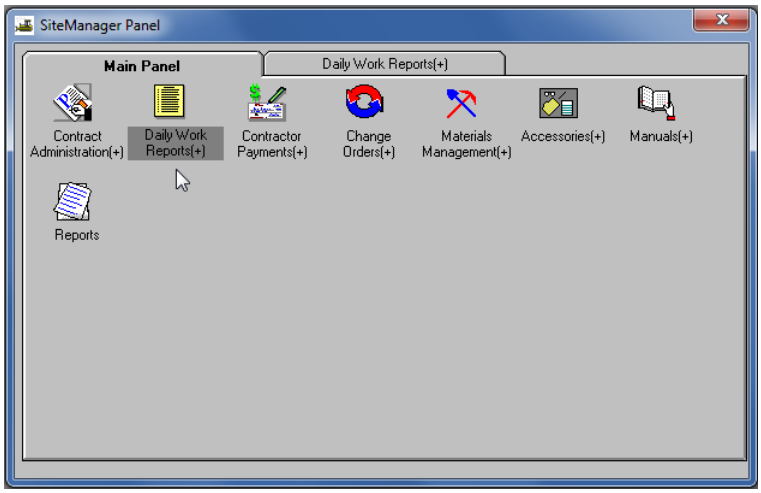


Figure 9-1: SiteManager Main Panel

In Daily Work Reports, select Reference Tables.

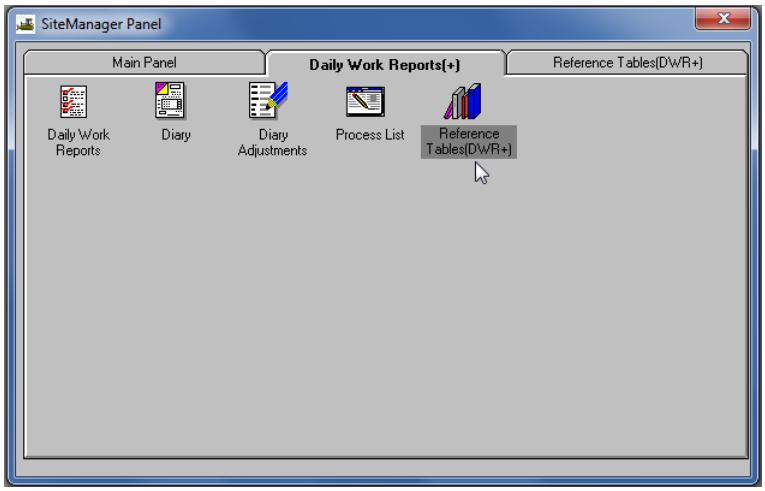


Figure 9-2: Daily Work Report panel

In Reference Tables, select Contract Master List.

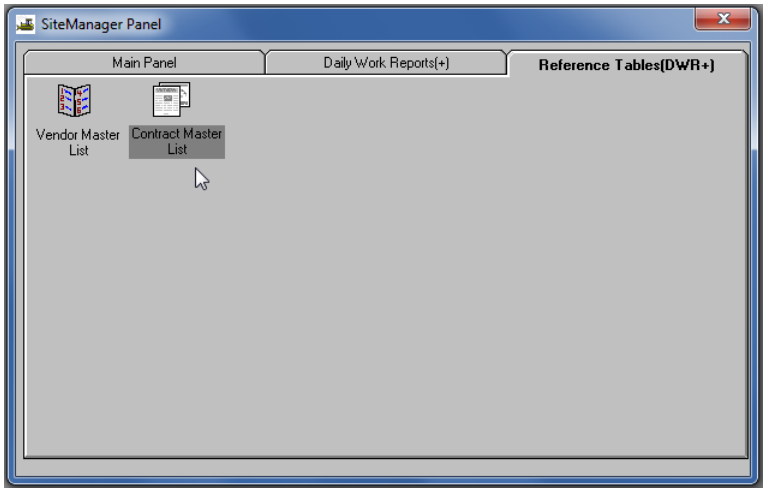


Figure 9-3: Reference Tables panel

In Select Contract Vendor, choose the contract from the list.

Note: Contracts can be sorted by any of these columns by clicking on the column header.

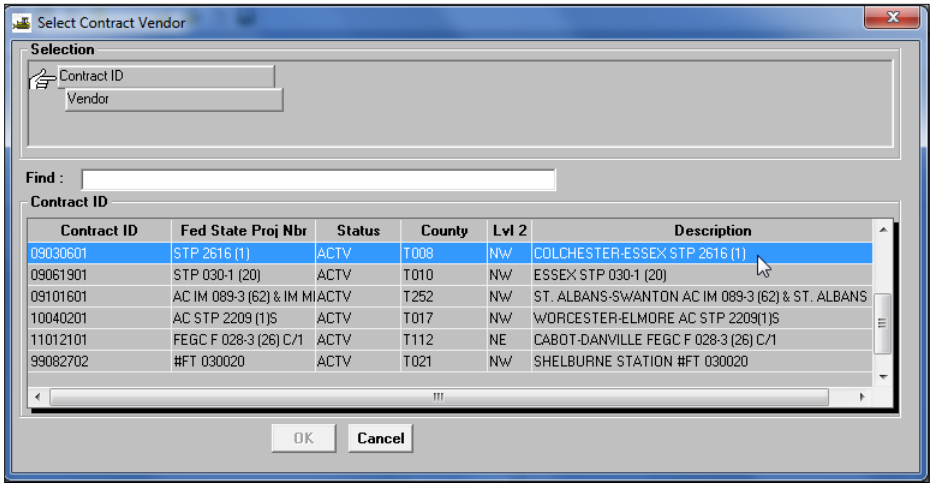


Figure 9-4: Select Contract Vendor panel, Contract ID menu

This window lists the Contractors and Subcontractors currently assigned to the contract. Select the Contractor you wish to make changes to.

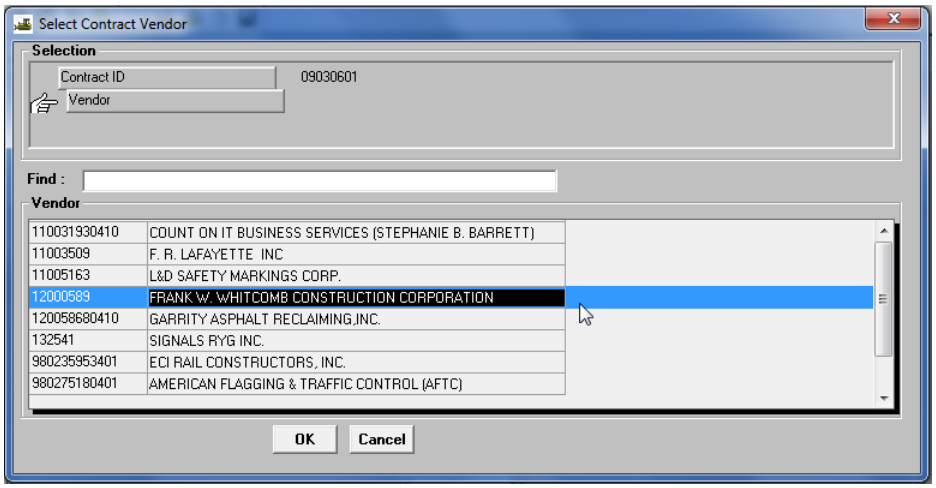


Figure 9-5: Select Contract Vendor panel, Vendor menu

The equipment master list is displayed for this Contractor because it was selected in the category header. This window's left column lists all equipment known for this Contractor. The right window shows any equipment already added to the contract and available for entry into a *Daily Work Report*. To add or remove equipment, click to highlight the equipment piece and then select the Add or Remove button. Multiple items can be selected at one time. Again, clicking on its column heading can change which column sorts the list.

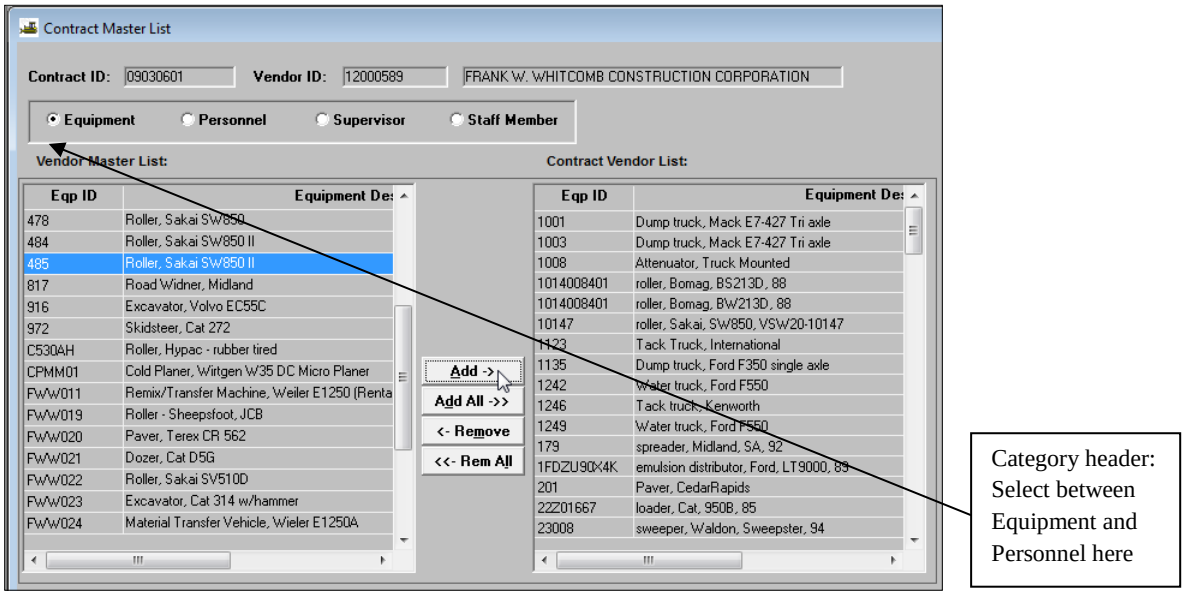


Figure 9-6: Contract Master List panel, Equipment category

The process is the same for changing personnel, supervisors (shown below), and staff members. Just select the appropriate category in the header. If information for other Contractors needs to be adjusted, close windows until you get back to the Select Contract Vendor window.

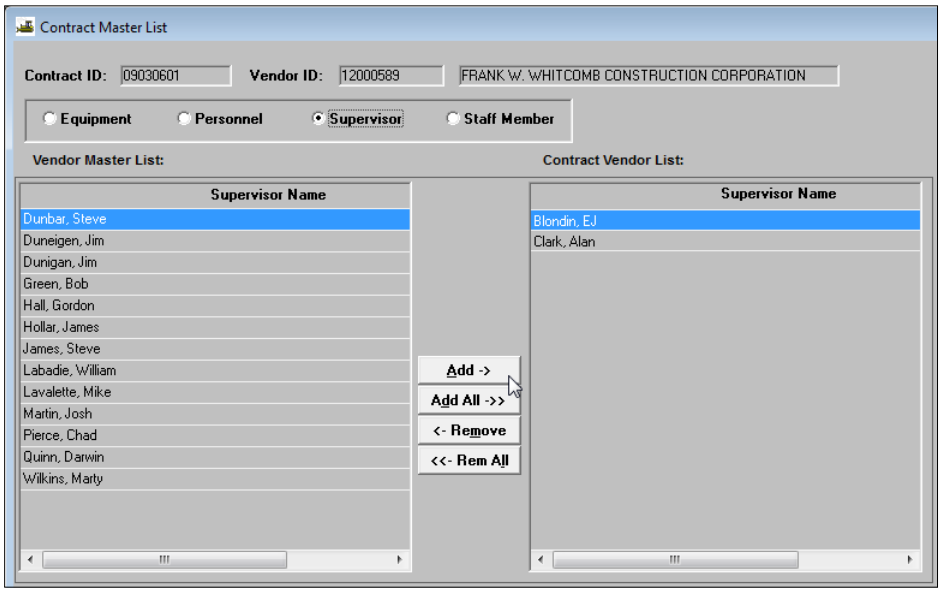


Figure 9-7: Contract Master List panel, Supervisor category

If the piece of equipment, personnel, or individual cannot be located in the master lists, please notify the Construction IT Support Technician by email to update the master list. For equipment, include as much information as possible to identify it properly: Year, Make, Model, Type, Contractor's ID # (preferred) or Serial # (i.e. 2006 Cat D9 Bulldozer PI-0363 or 2010 Mack R3000 tri axle 18yd dump truck PI-3445). The major pieces of equipment directly involved in the construction of the project are of particular tracking importance. Secondary equipment such as trailers for hauling equipment, pickups, hand tools, walk behind tampers, or similar items do not need to be incorporated in the master list.

If a piece of equipment, personnel, or individual on the master list is no longer with the Contractor, please notify the IT Support Technician so the list can be updated.

Once changes have been made to the master list, a notification will be sent out that the new items are ready for use.

9-100.50 Change Order

This Change Order section describes the process of how to approve a *Change Order*. A complete step-by-step guide on developing and executing a Change Order can be found under *Drafting and Executing Change Orders – Guidance and Procedures* (Appendix B-23). It illustrates where information is obtained for the different steps of the *Change Order* process.

Once all signature approval levels have been set, those individuals will be prompted via email to go into *SiteManager* and electronically sign the *Change Order*:

From: oracle.aot@ [mailto:state.vt.usoracle.aot@state.vt.us]
Sent: Monday, March 11, 2013 3:28 PM
To: Judy.Gilmore@
Subject: *SiteManager* CO approval required
Importance: High

jgilmore		
Contract	**CO Nbr**	**Description**
11031102	005	WINHALL STP CULV (22)
This message was automatically generated DO NOT REPLY		

Figure 9-8: Sample Oracle email

When the Resident Engineer has received the Oracle email notification that the *Change Order* is awaiting approval, they will perform the following steps to approve the *Change Order*. This process shall be completed in a timely manner (two days or less) upon receipt of the email.

Approval of the Change Order:

MAIN PANEL > Change Orders > Change Orders MAINTENANCE > Change Orders REVIEW/APPROVE

1. Select the Contract and Change Order.
2. Click on a Recommendation (Approved or Denied)
3. Enter any remarks by clicking on the Remarks button.
4. Click on the Remarks button again to close the remarks window.
5. Click on Save, a window will come up asking to confirm the recommendation.
6. Click Yes or No.

The Regional Administrative Services Technician will send a copy of the signed *Change Order* to the Resident Engineer and only then will the Resident Engineer issue payment in *SiteManager* for the appropriate items listed in the *Change Order*.

9-100.60 SiteManager Materials

This section describes how to access and use the *Materials Sampling Checklist Report* (Appendix B-16). The report provides the Resident Engineer with current status of material testing results and certifications for their project.

The Sampling Checklist Report is included in the *Bi-weekly Estimate* package that is generated by the Regional Technician. This package is sent to the Resident Engineer and the Contractor with every estimate and details the material requirements, installed quantity, certified quantity, and date certified.

The report is also used by the Materials Section when writing the *Material Certification Memo* for the project.

The Sampling Checklist Report can be run by following the steps listed below:

In *SiteManager*, open Materials Management.

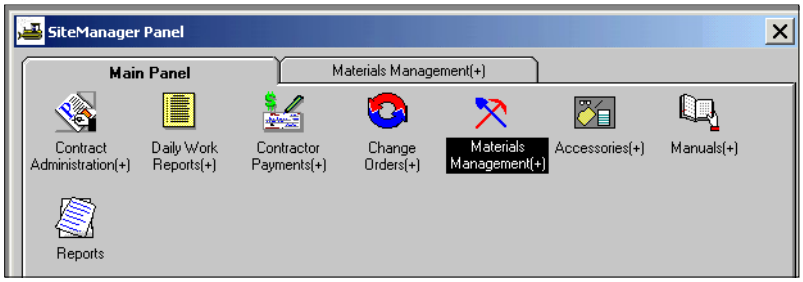


Figure 9-9: SiteManager Main Panel

Open Process List.

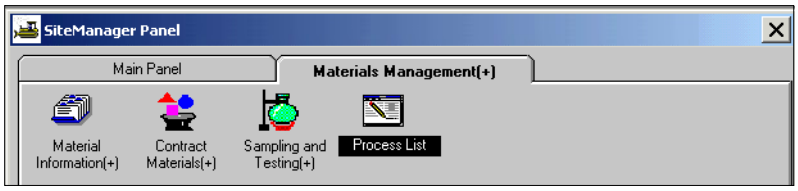


Figure 9-10: Materials Management Panel

Double click on Sampling Checklist or click the icon resembling a running blue man, either one will open the contract list.

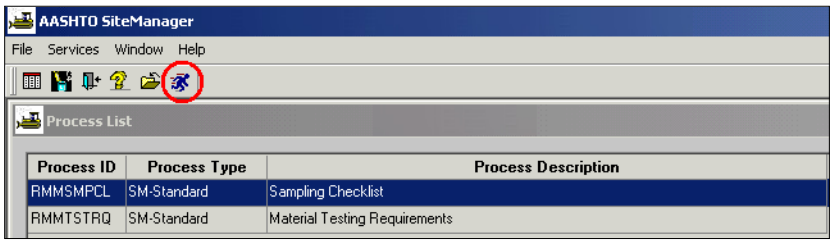


Figure 9-11: Materials Management Process List Menu

Choose the contract and click Submit.

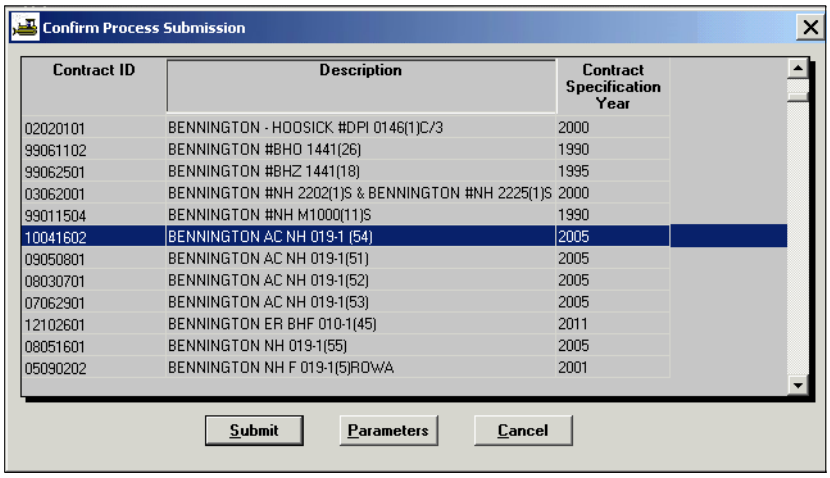


Figure 9-12: Materials Management Sampling Checklist Contract Menu

Click OK on the Client Job Monitor.

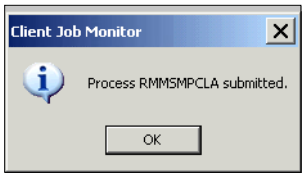


Figure 9-13: Client Job Monitor Popup Window

The report may take a minute or two to run. Click OK on the DPS Status Monitor

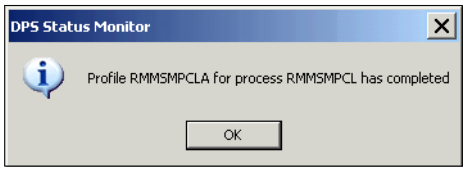


Figure 9-14: DPS Status Monitor Popup Window

Select Services and Process Status

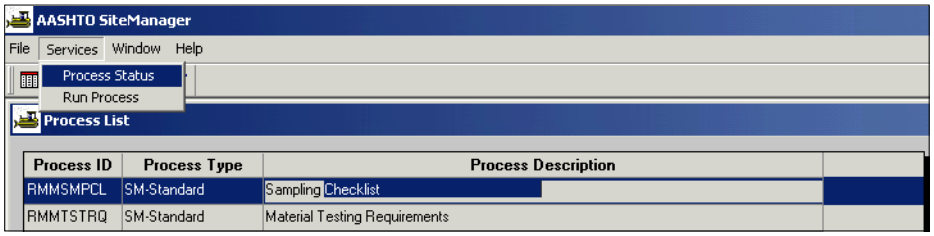


Figure 9-15: Materials Management Process List Menu

The report should be the last one in the queue. Select and double click.

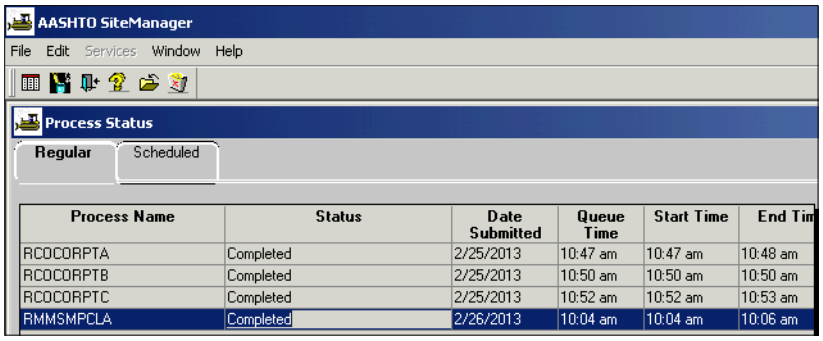


Figure 9-16: SiteManager Process Status Menu

Select the *Output.pdf* file, then double click (sometimes a triple click is required).

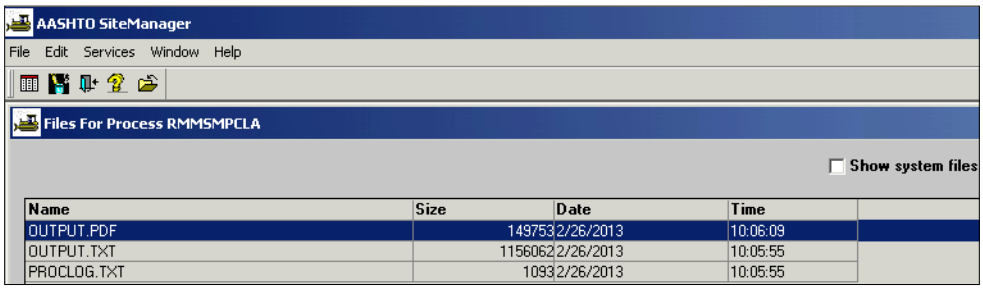


Figure 9-17: SiteManager Processed Files Menu

Sample Report:

Rpt-ID: RMMSMPCL

Vermont
Agency of Transportation
Sampling Checklist Report

Date: 02/26/2013

Contract ID: 10041602
Vendor ID: 11008644

Description: BENNINGTON AC NH 019-1 (54)
Vendor Name: J. A. MCDONALD INC.

County: BENNINGTON

Project / Material Code / Sample ID	Line Item / Material Name	Item Code	Item Description / Sampled by	Mat CD	Smpl Type / Smpl Type	Acpt Method / Acpt Method	Test Method / Test Method	Unit / Unit	Contract Qty	Qty Installed	Qty Tested / Represented Qty	Sample Qty (Total) / Authorized Date	Status
06B176	0025	203.31	SAND BORROW					CM	34,100.000	**34,438.070**	**0.000**		
703.03	SAND BORROW AND CUSHION				aa	Test	AG-COMB07					0.000	1
jdomey124R100553			jdomey	703.03	bia	Test	AG-COMB07	CM			0.000	0	PREA
703.03	SAND BORROW AND CUSHION				aa	Test	AG-COMP00					0.000	1
jdomey124R100553			jdomey	703.03	bia	Test	AG-COMB07	CM			0.000	0	PREA
06B176	0065	301.26	SUBBASE OF CRUSHED GRAVEL, FINE GRADED					CM	0.000	**0.000**	**0.000**		
704.05	CRUSHED GRAVEL FOR SUBBASE				aa	Test	AG-COMB07					0.000	1
704.05	CRUSHED GRAVEL FOR SUBBASE				aa	Test	AG-COMP00					0.000	1
06B176	0070	301.35	SUBBASE OF DENSE GRADED CRUSHED STONE					CM	51,184.000	**53,619.620**	**0.000**		
704.05	CRUSHED GRAVEL FOR SUBBASE				aa	Test	AG-COMP00					0.000	1
704.06	DENSE GRADED CRUSHED STONE FOR SUBBASE				aa	Test	AG-COMB07					0.000	1
06B176	0075	402.12	AGGREGATE SHOULDERS					T	3,314.340	**1,477.970**	**0.000**		
704.12	AGG. FOR SURFACE COURSE AND SHOULDERS				aa	Test	AG-COMB07					0.000	1
06B176	0080	404.65	EMULSIFIED ASPHALT					KG	11,589.000	**42,577.500**	**93,758.260**		
702.04	Emulsified Asphalt				ecrt	CrtA	CT-TYPEA00					84,200.000	1
bearls12BT144714			rlemaire	702.04	ecrt	CrtD	CT-TYPEA00	KG			42,100.000	20121129	ACPT
bearls12C3144335			rlemaire	702.04	ecrt	CrtA	CT-TYPEA00	KG			42,100.000	20121203	ACPT
bearls1317120751			rlemaire	702.04	ecrt	CrtA	CT-TYPEA00	KG			42,100.000	20130107	ACPT

Figure 9-18: Materials Sampling Checklist Report

For quick checks of the *Sampling Checklist Report* there is a shorter report that can be run:

In *SiteManager* open Contractor Payments

Figure 9-19: SiteManager Main Panel

Open Process List.

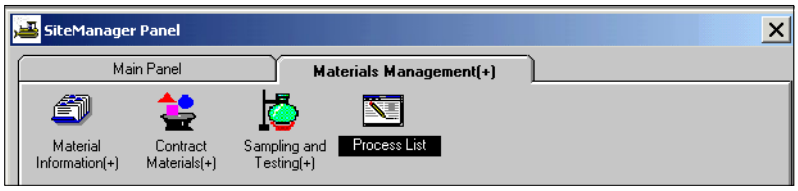


Figure 9-20 Materials Management Panel

Double click on Material Testing Requirements

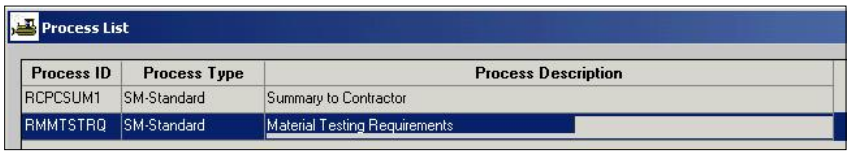


Figure 9-21: Materials Management Process List Menu

Choose your contract and click Submit

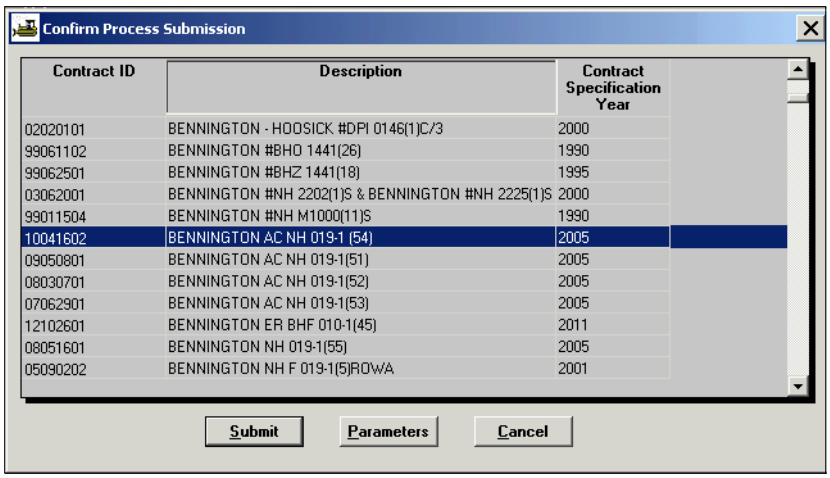


Figure 9-22: Materials Management Testing Requirements Contract Menu

Click OK on the Client Job Monitor

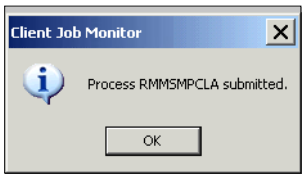


Figure 9-23: Client Job Monitor Popup Window

The report may take a minute or two to run.

Click OK on the DPS Status Monitor

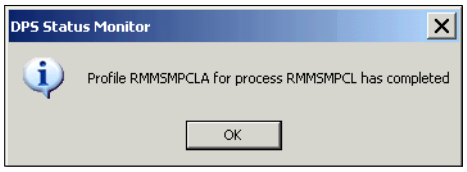


Figure 9-24: DPS Status Monitor Popup Window

Select Services and Process Status

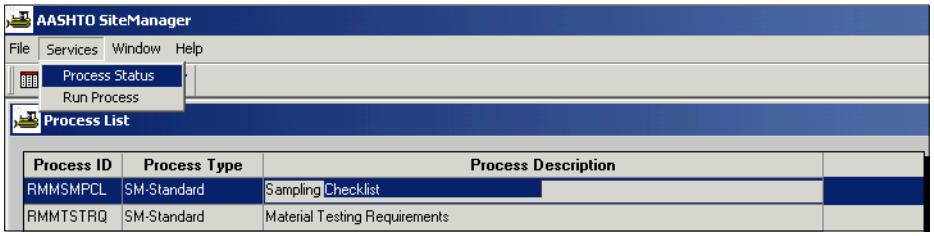


Figure 9-25: Materials Management Process List Menu

The report should be the last one in the queue – select and double click.

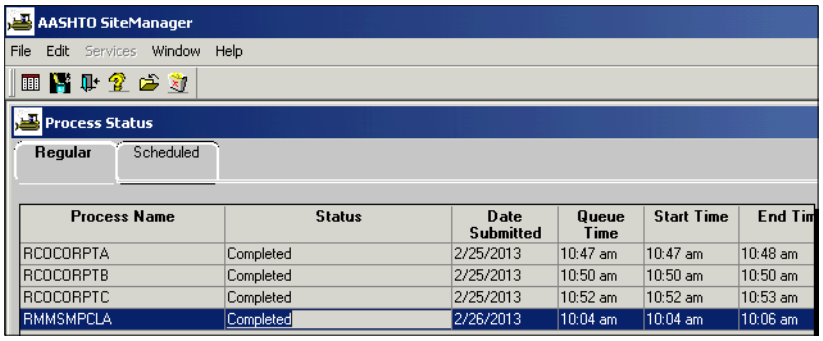


Figure 9-26: *SiteManager Process Status Menu*

Select the Output.pdf file, then double click (sometimes a triple click is required)

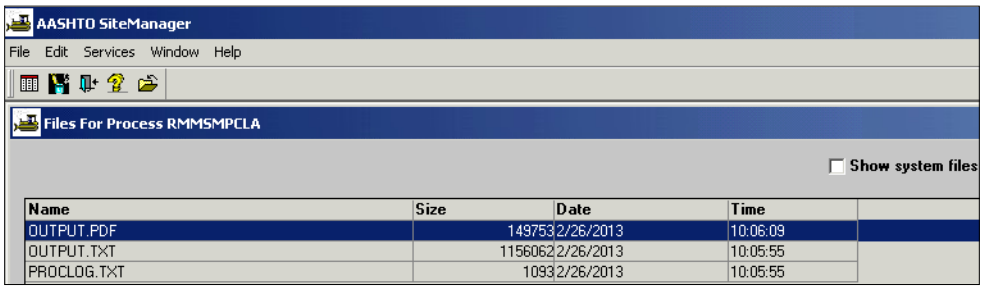


Figure 9-27: SiteManager Processed Files Menu

Sample Report:

Rpt-ID: RMMTSTRQ — Vermont — Date: 02/26/2013

Agency of Transportation

Sampling Checklist Report

Contract ID: 10041602 — Description: BENNINGTON AC NH 019-1 (54) — County: BENNINGTON

Vendor ID: 11008644 — Vendor Name: J. A. MCDONALD INC.

Project / Material Code	Line Item	Item Code	Item Description / Material Name	Acpt Method	Test Method	Unit	Contract Qty	Qty Installed	Qty Tested	Sample Qty (Total)
06B176	0025	203.31	SAND BORROW			CM	34,100.000	**34,438.070**	**0.000**	
703.03			SAND BORROW AND CUSHION	Test	AG-COMB07					0.000
703.03			SAND BORROW AND CUSHION	Test	AG-COMP00					0.000
06B176	0065	301.26	SUBBASE OF CRUSHED GRAVEL, FINE GRADED			CM	0.000	**0.000**	**0.000**	
704.05			CRUSHED GRAVEL FOR SUBBASE	Test	AG-COMB07					0.000
704.05			CRUSHED GRAVEL FOR SUBBASE	Test	AG-COMP00					0.000
06B176	0070	301.35	SUBBASE OF DENSE GRADED CRUSHED STONE			CM	51,184.000	**53,619.620**	**0.000**	
704.05			CRUSHED GRAVEL FOR SUBBASE	Test	AG-COMP00					0.000
704.06			DENSE GRADED CRUSHED STONE FOR SUBBASE	Test	AG-COMB07					0.000
06B176	0075	402.12	AGGREGATE SHOULDERS			T	3,314.340	**1,477.970**	**0.000**	
704.12			AGG. FOR SURFACE COURSE AND SHOULDERS	Test	AG-COMB07					0.000
06B176	0080	404.65	EMULSIFIED ASPHALT			KG	11,589.000	**42,577.500**	**93,758.260**	
702.04			Emulsified Asphalt	CrtA	CT-TYPEA00					84,200.000
702.04			Emulsified Asphalt	Test	EM-COMB-09					9,558.260
06B176	0090	490.30	SUPERPAVE BITUMINOUS CONCRETE PAVEMENT			T	41,486.000	**46,654.140**	**43,188.220**	
490.30			BITUMINOUS CONCRETE-SUPERPAVE	Test	BC-MBV-10					43,188.220
490.30			BITUMINOUS CONCRETE-SUPERPAVE	Test	BC-Grad-10					0.000
702.02			Performance Graded Binder	Test	PG-COMB-09					46,050.000
06B176	0115	507.15	REINFORCING STEEL			KG	708.000	**818.650**	**0.000**	
713.01			REINFORCING STEEL	Test	ST-REBARC0					0.000
06B176	0120	514.10	WATER REPELLENT, SILANE			L	233.000	**227.100**	**233.000**	
726.02(a)			Concrete Sealer	Appd	None_1					233.000

Figure 9-28: Materials Sampling Checklist Testing Requirement Report

9-100.70 SiteManager Reports

SiteManager Reports is an invaluable tool that will greatly aid in the duties of the Resident Engineer and Inspector. *SiteManager* Reports is an Access-based reporting application that correlates the information that has been input into *SiteManager*.

To access *SiteManager* Reports, log into Citrix.

Click on the *SiteManager* Reports icon on the main Citrix screen.

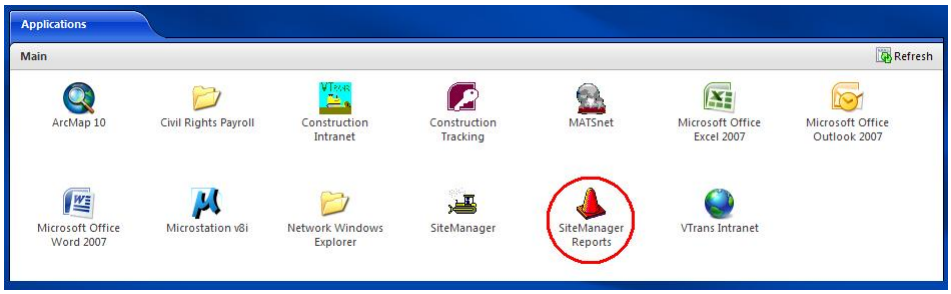


Figure 9-29: Sample Citrix Main Menu

STATE OF VERMONT

AGENCY OF TRANSPORTATION

CONSTRUCTION SECTION

2015

ENGLISH/METRIC

CONSTRUCTION MANUAL

SECTION X

SAFETY

10-100 CONSTRUCTION SAFETY

DISCLAIMER: If any discrepancies are found between this section, *Safety*, and the VTrans Safety Manual, the VTrans Safety Manual will govern the outcome. The VTrans Safety Manual may be found at the following URL:

http://vtransengineering.vermont.gov/sites/aot_program_development/files/documents/publications/Complete_Safety_Manual_2014.pdf

10-100.10 General

The Construction Section policy on safety can be easily summarized with the following statement:

The safety of VTrans employees, the Contractor, and the traveling public is our number one priority.

The Resident Engineers and their staff are responsible for promoting safety on the job site. The Resident Engineers and their staff shall bring any recognized safety issues to the immediate attention of the Contractor, specifically their Safety Officer, Superintendent, or other competent person. However, if the Contractor is unwilling to address any safety issue on a project, the Resident Engineer has the authority to shut down the operation in question until the situation has been remedied. Refer to *Subsection 107.01 Laws to be Observed* and *Subsection 105.10 Authority and Duties of the Resident Engineer* of the Standard Specifications for Construction for more information.

When it is necessary to shut down a construction operation or project because of a safety concern, the Resident Engineer or their representative shall issue a *Written Order* (Appendix A-3) directing the Contractor to discontinue work and include in the *Written Order* the nature of the concern. The Resident Engineer should then consult with the Regional Construction Engineer, the Safety Coordinator for the Construction Section, and the VTrans Safety Officer, or the VTrans Hazardous Materials Officer, for further guidance. If any one of these individuals issues a directive related to safety or hazardous materials, it shall be followed. These individuals are familiar with both VOSHA regulations and many other pertinent regulations. They are the authority for VTrans on anything pertaining to these matters.

10-100.20 Personal Protective Equipment

The staff of the Construction Section shall be issued the Personal Protective Equipment (PPE) required for the safe performance of their work or have access to the required equipment. It is a requirement that PPE be used as necessary during performance of any and all inspection work by VTrans personnel or contract work done by Contractor personnel. The Construction Safety Coordinator may be consulted at any time during the project to ensure that proper protection against the hazards that exist in the workplace is provided. Employees shall keep all PPE supplied by VTrans in good working order.

Personal Protective Equipment is designed to protect personnel from health and safety hazards that exist in the workplace and its use is required by law. This is not only a requirement for VTrans personnel, but also applies to Consultants working for VTrans. Consultants may contact the Construction Section's Safety Coordinator for additional information on PPE.

From time to time, personnel from other sections, other Agencies, or Departments may visit the work zone. All visitors to the project are required to abide with these safety requirements. An extra hard hat, safety vest, hearing protection, and eye protection should be kept on hand in the field office for visitors to use. The Resident Engineer is the responsible party to ensure compliance with the law. The brief descriptions that follow are intended to provide general guidance; you should always seek project specific advice to ensure compliance.

a. **Hard Hats:** VTrans provides a protective hard hat for all staff and it requires all employees to wear hard hats whenever there is a possible danger of head injury from any work overhead, impact, falling or flying objects, or from electrical shock and burns. There are times when a hard hat is not required; however, the circumstances on a construction project can change quickly. Developing the habit of wearing the hard hat ensures the employee won't inadvertently be placed in a situation for which they are unprepared. There are very few situations where a hard hat would be a detriment so it is a good habit by which to work. If you have any doubt, wear a hard hat.

b. **Safety Vests:** The Construction Section provides high-visibility safety vests to all its employees. Safety vests shall be worn when working within the right-of-way when exposed to traffic or construction equipment. Each employee shall be responsible for maintaining their vest in a clean, serviceable condition. Should a vest become damaged, misplaced, or no longer in good condition, contact your supervisor or the Construction Section's Safety Coordinator to obtain a replacement.

c. **Foot Protection:** VTrans provides safety shoes for field employees once every other year and they need to be worn when the danger of falling or rolling objects exist. When employees are working on or around electrical devices such as traffic signals and street lighting, their safety shoes should feature non-metallic toe protection.

d. **Hearing Protection:** Only approved hearing protection is allowed for use during construction. The noise level and duration are both factors in determining the exposure and therefore the required protection. The chart below provides duration and sound pressure levels for which hearing protection shall be worn. Construction operations and equipment likely to exceed the permissible noise levels include, but are not limited to: Pavers, rollers, jackhammers, cold planers, rotor milling, pile driving, and blasting.

Duration per Day (Hours)	**Sound Pressure Level (dBa)**
8	90
6	92
4	95
3	97
2	100
1 ~ 1 ½	102
1	105
½	110
¼ or less	115

e. **Clothing:** VTrans employees are expected to take the necessary precautions to protect themselves from over-exposure to weather elements. Excessive heat, sun, cold, moisture, and freezing conditions can impair a person's judgment. Employees should learn to recognize the signs of dehydration and hypothermia in themselves and others and take appropriate action.

Proper clothing can protect employees from many other hazards that exist on a construction site, such as contact with chemical spills or splatter, raw or bituminous concrete, and harmful plants. Loose or torn clothing should not be worn when working around construction equipment or on the work site. Shorts should not be worn when working on any VTrans project.

f. **Eye and Face Protection:** Eye and face protection shall be worn when employees are exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases, or other hazardous chemicals or products.

10-100.30 Lifting and Material Handling

Improperly lifting or handling heavy or awkward objects is the most common cause of occupational injuries. Back harnesses or back braces are available and may help reduce the risk of back injury. Avoid injuries by using good technique, mechanical lifters, or by seeking the assistance of others when working with heavy or awkward objects. Employees are encouraged to work smarter.

10-100.40 Fall Protection

Employees shall use fall protection equipment when working in a project area that has a vertical drop greater than 6 ft (2 m). There are many forms of fall protection, including personal fall arrest systems with lanyards, lifelines, railings, guard rails, and safety nets. Each condition where fall protection is required should be evaluated by the Safety Officer or qualified individuals to determine the proper type of fall protection equipment.

The Contractor is responsible for providing fall protection equipment as part of providing access for the Resident Engineer to inspect the work. The Resident Engineer must assess the conditions of the work site and determine if they have the appropriate personal fall arrest equipment to be used with the contractor's fall protection system.

The Resident Engineer and/or inspection staff shall verify that they are outfitted with the proper fall protection equipment, provided by the Construction Safety Coordinator, to safely inspect the Contractor's work. The lack of fall protection equipment on the part of the Contractor or required equipment for the Resident Engineer shall not prevent the inspection work from occurring.

Personal fall arrest equipment must be properly fitted to each employee by qualified individuals. Personal fall arrest equipment must also be periodically inspected by qualified individuals to ensure continued proper performance, as an improperly fitting harness will not provide the safety functionality for which it was designed. Failure to follow these steps may place the employee in a potentially dangerous situation which may result in equipment failure and employee injury or death.

VTrans employees required to use a personal fall arrest system must be trained in its proper use by qualified individuals and acquire a certificate testifying to the successful completion of the training. Contact the Construction Section Safety Coordinator for all personal fall arrest system training, fitting, and inspection needs.

10-100.50 Working Over or Near Water

Bridge construction and bridge rehabilitation projects are examples of work that typically involve work over water where the danger of drowning exists. Employees working over or near water shall wear a U.S. Coast Guard approved personal flotation device. Fall protection systems may in some case negate the need for a personal flotation device. Employees should consult the Construction Safety Coordinator with the site-specific situation to ensure personal safety. The Contractor must take additional measures in these situations as required by the regulations.

10-100.60 Traffic Control

Traffic control in work zones is an essential element of construction work zone safety. The Manual on Uniformed Traffic Control Devices (MUTCD) is the State law in Vermont. In addition to this manual, most projects have a traffic control plan or, for more straight-forward applications, refer to *Section 641 Traffic Control* of the Standard Specifications for Construction.

The traffic control package must be meticulously maintained and reflect a clear message to the traveling public in order to provide a smooth and safe flow of traffic through the project. The Resident Engineer shall review and evaluate the project traffic control package on a daily basis to determine if it is functioning as intended by the design, or if improvements over the design can be made to further enhance the safety of the traveling public and all personnel within the construction work zone. The Traffic Operations Section and Project Manager should be consulted if there are any significant changes anticipated or questions regarding the traffic control package.

Traffic patterns change and traffic flows vary throughout the day. The Contractor should have competent people oversee and make any necessary changes to the traffic flow. Only certified flaggers and Uniformed Traffic Control Officers (UTOs) shall be employed to manage traffic control. The UTO's primary responsibility is to control traffic, but in the event the UTO is required to leave their post to perform law enforcement tasks, the travelling public's safety in the construction work zone must be maintained. If necessary, the work may need to be halted until a replacement UTO can be located.

10-100.70 Excavation

Excavation and trenching operations are a major focus area in construction safety and require careful planning and consideration on the part of the Contractor and the Resident Engineer. The Contractor shall provide a safe work site that meets the regulations for excavation and trenching. The Contractor shall also appoint a competent individual to oversee excavation and trenching operations.

Employees working in an excavated area shall be protected from cave-ins by an adequate protective system. The protective system shall have the capacity to resist, without failure, all applied loads. Adequate egress from the excavated area must be provided, along with protection from water, gases, or fumes. An adequate supply of breathable air must be provided to employees in the excavated area. Any protective system must be properly designed for the application; comply with all safety regulations, and have components free from damage or defects.

Depending on the soil type in the excavated area, which is determined by a qualified individual, the excavation sides may be sloped, cut back, or benched, providing addition protection to employees working in the excavated area.

The three basic soil types are as follows:

Type A: Clay, silty clay, sandy clay, clay loam, silty clay loam, and sandy clay loam

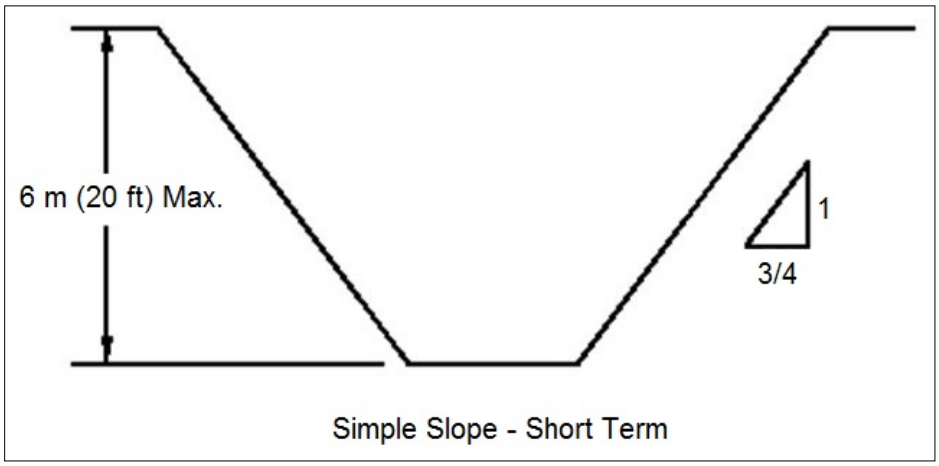
Type B: Angular gravel (similar to crushed stone), silt, silt loam, sandy loam, silty clay loam, and sandy clay loam

Type C: Gravel, sand, loamy sand or soils from which water is seeping, or submersed, unstable rock

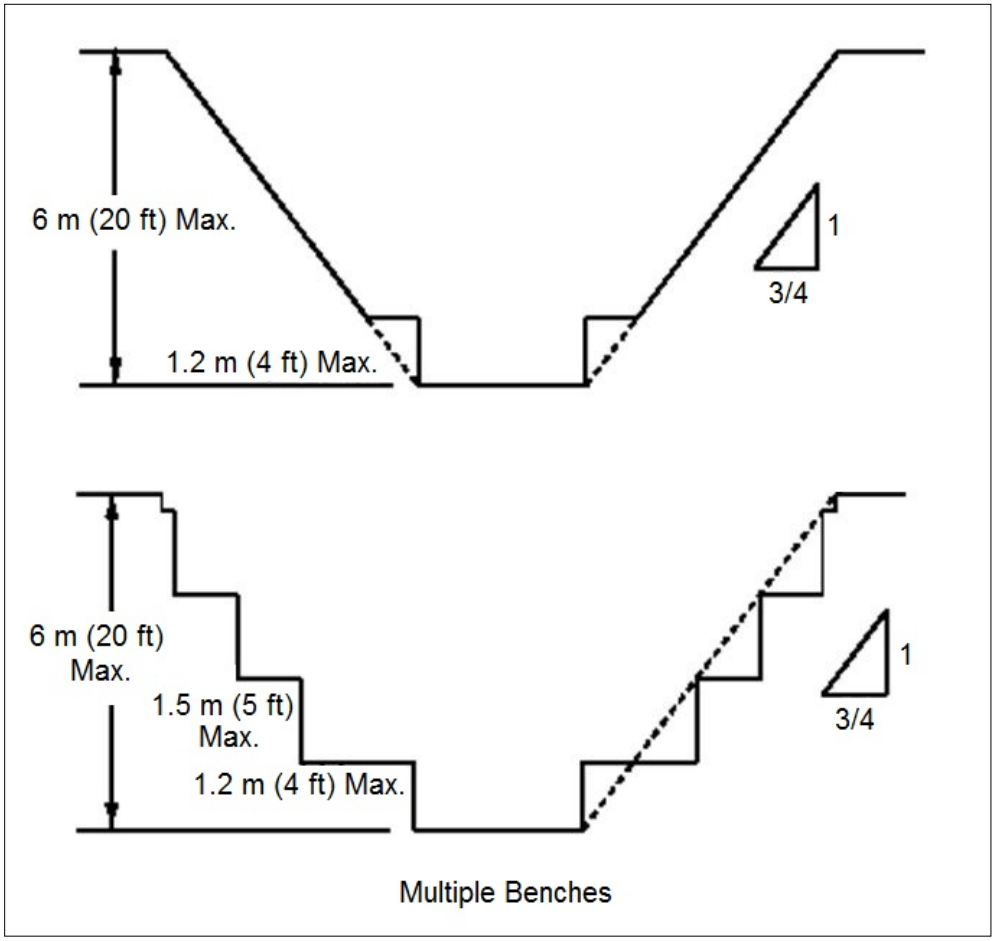
The following illustrations show examples of excavated slope configurations in various soil types. Type C soil is the most unstable of the three soil types, and is the default "worst case scenario" to plan for when the soil conditions are uncertain. All examples have the indicated slope value ratio as horizontal to vertical (H:V).

Slope Configurations – Excavations made in Type A soil

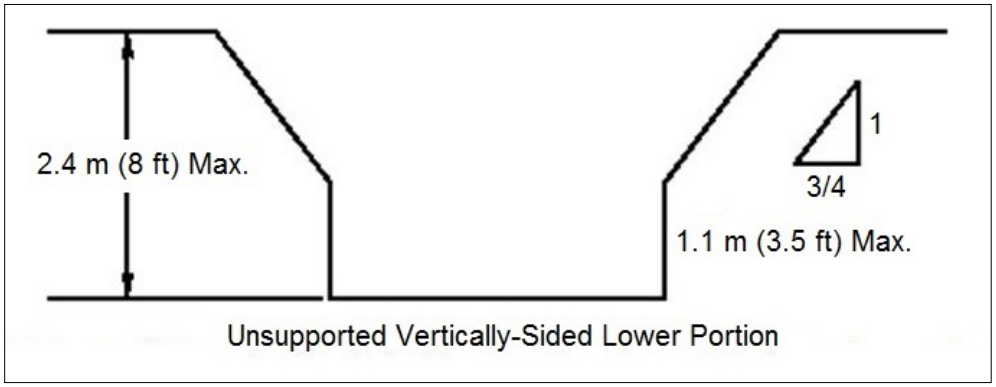
All simple slope excavations 6 m (20 ft) or less in depth shall have a maximum allowable slope of ¾:1.



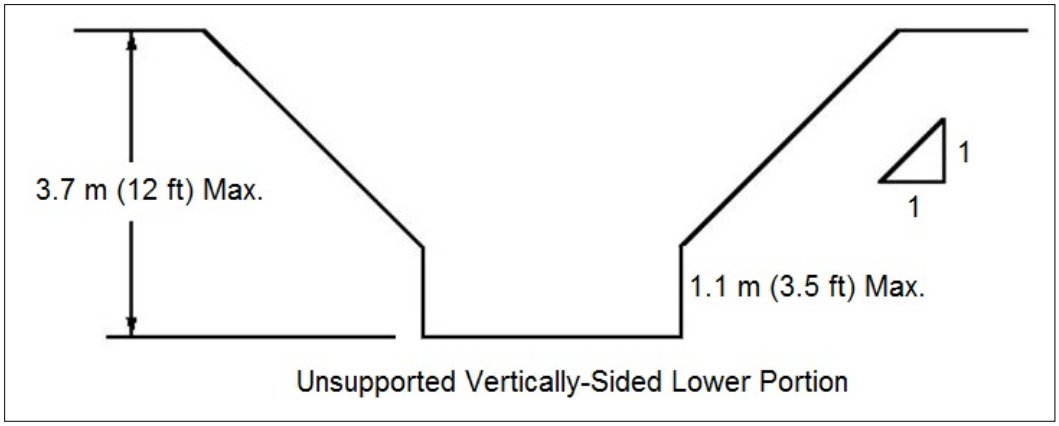
All benched excavations 6 m (20 ft) or less in depth shall have a maximum allowable slope of ¾:1 and maximum bench dimensions as follows:



All excavations 2.4 m (8 ft) or less in depth which have unsupported vertically-sided lower portions shall have a maximum vertical side of 1.1 m (3.5 ft).

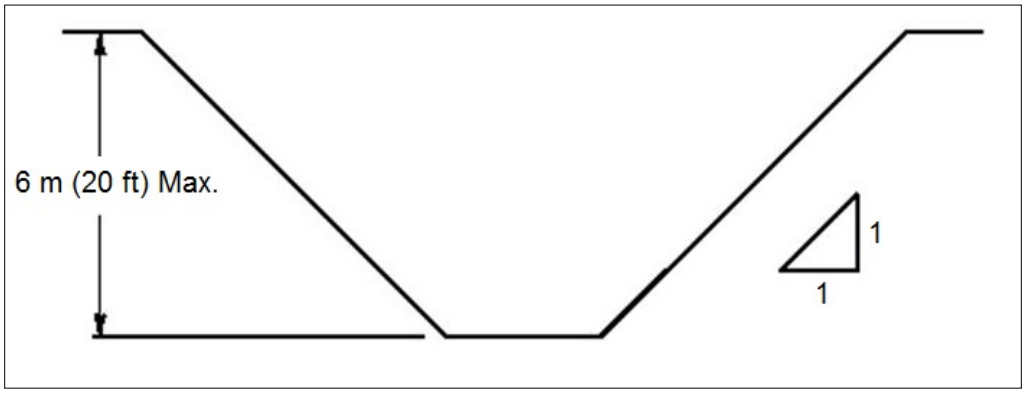


All excavations more than 2.4 m (8 ft) but not more than 3.7 m (12 ft) in depth with unsupported vertically-sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 1.1 m (3.5 ft).

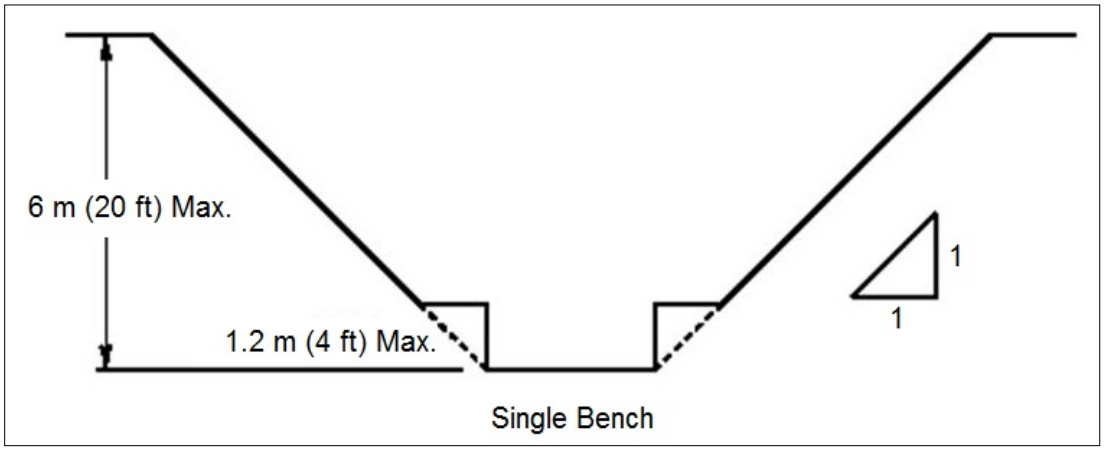


Slope Configurations – Excavations made in Type B soil

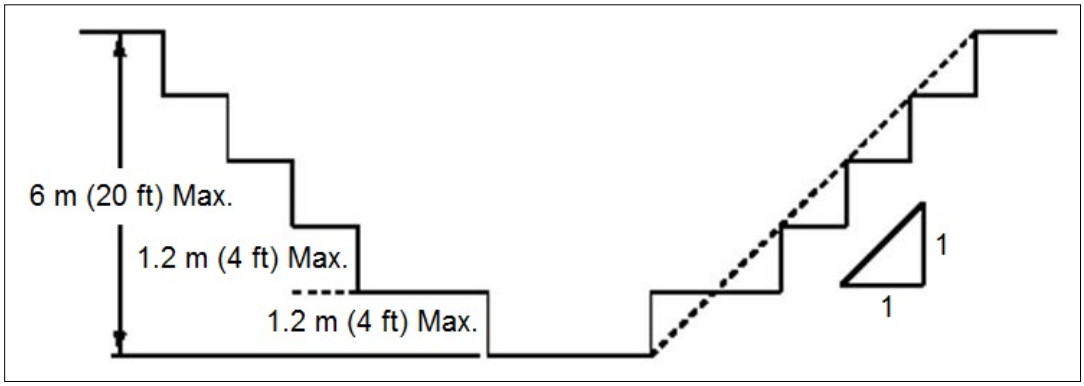
All simple slope excavations 6 m (20 ft) or less in depth shall have a maximum allowable slope of 1:1.



This type of single bench may only be made in cohesive Type B soil.

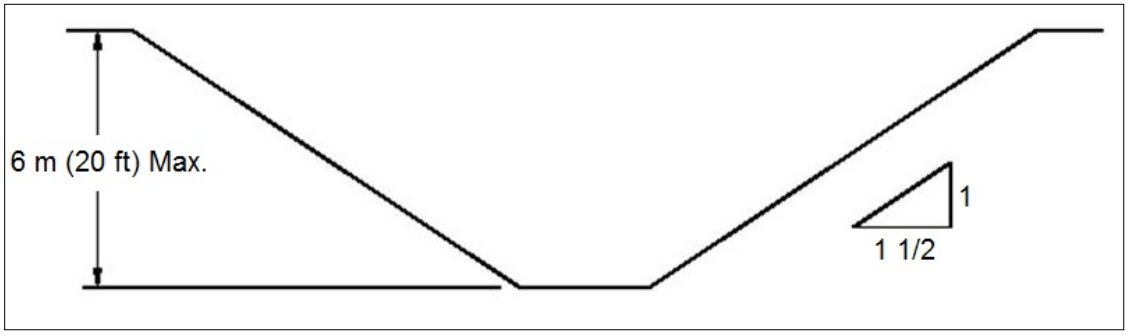


This type of multiple benching may only be made in cohesive Type B soil.



Slope Configurations – Excavations made in Type C soil

All simple slope excavations 6 m (20 ft) or less in depth shall have a maximum allowable slope of 1 ½:1



Access and Egress: All trench excavations with a depth greater than 1.2 m (4 ft) shall be provided with a suitable method of egress. This method of egress may be a stairway, ladder or ramp, or other approved means, and shall be located no further than 8 m (25 ft) laterally from any employee working in the excavated area.

10.100.80 Blasting

Only authorized and qualified persons will be permitted to handle and use explosives on VTrans projects. Refer to *Subsection 107.11 Use of Explosives* of the Standard Specifications for Construction for more information.

10-100.90 Toxic and Hazardous Material

Any toxic or hazardous material used on the project shall be accompanied by a *Material Safety Data Sheet* (MSDS) and appropriately labeled material container(s) by the material supplier. The Occupational Safety & Health Administration's *Regulation (Standards – 29 CFR) Standard Number 1910.1200 Hazard Communication* outlines the rules for informing the employees of the material supplier and VTrans of the potential hazards associated with the use and application of these materials.

The Resident Engineer should obtain a copy of the *MSDS* from the Materials & Research Chemist for toxic or hazardous materials used on the project that are tested by VTrans at the Materials Section Laboratory. Copies of the *MSDS* should be retained in the project files and the field office.

10-100.100 Hazardous Spills

A hazardous spill occurs when at least 7.6 L (2 gal) of a hazardous substance is spilled on the work site or any amount of a spilled hazardous substance reaches a waterway. The Resident Engineer must contact either the Hazardous Materials Coordinator or the VTrans Safety Officer to report the hazardous spill within two hours of the incident.

10-100.110 Erected Structures

VTrans construction projects involve lifting large or heavy masses into place, including such items as structural steel for bridge beams, pre-cast reinforced concrete components,, and sheet piling for cofferdams. The Contractor is required to submit erection plans, stamped by a Professional Engineer, in advance of any erection work. Any deviation from the plans of record must be approved by the Professional Engineer of record.

Specific pay items in the Standard Specifications for Construction list the requirements for erecting structural members, including the use of cranes, slings, chains, and bars. The Contractor is responsible for complying with all applicable regulations when involved with lifting and placing structural members that are not covered by a pay item or pay items that are not required to have erection plans. The Contractor must employ a competent and qualified individual to oversee the safety requirements of the erection operation.

10-110 OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)

10-110.10 General

The Federal Highway Administration (FHWA) *Form 1273 – Required Contract Provisions Federal-aid Construction Contracts*, which is included in all Federal-aid Construction contracts, makes the Occupational Safety and Health Act (OSHA) regulations a part of all Federal-aid construction contracts.

As with other laws incorporated in the contract, either directly or by reference, FHWA and VTrans officials are obligated to cooperate with the enforcing agencies to the fullest extent practicable by making the project inspection by these agencies feasible, observing and reporting potential violations, and using sanctions available under the contract to enforce compliance where necessary.

Occupational Safety and Health Act regulations are published in the *Federal Register* and are summarized by AASHTO in *An Informational Guide on Occupational Safety on Highway Construction Projects*. The AASHTO Guide includes a "brief summary for reviewing occupational safety and health provisions on highway construction projects."

OSHA regulations have been adopted by the Vermont Department of Labor and Industry, which makes the following titles available:

- *VOSHA Safety and Health Standards for Construction*
- *VOSHA Safety and Health Standards for General Industry*

Copies of these publications are available from Construction Headquarters.

10-110.20 Preconstruction

Before any construction work is started, and in the interest of safety considerations, VTrans inspection personnel should:

1. Study and become familiar with the occupational safety and health regulations for construction
2. Study and become familiar with the plans and specifications for the project
3. Identify those aspects of the work meriting special attention from the standpoint of hazard elimination
4. Participate in a Preconstruction Conference with the Contractor to discuss safety issues. Refer to *Subsection 2-130.20 Preconstruction Conference* for more information. The following points specific to safety should be covered:

    a. The Contractor's contractual obligation to comply with Federal construction safety standards

    b. The availability of the safety standards that apply to the contract

    c. The safety program of the Contractor, including identification of the Safety Officer for the organization and the competent persons as defined by the appropriate OSHA regulations

    d. The Contractor's responsibility for ensuring that Subcontractors comply with safety regulations

    e. The Contractor's plans for meeting specific safety requirements and for eliminating potentially critical hazards on the project

    f. Have a written record placed in the project file covering safety

10-110.30 Construction Operations

When construction starts, and throughout the project's life, VTrans personnel should always closely observe the Contractor's operations and be alert to safety violations, taking measured action to immediately correct an unsafe situation. Action may range from calling unsafe conditions to the Contractor's attention and providing an opportunity to take corrective action to immediate cessation of all construction activities.

The Resident Engineer has a tremendous responsibility for safety, but there are resources on which they may rely. Safety is a team approach and collectively VTrans personnel must make safety a priority. It is not possible or practical to provide exacting directions to all VTrans staff for every situation covered by the Construction Manual. Employees must rely on the training they have been provided, their own experience, and the support services offered by VTrans and the Construction Section to make informed decisions to ensure that the right action is taken.

Resident Engineers and Inspectors should read and become familiar the VOSHA Regulations for the specific type of work that they are inspecting. Specific VOSHA regulations for the job being performed may be found at the Vermont Department of Labor website at following URL:

http://www.state.vt.us/labind/Vosha/ruleslaws.html

Printed copies of VOSHA regulations may also be obtained from Construction Headquarters.

The following list, based on federal construction safety standards, indicates many of the principal safety requirements that must be met for various work site conditions:

1. First Aid and Medical Services: The Contractor must provide readily accessible first aid kits; and in the absence of an infirmary, clinic, hospital, or physician that is reasonably accessible in terms of time and distance to the worksite; a person who has a valid certificate in first-aid training. Telephone numbers of doctors, hospitals, and ambulances must be conspicuously posted.
2. Housekeeping: Scrap and used materials, scattered debris, and combustible scrap that would constitute hazards to workers must be cleared from work areas.
3. Noise Exposure: If effective means cannot be provided to lower noise level exposures to permissible levels, personal protective equipment must be provided.
4. Personal Protective Equipment: Personal protective equipment for eyes, face, head, and extremities; protective clothing, respiratory devices, and protective shields and barriers shall be provided and maintained whenever it is necessary to protect employees.
5. Fall Protection: Each employee exposed to an unprotected side or edge which is at least 1.8 m (6 ft) above a lower level shall be protected from falling through the use of a guardrail system, safety net system, or a personal fall arrest system, unless specific project conditions require exceptions.

6. Scaffolds: Scaffolds at least 1.2 m (4 ft) to 1.8 m (6 ft) in height, having a minimum dimension in either direction of less than 1.1 m (45 in) shall have guardrails on all open sides. Scaffolds more than 3.1 m (10 ft) above the ground must have guardrails and toe-boards.

7. Hand Tools: Electrically powered hand tools must be of the double-insulated type or grounded. Hand held power tools must be equipped with constant pressure switches. Power actuated tools must be operated by employees trained in the operation of the particular tool.

8. Ladders: Ladders shall not be loaded beyond the manufacturers rated capacity and shall extend at least 0.9 m (3 ft) above an upper landing surface.

9. Cranes, Derricks, etc.: Rated load capacities, recommended operating speeds, special hazard warnings, and/or any relevant instructions shall be conspicuously posted on all equipment and be visible to the operator while at their control station. Inspections shall be conducted of all equipment as required. Electrical distribution lines near equipment should be de-energized and grounded or insulating barriers erected to prevent contact with the lines. Otherwise, operation must allow at least 3.0 m (10 ft) clearance from live (50 kV or below) power lines.

10. Motor Vehicles and Mechanized Equipment: Motor vehicle equipment that has an obstructed view to the rear shall have a reverse signal alarm that is audible above the surrounding noise level or shall back up only when an observer signals that it is safe to do so.

11. Protection of Employees in Excavations: Employees in excavations shall be protected from cave-ins by an adequate protective system except in the following situations:

    - Excavations are made entirely in stable rock; or
    - Excavations are less than 1.5 m (5 ft) in depth and examination of the ground conditions by a competent person provides no indication of a potential cave-in

12. Concrete Reinforcing Steel and Form Work: Employees shall be protected from impalement hazards from any protruding reinforcing steel onto and into which they could fall. Concrete forms must be erected and braced so as to withstand without failure all vertical and horizontal loads that may reasonably be anticipated.

13. Structural Steel Assembly: During the final placing of solid web structural members, the load shall not be released from the hoisting line until the members are secured with not less than two bolts, or the equivalent, at each connection and drawn up wrench-tight.

14. Cofferdams. Adequate means shall be provided for controlled flooding of the work area if overtopping of the cofferdam by high waters is possible. Warning signals for evacuation of employees in case of emergency shall be developed and posted.

15. Explosives. VTrans allows that only authorized and qualified persons shall be permitted to handle and use explosives. Smoking, firearms, matches, open flame, lamps, and other fires, flame, or heat producing devices and sparks shall be prohibited in or near explosive magazines or while explosives are being handled, transported, or used.

16. Handling traffic through and around construction: Temporary roadways and detours must be properly maintained and satisfactory traffic control measures must be used such as signs, barricades, and flag-persons to handle traffic through and around the construction area.

The items listed above are for general guidance and if there are differences between these items and the regulations, the regulations shall govern.

10-110.40 General Checklist of the Contractor's Overall Safety Program

The Contractor's overall safety program may be evaluated by answering the following questions:

1. Does the Contractor make frequent safety inspections of all operations on the project? Does this include Subcontractor operations?
2. Are the Contractor's employees trained to recognize and to avoid unsafe conditions and practices related to their individual work assignments?
3. Are periodic safety meetings held with employees?
4. Are all accidents investigated, recorded, and reported by the Contractor?
5. Does the Contractor keep currently informed on governmental safety regulations and standards?
6. Does the field staff for the Contractor follow the company safety plan?

10-110.50 Violations

When a member of the VTrans inspection staff observes a blatant safety violation, the matter must be brought to the Contractor's immediate attention. If verbal notification does not result in corrective action, a *Written Order* (Appendix A-3) should be issued, and the Regional Engineer and Safety Coordinator should be immediately contacted by the most expedient method available. The *Written Order* will direct the Contractor to cease work on the operation or project until the matter is brought into compliance with the regulations.

Should the Contractor fail to follow the *Written Order*, the Resident Engineer should again notify the Contractor in writing that they have failed to follow the *Written Order* and that inspection activities on project will now terminate.

In extreme safety violation cases, the appropriate law enforcement authorities or VOSHA may need to be contacted. The Safety Officer is responsible for notifying VOSHA. Ultimately, VTrans personnel shall not allow a Contractor's actions to jeopardize the safety and welfare of the project workers or the public.

All safety issues should be recorded on the Contractor performance evaluation and forwarded to the Construction Services Engineer for distribution to the Prequalification Committee.

10-120 FIRST REPORT OF INJURY

10-120.10 General

Any VTrans employee who is injured on the project must contact the Construction Executive Assistant or the Construction Safety Officer to report this injury. The employee must fill out a *First Report of Injury* form (Appendix J-1) and submit it to Program Development's Personnel Coordinator with a copy to the Construction Executive Assistant and Construction Safety Coordinator within 72 hours of the injury. This form may also be obtained by contacting Construction Headquarters.

10-130 TRAFFIC SAFETY ENFORCEMENT WITHIN CONSTRUCTION WORK ZONES

10-130.10 General

VTrans has a *Memorandum of Understanding* with the Vermont Department of Public Safety – State Police Division to provide traffic safety enforcement within construction work zones. The State Police have agreed to provide traffic safety enforcement on construction projects as requested by the Construction Section. VTrans also has an Agreement with the Agency's Department of Motor Vehicles, Field Forces Division, to also provide traffic safety enforcement on construction projects.

10-130.20 Types of Projects Covered Under This Memorandum of Understanding

Project funds to provide traffic safety enforcement on VTrans projects are authorized by FHWA and allocated by the Project Manager. This authorization and allocation normally takes place prior to bid letting. The following types of projects will have traffic safety enforcement:

- Interstate projects
- Projects on the National Highway System
- Projects on some "high profile" secondary roadway systems

There may be some instances where funds have not been specifically allocated to a project prior to bid letting. In this case, the Project Manager must obtain all required approvals and the Resident Engineer shall file all approvals with the project records.

10-130.30 Procedure to Request the State Police/DMV to Provide Traffic Safety Within the Construction Work Zone

If the Resident Engineer and/or the Regional Construction Engineer determine that there is a need for speed enforcement on the project, they should do the following:

1. Contact the Construction Executive Assistant and let them know at least a week ahead of time, if possible, that they would like to have the State Police/DMV Field Forces enforce traffic safety on their project.
2. Designate the amount of hours per week, while the Contractor is working, that they would like the enforcement provided.
3. Provide a timeframe for the traffic safety enforcement and indicate whether or not the Contractor works on Saturdays.

Once contacted, the Construction Executive Assistant will contact the State Police Coordinator to inform the State Police of when their services are required and the project location. The State Police Coordinator in turn will contact the Regional Barracks' appointed contact and the appropriate Barracks Coordinator will ensure that traffic safety services are provided within the parameters specified in the *Memorandum of Understanding*.

At the same time, the State Police Coordinator of DMV will be notified. Traffic safety enforcement will be provided by both entities, and coordinated strictly through the State Police. The State Police/DMV will provide a minimum of two hours each time they are on project, unless recalled for enforcement emergencies.

Upon the State Police/DMV providing an officer within the construction zone, they will in turn contact the Resident Engineer when they arrive on the project and when they leave the project site. The State Police and DMV have been provided a copy of the *Emergency Contact & 551 Information Form* (Appendix B-4) and also a copy of the spreadsheet designating which projects may be requesting their services.

The Resident Engineer is responsible for noting the hours that the Public Safety/DMV personnel are providing traffic safety enforcement on their project(s) in the *Daily Work Report* (Appendix B-2).

The Department of Public Safety will forward monthly invoices to the Construction Section. When these invoices are received by Construction Headquarters, they will be routed to the Resident Engineer for verification of the hours. The Resident Engineer will initial the invoices and return them to Construction Headquarters for payment processing.

DMV will provide monthly reports indicating the hours they provided traffic safety enforcement on VTrans construction projects.

The services that the Construction Section will provide to the Department of Public Safety, State Police Division, and VTrans DMV Field Forces Section are as follows:

1. Access to all plans, maps and drawings that are presently on file with VTrans, if requested.
2. A list of all projects, including the official name, project number, and the expenditure account number to which they will charge their time.
3. The name and contact numbers for the Resident Engineer and the Regional Construction Engineer overseeing the project(s) where the Department of Public Safety, State Police Division, and the VTrans DMV Field may contact them.

4. Verification that the sign package containing speed limits are placed and maintained appropriately.

10-130.40 The State Police / DMV Will Provide the Following Documentation to the Construction Section

The following documents are provided by the State Police/DMV to the Construction Section:

1. Copies of any and all written accident reports for incidents that occurred within the work zone.
2. Copies of the daily log of on-project activity, including warnings and tickets issued and any other pertinent information which may provide an indication of general traffic speed through the work zone.
3. A detailed activity report yearly for each project covered.

10-130.50 U-Turn Authorization Certificate for Limited Access Highways

When working and travelling on a limited-access highway, State employees and Contractor and Subcontractor personnel may make U-turns if they have obtained authorization to do so. They must retain the proper paperwork in their vehicle and display the proper equipment, as well as follow all of the guidelines in the VTrans Safety Manual.

Use the following procedure to obtain U-turn authorization:

a. The Resident Engineer will obtain a copy of the *U-turn Authorization Certificate*, which may be found on the "Z:/" drive or the Field Forms CD. The Resident Engineer will complete the *U-turn Authorization Certificate* and forward it to the Regional Administrative Services Technician, who may, with the Resident Engineer's approval, add additional project personnel or Contractor and Subcontractor personnel to the form. Once the *U-turn Authorization Certificate* has been completed, the Regional Administrative Services Technician will forward it to the Construction Executive Services Coordinator.

b. Once the *U-turn Authorization Certificate* has been reviewed and approved by the Regional Construction Engineer, it will be returned to the Resident Engineer, with additional copies going to the Vermont State Police, the project files, Construction Headquarters files, and the Construction Executive Services Coordinator's files.

c. The *U-turn Authorization Certificate* should be forwarded to the Contractor if necessary, with a letter specifying distribution of the *U-turn Authorization Certificate* to all Contractor personnel who need authorization to make U-turns.

d. The *U-turn Authorization Certificate* should be forwarded to any Subcontractors if necessary, with a letter specifying distribution of the *U-turn Authorization Certificate* to all Subcontractor personnel who need authorization to make U-turns.

10-140 PROJECT VISITORS

10-140.10 General

All project visitors conducting VTrans business shall report to the Construction Office and/or Resident Engineer before proceeding to the work area. The Resident Engineer or project staff should make the superintendent aware that there are visitors on the project.

The Resident Engineer and/or field Inspector(s) shall be responsible for making sure that the visitors on project are limited to areas on the project that will not in any way endanger them. Visitors are expected to wear personal protective equipment, or they will not be allowed to visit areas of the work that would require this equipment.

10-150 INCIDENT REPORTING / INVESTIGATION

10-150.10 General

All VTrans Construction employees are obligated to report any incident that results in personal injury or property damage to Construction's Safety Coordinator.

All incidents resulting in personal injury or property damage must be clearly and concisely documented in the *Daily Work Report* (Appendix B-2) for that day. In the absence of Construction Section's Safety Coordinator, the VTrans Safety Officer should be contacted. The Resident Engineer is also responsible for notifying the Regional Construction Engineer of the incident.

10-150.20 Incidents with Property Damage

As stated previously, it is imperative to first contact Construction Section's Safety Coordinator to report the incident and obtain guidance in the handling of the event. The Construction's Safety Coordinator may decide that the accident needs a project visit for follow up, or may indicate that the incident reporting can be conducted as outlined in *Subsection 10-150.40 Incident Reporting*.

10-150.30 Incidents with Personal Injuries

Incidents involving personal injuries may be either minor or major, as follows:

Minor Injuries: The first point of contact for minor injuries should be the local rescue squad or 911, and then follow up with Construction Section's Safety Coordinator. The Safety Coordinator may decide that the accident needs a project visit for follow up, or may indicate that the incident reporting can be conducted as outlined in *Subsection 10-150.40 Incident Reporting*. The Safety Coordinator will be responsible for any follow up with VOSHA, State Police, and VTrans Legal Section.

Major Injuries: The first point of contact for major injuries should be the local rescue squad or 911, and then follow up with Construction Section's Safety Coordinator. A *Written Order* (Appendix A-3) should be issued to close the work site to public access and to the Contractor, unless access is required for emergency efforts. The Safety Coordinator will be responsible for any follow up with VTrans Safety Officer, VOSHA, State Police, and VTrans Legal Section. The Resident Engineer should conduct a preliminary review on site, but the Safety Coordinator is responsible for reporting the incident.

10-150.40 Incident Reporting

It is extremely important to gather the following information regarding any and all incidents that result in personal injury and/or property damage:

1. Facts about who specifically was on the project and who was responsible for the specific aspects of the work, including Inspectors, Contractors, Subcontractors, suppliers, and visitors.
2. Photographs of the project including the entire traffic control package, the accident scene, and any other aspects of the incident that will help an investigation. Photographs are a valuable resource in incident reporting.
3. Sketches of the project work site and surroundings indicating where personnel, equipment, and materials were located.
4. Witness names and contact information.

STATE OF VERMONT

AGENCY OF TRANSPORTATION

CONSTRUCTION SECTION

2015

ENGLISH/METRIC

CONSTRUCTION MANUAL

SECTION XI

ENVIRONMENTAL

11-100 GENERAL

Project permits include specific conditions and requirements that must be upheld during construction. Changes to the contract plans during construction may require amendments to existing permits and/or additional permits.

- Permits and amendments that are necessary due to a Contractor's means and methods are the responsibility of the Contractor. They will be responsible for preparing submittals and acquiring the permit/amendment. Refer to *Subsection 105.22 Environmental Protection* of the Standard Specifications for Construction for more information.
- Permits and amendments that are necessary due to Agency-initiated changes to contract plans shall be acquired by the Agency and the Environmental Engineer will be responsible for coordination of those efforts.

Although the Contractor is responsible for ensuring compliance with all regulations and permits, and for preparing documentation to acquire amendments and/or necessary additional permits, on most permits, VTrans is considered "the applicant" and holds a degree of responsibility.

The Resident Engineer, with as much assistance as is needed from the Environmental Engineer, must ensure that the Contractor has completed necessary actions to achieve and maintain compliance. Therefore, if there is a concern or question regarding permit requirements or compliance, the Resident Engineer will contact the Environmental Engineer immediately.

The following sections outline the most common environmental permits and regulatory review processes likely to be encountered during construction and the related procedures that need to be followed immediately prior to, during, and after construction. It is not a comprehensive list, so it is important to review specific permits included in each contract.

11-110 WASTE, BORROW, AND STAGING AREAS

11-110.10 Control of Waste, Borrow, and Staging Areas

Internal Review and Clearance

Waste, borrow, and staging areas are necessary adjuncts to Construction projects. If the Contractor proposes operations that would impact areas that may be classified as cultural or natural resources, the Agency will conduct an Off-Site Activity Review Process.

Contractors will identify their staging and material waste and supply areas as early as possible to facilitate the approval process. They are encouraged to request as many areas for use as possible, in the event that specific areas are not approved. The contractor must determine whether the site requires a formal submittal for Environmental Unit review or if it can be considered exempt from the process. Forms have been developed to help provide guidance to the Contractor in determining which form shall be filed.

These forms may be found at the following URL:

http://vtransengineering.vermont.gov/bureaus/pdb/environmental/off-site-activity

These guidance forms include the following:

- Off-Site Activity Exemption Record: In order for the site to be considered Exempt, it must meet the criteria described on the form exactly. When that determination is made the Contractor shall complete the form and provide a copy of it to the Resident Engineer for his/her Environmental records folder.
- Off-Site Activity Submittal Form: If the site does not meet the exemption criteria exactly, a full submittal is required. The contractor shall fill out the submittal form completely and thoroughly and file it with the Environmental Unit for review. The Resident Engineer shall be copied on that submittal. It is important to note that there are conditions for closing out waste, borrow and staging areas. They are outlined in *Subsection 105.28 Closing Waste, Borrow, and Staging Areas* of the Standard Specifications for Construction. The Contractor is strongly encouraged to notify the landowner of these conditions.
- Off-Site Activity Frequently Asked Questions (FAQ)

External Review and Clearance

Proposed waste, borrow, or staging areas may trigger the need for permitting from external regulatory agencies including but not limited to the Army Corps of Engineers, ANR Construction Stormwater and Solid Waste, and *Act 250*.

One of the most common permits is an *Insignificant Waste Management Event Approval*, also referred to as a *Solid Waste Permit*. The *Solid Waste Permit* may be found at the following URL:

http://www.anr.state.vt.us/dec/wastediv/solid/Permits/2013.10.08%20Inert%20disposal%20IWMEA%20guidance%20&%20form.docx

A *Solid Waste Permit* is required for the disposal of inert material other than earthen, such as concrete, bricks, bituminous, stumps, etc. Before removing materials from the project limits, the Contractor, in conjunction with the Landowner, will acquire the *Solid Waste Permit* from the Agency of Natural Resources (ANR). A *Solid Waste Permit* is not necessary if the material is disposed of, or is temporarily stored, within project limits.

Erosion Prevention and Sediment Control

An *Erosion Prevention and Sediment Control* (EPSC) Plan is required for areas that include the initial disturbance of soil or wasting of erodible materials.

The current practice varies slightly from what is described in *Subsection 105.25(c) Establishment of Waste, Borrow, and Staging Areas* of the Standard Specifications for Construction. . The specification states that the Environment Engineer shall review a site-specific *EPSC* Plan prior to use of an area. However, the process for review by the Environmental Unit, in most cases, is based on the ANR's Low Risk Handbook for erosion prevention and sediment control. This is in lieu of a site-specific plan.

Larger and/or more complex sites or those areas requiring external permits may require a site-specific *EPSC* Plan. *EPSC* plans may be submitted concurrently with the environmental information submittal, or after the area has been cleared by the Environmental Unit. Required *EPSC* Plans shall be provided to the Environmental Engineer, with a copy to the Resident Engineer. Once accepted, copies should be forwarded to any other regulators with jurisdiction over the project or proposed area per the direction of the Environmental Engineer.

The Resident Engineer should not allow use of any proposed areas until all environmental reviews have been performed and the Contractor should not conduct activities at the sites until approval in writing from the Resident Engineer is provided.

11-110.20 Opening Waste, Borrow, and Staging Areas

Before opening a waste, borrow, or staging area, clearance must be obtained from the Agency's Environmental Unit and the Construction Environmental Engineer, as necessary, and the appropriate amendments to original permits and/or additional permits must be in place. The Resident Engineer may then issue a *Written Order* (Appendix A-3) approving the specific area for use as a waste, borrow, or staging area. *Refer to Subsection 105.25- 105.26 Control of and Opening Waste, Borrow, and Staging Areas* of the Standard Specifications for Construction for additional guidance.

11-110.30 Maintaining Waste, Borrow, and Staging Areas

The Contractor is responsible for the operation of the waste, borrow, and staging areas in accordance with all permits and the ANR Low Risk Handbook or the site-specific *EPSC* Plan. The Contractor's On Site Plan Coordinator will include waste, borrow, and staging areas in their review and reports. It is further the responsibility of the Resident Engineer and the Environmental Engineer to ensure the Contractor is meeting all contractual and regulatory obligations at the waste, borrow and staging areas that they manage.

When the project includes Item 652.20 Monitoring EPSC Plan, the Contractor will be reimbursed for monitoring the waste, borrow, and staging areas. However, regardless of whether the Contractor is reimbursed by VTrans for monitoring these areas, all costs associated with the *EPSC* measures implemented for and the maintenance of waste, borrow, and staging areas will be borne by the Contractor. Refer to *Subsection 105.27 Maintaining Waste, Borrow, and Staging Areas* of the Standard Specifications for Construction and *Subsection 652.07* of the Special Provisions for additional guidance on monitoring waste, borrow, and staging areas.

11-110.40 Closing Waste, Borrow, and Staging Areas

The Contractor, Resident Engineer, and Environmental Engineer must verify that all waste, borrow, and staging areas are closed in accordance with the requirements of *Subsection 105.28 Closing Waste, Borrow, and Staging Areas* of the Standard Specifications for Construction. The closing of waste, borrow, and staging areas should also be conducted in accordance and with any conditions detailed on the *Off-Site Activity Form*, including those related to the *EPSC* Plan, and any related environmental permits. Haul roads must be restored to their original state unless there is a permit to leave the haul road in place. Areas that do not have fully established vegetation will result in a hold-over of the project and a contract closure delay.

The Contractor should also inform any affected landowners of the conditions outlined in *Subsection 105.28 Closing Waste, Borrow, and Staging Areas* of the Standard Specifications for Construction as well as on the *Off-Site Activity Review Form*.

11-120 ARMY CORPS OF ENGINEERS 404 VERMONT GENERAL PERMIT

The Department of the Army Corps of Engineers (COE) regulates construction activity for impacts to waters of the State, including wetlands, and impacts to areas below Ordinary High Water (OHW). The construction project will be covered under an Individual COE Permit or under the *General Permit State of Vermont* (VT GP). An individual permit is project-specific and has complex requirements. Coverage under the VT GP is categorized as a "1" or "2" based on the area of impact. The categories have varying degrees of requirements and conditions.

Army Corps of Engineers – Category 1: COE CAT 1 projects are considered non-reporting, although all terms and conditions of the VT GP still apply. A CAT 1 covers scopes of work that result in total impacts of less than 275 SM (3,000 SF) in area and that will occur between July 15th and October 1st.

- If a Contractor proposes changes to the project that results in impacts to an area greater than 275 SM (3,000 SF) or puts jurisdictional work outside of the July 15th – Oct 1st timeframe, they will need to prepare a CAT 2 permit application. The Environmental Engineer should be available to aid the Contractor with this process.
- Although non-reporting, the contractor must submit a *Self-Verification Form* two weeks prior to the start of jurisdictional work. The *Self-Verification Form* is part of the contract documents.

Army Corps of Engineers – Category 2: COE CAT 2 projects are reporting. A CAT 2 Permit covers project impacts between 3,000 square feet and 1 acre. Projects covered under the CAT 2 permit must adhere to the following requirements:

- Permit availability: The Contractor shall have a copy of the VT GP and authorization letter on-site. The Resident Engineer shall not allow work to occur if this authorization is not on site.
- *Work Start Notification Form*: The Contractor, as the entity actually performing the work, must sign the form indicating they have read the permit and understand its conditions. It must be submitted by the Contractor to the COE two weeks prior to the start of work. To ensure compliance with this requirement, VTrans requires a copy be provided to the Resident Engineer and Environmental Engineer. The Resident Engineer shall ensure no work occurs until two weeks from submittal of this form. The *Work Start Notification Form* is part of the contract documents.

- *Certification of Compliance Form*: When the project is complete, the Environmental Engineer shall complete and submit a *Certification of Compliance Form* to the COE. The *Certification of Compliance Form* is part of the contract documents.
- Coordination of Project Modifications: The Contractor shall inform the COE of any proposed work which extends beyond the limits of construction shown on the Contract Plans and involves U.S. waterways. The Resident Engineer shall ensure project changes are coordinated with the COE.

Army Corps of Engineers – Individual: COE Individual Permits cover impacts of greater than 1 acre or those projects that are unable to comply with the terms of the GP. They include many site-specific conditions including, but not limited to the following:

- Permit Posting: The Contractor must have the *Notice of Authorization*, which will be in the contract, conspicuously displayed at the work site. The Resident Engineer shall not allow any work to occur if the authorization is not posted.
- On-site Conferences: A Preconstruction Conference with the COE is required prior to commencement of work. The Resident Engineer shall consult with the Environmental Engineer to ensure the Preconstruction Conference is scheduled. There is also often a requirement for a site meeting on or around September 1st to review the project schedule and the potential for late season construction.
- Construction Environmental Oversight: The permit will require the hiring of an Environmental position to monitor the site for compliance and provide bi-weekly reports to the COE for review. Because the Agency is the applicant for COE permits, this individual is hired by the State.
- Coordination of Project Modifications: The Contractor shall inform the COE of any proposed work which extends beyond the limits of construction shown on the Contract Plans and involves U.S. waterways. The Resident Engineer shall ensure project changes are coordinated with the COE prior to their incorporation in the field.
- Waste, Borrow and Staging Areas: Proposed waste, borrow, and staging areas must be approved through the COE prior to use. Typically, the Contractor will submit plans for the waste, borrow, and staging areas to the Environmental Unit for approval, and then to the COE for review.

11-130 ANR CONDITIONAL USE DETERMINATION

The Vermont Agency of Natural Resources (ANR) Wetlands Office monitors construction project impacts to Class I and II wetlands and their buffers. Impacts from construction activities that do not meet the definition of an "allowed use" under the VT Wetlands Rules are considered "conditional uses" and must be permitted with a Conditional Use Determination before work may commence.

- The Contractor is required to:
  - Notify the ANR Wetlands Office prior to beginning work on the project
  - Notify the ANR Wetlands Office of any changes made during construction that increase and/or alter in any way impacts to the wetlands or their buffers.
- The Resident Engineer shall ensure no work occurs prior to the Contractor notifying the Wetlands Office and that coordination occurs prior to any project changes.

11-140 ANR STREAM ALTERATIONS PERMIT

The ANR Rivers Management Program regulates stream alteration activities. Under *Title 19 V.S.A. Chapter 1, § 10 (12)*, VTrans is required to "consult" with the Rivers Management Engineers when engaging in road repairs or construction which in any way involves streams. Although the requirement is a consultation, the process is referred to as the *Stream Alteration Permit*.

- A *Stream Alteration Permit* requires the Contractor to do the following:
  - Conduct an on-site meeting with the Rivers Management Engineer, the Resident Engineer, and if necessary, a representative of the town in which the work is to be performed to assess field conditions and the Contractor's means and methods.
  - Submit an *EPSC* Plan to the Rivers Management Engineer for approval.
  - Submit for review and acceptance any changes to plans that affect surface waters or riparian buffers.
- In-water work done under a *Stream Alteration Permit* must be conducted within a restricted period, often with a June 1st or July 1st start date and an Oct 1st end date. If this time frame is too restrictive to accomplish the contract work, the Contractor may seek permission to work either before the proposed start date or after the proposed end date. The Contractor must obtain written permission to do this before any in-water work will be allowed.

11-150 STORMWATER REGULATIONS

11-150.10 ANR Construction Permits – (General Permit 3-9020) or Individual

The Stormwater Section of the ANR Watershed Management Division issues a *Construction General Permit 3-9020* to authorize storm water discharges from project sites resulting from construction activities involving areas greater than 0.4 hectare (1 acre) of earth disturbance. A *Construction General Permit 3-9020* authorizes permittees to discharge stormwater runoff from construction sites provided the project is in compliance with the requirements of the permit. The permitting requirements for projects authorized under this permit depend upon the type of stormwater discharge risk that may occur on the construction site.

There are two categories of risk that qualify for use of a *Construction General Permit 3-9020: Low Risk or Moderate Risk.* Projects that pose special risks to water quality are not eligible for this permit, and must be covered by an *Individual Discharge Permit*, which may be found in the contract documents.

The type of risk determination is based on the following features:

- Water type (Impaired or Outstanding Resource)
- Extent of the disturbed area: 0.8 hectare (2 acres), 2.0 hectares (5 acres), or 2.8 hectares (7 acres)
- Duration of the disturbance: 7, 14, or 21 days
- Slopes and soils
- Presence or absence of vegetated buffers
- Work within resource buffer

Contracts for projects that require a *Construction General Permit 3-9020* or an *Individual Discharge Permit* will include Items under Special Provision 652, *Erosion Prevention and Sediment Control Plan. Section 4-652 Erosion Prevention and Sediment Control (EPSC) Plan* describes the protocol for fulfilling some specific requirements relative to the determined risk. However, it is important for the Contractor and Resident Engineer to review the authorization included in the contract to understand conditions and constraints specific to that particular project.

- For *Low Risk* projects, the Contractor shall do the following:
    - File a *Notice of Addition of Operator Form* and submit it to all parties listed on the form with copies sent to the Resident Engineer and the Environmental Engineer.

- Post the *Construction Permit Notice of Authorization* on the job site in a public place.
- Be aware of the Low Risk Inspection and reporting requirements and applicable forms.

- For *Moderate Risk* projects the contractor shall do the following:
  - Complete and submit the *Notice of On-Site Plan Coordinator*. This form must also be signed by the landowner. For projects on State land, the Environmental Engineer may sign on behalf of the State.
  - Be aware of the Moderate Risk Inspection and reporting requirements and applicable forms.

The Resident Engineer shall ensure the above requirements are met for each level of risk.

11-150.20 ANR Operational Stormwater Permits (General Permit 3-9010, General Permit 3-9015, or Individual)

The ANR Operational Stormwater permit regulates runoff from impervious area and requires treatment practices to mitigate the impact of such runoff.

For those projects that include an *Operational Stormwater Discharge Permit* in the contract, the Contractor shall contact the VTrans Stormwater Management Engineer and provide the Resident Engineer and the Environmental Engineer with copies of the *Operational Stormwater Discharge Permit* prior to doing any of the following:

- Implementing modifications to drainage conveyance features and/or the location of stormwater discharge points.
- Implementing modifications that involve an unplanned expansion of an impervious surface area.
- Installing complex treatment systems such as underground filters, bioretention and/or infiltration trenches, swirl separators, permanent detention ponds, and constructed treatment wetlands.

11-150.30 Illicit Discharge Detection and Elimination

Illicit discharge is defined as any discharge to public stormwater conveyance or to waters that are not composed entirely of stormwater. It is sometimes referred to as "Non-Stormwater Discharge."

If there is suspicion of or a clear indication of an illicit discharge into State waterways, the Contractor or VTrans Inspector must notify the Resident Engineer. The Resident Engineer shall contact their Regional Construction Engineer and the VTrans Stormwater Management Engineer. The VTrans Stormwater Management Engineer will work closely with the Resident Engineer, Contractor, Highway District staff, and others as necessary to effectively resolve the issue and minimize delays in the construction.

11-160 HISTORICAL AND ARCHAEOLOGICAL DISCOVERIES

The project plans should bear clear indication of archaeologically sensitive areas that are to be marked off and protected from disturbance. The Contractor is responsible for avoiding sensitive areas that are so demarcated. It is possible, however, that the Contractor may come across an unanticipated archaeological site during construction operations.

When it appears the Contractor has encountered objects or materials that may be of historical or archaeological significance, the Resident Engineer should follow the protocol as specified in *Section 107.14 Protection of Historical and Archaeological Sites* of the Standard Specifications for Construction. The Resident Engineer shall stop construction activities immediately in the affected area and notify the VTrans Archaeologist that the Contractor has encountered objects or materials that may be of historical or archaeological significance.

State of Vermont Agency of Transportation
CHANGE OF DESIGN / SUPPLEMENTAL AGREEMENT

Contract ID Number: _____ **Project Name & Number:** _____ **CO Name:** _____

Choose the Change Type: Change Order ☐ Supplementary Agreement ☐ Force Account ☐ Time Extension ☐

Revision:
Necessity for Revision:

This change order received verbal approval from, _____ Project Manager, on _____
This change order received verbal approval from, _____ Federal Highway Administrator, on _____

New Items not in Contract:

Sub to perform work?	PPMS No.	Contract Line No.	Category No.	Item No.	Item Description	Unit	Unit Price	Current Contract Quantity	Change Order Quantity Adjustment (+/-)	Current Contract Cost	Change Order Cost Adjustment (+/-)
								Totals:			

Additional Cost : _____ Contract Extension Granted: **N/A** New Completion Date: _____

VERMONT AGENCY OF TRANSPORTATION
CONSTRUCTION SECTION
CHANGE OF DESIGN
COST ANALYSIS WORKSHEET

PROJECT NAME & NO:

CONTRACTOR:

ANALYSIS BY, TITLE:

ANALYSIS DATE:

CHANGE OF DESIGN NO:

Pay Item No & Description	Qty & Unit	Per Unit Cost Provided by Contractor	2 year Bid History	5 year Bid History	REMARKS

Bid histories can be found here: http://vtransestimating.vermont.gov/

ANALYSIS NARRATIVE:

TO: _____, Regional Construction Engineer

FROM: _____, Resident Engineer

DATE:

SUBJECT: Request for Overtime

OVERTIME AUTHORIZED AT THE DIRECTION OF THE RESIDENT ENGINEER/REGIONAL CONSTRUCTION ENGINEER FOR THE DURATION OF THE BELOW-NAMED PROJECT

Project Name and Number: _____

Request permission to Work the Following Employees:

NAME	GRADE	COMP	PAY	Reason for Overtime
				As required by project
				work schedule

Approved: _____ Regional Construction Engineer

Instructions: Submit original once during a project's duration, or unless someone new is assigned to the project, and who's name does not already appear on an approved sheet.

c Regional Construction Project Files (original)
Headquarters Project Files
Resident Engineer's Project Files

State of Vermont
Northwest Regional Construction Office
347 Emerson Falls Road, Suite 5 (NE)
St.Johnsbury, VT 05819-8501
www.aot.state.vt.us

A-3 Written Order

Agency of Transportation

[phone] NW 802-654-0726
[fax] NW 802-654-0793

WRITTEN ORDER No. ___

The following Written Order is hereby issued to, _____ representing the Contractor, _____ on the _____ project.

You are hereby

Date:May , 2015 Signed,

_____
, Resident Engineer

Electronic Distribution:

Headquarters via Finals Engineer
Regional Construction Engineer
Regional Construction Technician
Regional Administrative Services Technician

COMPENSATORY TIME REQUEST

I, _____ request that my Compensatory Time limit be increased to _____ hours, to be accumulated as I accrue overtime. I understand that it is my responsibility to monitor my accrued hours so that no request is made on my Time Report that would, if credited, exceed this limit regardless of whether the hours were accrued through overtime or through floating holidays.

I am aware that this approval does not authorize, in any way, the future use of such compensatory time granted under this process. Granting the use of such time is subject to the Unit's operating needs at the time of a leave request, which is outside of this guideline.

My reason for requesting this increased limit is as follows:

_____

_____

_____

_____

Approved/Denied

_____ Date: _____ [ ] [ ]
Regional Construction Engineer

_____ Date: _____ [ ] [ ]
Construction and Materials Bureau Director

NOTE:
The maximum amount of Compensatory Time Construction Personnel can accrue and have on the books at any one time is 120 hours. Anyone accruing beyond the 56 hours allowed by the VSEA Contract must fill out this document and receive approval from their Regional Construction Engineer and the Construction and Materials Bureau Director. This directive will stay in effect until rescinded in writing by the Construction and Materials Bureau Director.

AGENCY OF TRANSPORTATION, FINANCE AND ADMINISTRATION

Use of Privately-Owned Vehicle Approval Form

EMPLOYEE INFORMATION

Employee Name: _____

Employee ID: _____

Job Title: _____ Department: _____

Supervisor: _____

Date: _____ Is this an Annual Approval?*:

REASON FOR USE OF PRIVATELY-OWNED VEHICLE

Reason:

APPROVAL

_____ _____

Appointing Authority's Signature Date

*If this is a request for annual approval, the renewal is required to be done on July 1st of each year.

Z:\Highways\ConstructionMaterials\Construction\Forms\2015 Construction Field Forms\General\2015 Privately Owned Vehicle Approval Form

State of Vermont
Agency of Transportation
Construction Section

Privately Owned Vehicle Approval Form - Sample Justifications for Annual Approvals

Sample 1: (Justification for an Annual Approval)
Reason: Due to my specific job duties as a Resident Engineer/Inspector (choose which fits you and delete the other), travel from my residence to multiple job locations five to six days per week is required. I am currently assigned to the _____ and _____ project(s). My position requires that I transport files, survey equipment, computer equipment, stakes/hubs, paint, personal protective gear, personnel, material samples, etc. There are also occasions that require travel for meetings, trainings, material deliveries, covering other projects, traveling to some material site locations, etc.) I traverse rough ground and off road locations daily. I need a vehicle that enables me to carry out the requirements of my position. BGS Fleet Management will not guarantee that there are ½ ton pick-up trucks available for immediate use, and it is more cost effective for me to drive my personal vehicle than it is to rent one.

Cost Analysis:

POV: 2600 miles/month x (current GSA rate) /mi = $ /month

Rental: 2600 miles/15 mi/gal = 173.33 gal x (current price/gal) = $ /mo (Gas) + $980/mo (Rental Rate for ½ ton pick-up) = $ /month

Fleet Vehicle: $1200/month (Rental) (However, no guarantee to get the vehicle needed to fulfill the requirements of my position.

Sample 2: (Justification for using a personal car when assigned a Fleet Vehicle)
Reason: I am presently assigned a Fleet Vehicle for my duties as a Resident Engineer/Inspector while on project(s), but due to personal use restrictions of Fleet Vehicles, I am unable to utilize a Fleet Vehicle on various days (i.e. medical appointments, daycare, school, etc.). The project(s) I am assigned to presently are: _____. The cost analysis shows that it is more cost effective to allow my POV to be used in special circumstances.

I use a Fleet Vehicle on average of 3 days per week.
For July I will average about 170 miles per day, two days per week.
For August 2015 through June 2016 I will average 78 miles per days two days per week.

170 mi/day x 2 days x 4.33 weeks x 1 month = 1473 miles
78 mi/day x 2 days x 4.33 weeks x 8 months = 5404 mi

Total miles/year = 6877 miles
6877 mil/9 months/4.33 weeks/2 days = 88 miles/day

The average is only slightly above the allowed 80 miles per day for POV usage. This is an estimate.

Sample 3: (Justification due to a Medical condition)
Reason: I work as a Resident Engineer/Inspector assigned to the following project(s). For medical reasons I request the use of my personal vehicle. I need a vehicle that I can get in and out of without undue strain. I have to have the seat back further than most cars will go. I also need better than normal lower back/lumbar support and my personal vehicle accommodates my needs. There is no guarantee that a Fleet vehicle or Rental vehicle would be able to accommodate my medical condition.

State of Vermont
Agency Of Transportation
Construction Section

Activities and Field Positions Matrix

Activity	Resident Engineer	Chief Inspector	Inspector	Office Engineer
Plan Reviews before Contract				
Constructability issues	X			
Special provisions check	X			
Contract date- does it work	X			
Plan and Special Provision Review after award.				
Detail plan review and tabbing	X			
Contract review and tabbing	X			
Submittal checklist spread sheet set up - email to contractor	X			
Acquire Design Folder				X
Check permit dates		X		
Get ASTM or AASHTO Standards as referenced in contract				X
Identify the clear zone		X		
Get MUTCD from contractor if required				X
Pre-Construction Prep				
Contact DTA	X			
Drive through w/ District Foreman		X		
Speed Limit Reduction certificate request				X
Identify Special construction requirements		X		
Review Permits		X		
Initial Survey				
Contact Survey Section for baseline layout		X		
Verify traverse points		X		
Acquire stakes, hubs, and paint		X		
Perform bench run		X		
Upload or enter survey file in Data collector		X		
Install centerline of bearing line o/s		X		
Install additional traverse points as required		X		
Project Setup				
Contact/communicate with contractor on location of FO	X			
Communicate on FO phone, power and office equip.				X
Verify offsite activity paperwork for accuracy and completeness				X
Off site activities for waste/borrow/staging areas/FO		X		
Take Project photos prior to construction.		X		
Speak with property owners	X			
Existing sign inventory			X	

Activity	Resident Engineer	Chief Inspector	Inspector	Office Engineer
Existing Guardrail removal measurements			X	
Inventory (Ditching, drainage, GR, Signs, etc)			X	
Measure/note salvage material to operations or town			X	
Print Item Detail list from site-manager and setup books				X
Complete 511 form				X
Complete roadway restriction form				X
Complete OT authorization form	X			
Sign Stakeout			X	
Check status and/or requests of subcontract agreements				X
Verify certification checklist for accuracy		X		
Check sampling checklist for accuracy		X		
Start Concrete Log				X
Setup weather log				X
Setup Rain gauge				X
Setup project folders				X
Request Speed Enforcement from VSP	X			
Verify contractor has contacted dig safe/Ops/Local for utilities		X		
Identify lighting issues- supplemental lighting required		X		
Request U-turn authorization				X
Civil Rights Payroll				
Verify payroll				X
Interview employee				X
Complete forms and post to Civil Rights				X
Email Civil Rights with clarifications				X
OJT				
Interview meeting	X			
Employee check up				X
checking status of OJT log				X
Payments to contractor/verify training				X
Communication with Civil Rights throughout	X			
Field Operations				
Communicate with Superintendent of daily activity		X		
Weather cancellation documentation	X			
Traffic control setup and condition check			X	
Daily survey requirement determination		X		
Coordination with Regional Soils Tech for field sampling		X		
Verification of measurements- correct methods		X		
Interpretation of plan issues	X			
Documentation of design conflicts	X			
Investigation of design conflicts with solution recommendation	X			
Coordination with PM, Specialist for conflict resolution	X			

Activity	Resident Engineer	Chief Inspector	Inspector	Office Engineer
Observations and notifications of Traffic control issues		X		
Document adjustments made to traffic control setup		X		
Document extra work required, not on plans		X		
Observations of significant safety issues.	X	X	X	X
Communication with Superintendent/Competent Person		X		
End of day wrap up. Condition of traffic control/site		X		
Inspection of Contractor's work			X	
Inspect, sign, and date inspectors daily report		X		
Measure and record daily quantities			X	
Field Verify Materials Incorporated into work			X	
Altering or Shutting Down Contractors Operations	X			
Safety/Incident Data collection		X		
Inspect EPSC & waste areas			X	
Take Beam Profiles			X	
Maintain photo log				X
Maintain project weather log				X
Have Bridge Inspection team come out prior to Final Inspection				X
Communication				
Emergency Contact form				X
Update Roadway restriction form				X
Draft public relations or 511 site				X
Approve Public Relations or 511 site	X			
Public Relations with: Facebook, Icloud, news media	X			
Draft Weekly Project updates				X
Approve Weekly Project updates		X		
Work with property owners	X			
Work with local officials	X			
Work with affected utility companies		X		
Attend Public meetings	X			
Setup Pre-Pave/Pre-Pour/Pre-Paint meetings		X		
Communication with inquiries from Montpelier	X			
Notify Chain of Command of project accident		X		
Work with District		X		
Work with PM	X			
Work with Regional Engineer	X			
Schedule Plant Inspectors		X		
Weekly Project meeting	X			
Work w/ environmental regulators	X			
work w/ specialists		X		
Schedule and provide project site visits	X			
Correspondence for Claims	X			
Documentation				

Activity	Resident Engineer	Chief Inspector	Inspector	Office Engineer
Submit Estimate to Regional Tech	X			
Generate Inspector DWRs			X	
DWR Entries Into SiteManager/Check Qtys				X
DWR Proof Reading		X		
DWR Authorization	X			
Red Checking of Qtys (E-Books)		X		
Sample entries				X
Additional equipment/personnel in SiteManager w/ C Hebert				X
Initiate Change Order	X			
Change Order - draft				X
Change Order - review/revisions	X			
Develop Cost Analysis for Supp. Agreement				X
Review Cost Analysis for Supp. Agreement		X		
Change Order Approval	X			
Written Order - draft				X
Written Order - review/approve	X			
Claim Analysis	X			
Verify Subcontractor approval in place				X
Withhold authorization to work until Subcontractor approved		X		
Extension of Time	X			
prime/subcontractor evaluation forms		X		
project manager closeout comments		X		
Over/Under quantity explanations		X		
Calculations folders				X
Force account documentation		X		
Quantity calculations for payment		X		
Red Checking		X		
APA & Fuel Price Adjustments				X
Record Plans		X		
Accident Documentation, email, photographs, police reports		X		
Perform final cross sections			X	
Submittals & Responses				
Tracking of all submittals				X
CPM Schedule Review & forward	X			
Traffic Control Plan Review & forward	X			
EPSC Plan Review & forward	X			
Cofferdams/excavations review and forward	X			
Formwork review and forward	X			
Bituminous/Concrete Mix Design verify status		X		
Welding procedures review and forward	X			
Erection plans review and forward	X			
Precast Structures verify status		X		
Bearings verify status		X		

Activity	Resident Engineer	Chief Inspector	Inspector	Office Engineer
Structural Steel verify status		X		
Drilled Shafts review and forward	X			
Project Environmental Permits		X		
Stockpile review and forward				X
Temporary bridge review and forward	X			
Specialty subcontractors - review resumes/qualifications	X			
Supervisory				
Annual Evaluations of State/Consultant personnel	X			
Timesheet approval of State/Consultant personnel	X			
Expense approval of State/Consultant personnel	X			
Train Personnel	X			
Staff meetings	X			
Scheduling of personnel and assignments	X			
Ensure staff performs duties in a safe manner	X			
Certification and Sampling				
Check status of material certification checklist with SM items				X
Check status of material sampling checklist				X
Sample results are being recorded in the materials record				X
Maintain certification log				X
Process IA verification request		X		
Receive and Process material failure notification	X			
Communicate with Montpelier on status of missing certifications				X
Process non-compliance notifications	X			
Field verify material certifications			X	
Perform material testing and sampling			X	
Core Sampling generation		X		
Locating Core locations in Field		X		
Fill out Material Sample paper work (Cert. Of Compliance)		X		
SiteManager Sample entry				X
Fill out TA 555, 556, & 557 and small quantity forms				X
Verify approved product requirements		X		
Initial Project Sampling Memo				X
Notes and disposition of failing materials	X			
Scheduling w/ Regional Soil Technicians		X		
Review Sample results		X		
Project Completion				
Final Inspection Punch List	X			
Review Project Checklist with Regional Tech	X			
Project Box to Finals	X			

DAILY WORK REPORT FOR CONTRACT: 14022103

DWR Date: 02/23/2015	**Contract ID:** 14022103	**Authorized:** Yes	**Locked:** No	**Paid:** Yes
Inspector ID: sschmitt	**Inspector:** Schmitt, Sandra			
High Temp: 9	**Low Temp:** 0	**A.M. Condition:** Snow	**P.M. Condition:** Sunny	
Work Suspended Time: 00:00	**Work Resumed Time:**00:00	**No Work Items Instld:** ☐	**No Contrs Present:** ☐	**No Staff Present:** ☐

Remarks: Yes

A General

Jon Lemieux was on site (Miller) at 7 am until 3:30pm. He was on site to assist Wright. He used the Cat loader to move snow on the West side of the project limits.

B Project Accidents

In the morning, the snow fence was down at the approach to the East side work zone. At the end of the day, caution tape is up on the West side of the bridge at the approach to the ramp. Snow fence is also up at the end of the ramp at the approach to the west side. Snow fence, barrels and signs are up at the East side approach.

Z Subcontractor

The Wright crew consisted of Rich, Miguel, Kevin and Brian. They were on site at 7 am until 3:30 pm. They used the Gradall to move wood around the site. The Bobcat 873 E-12 was out of commission today.

The crew spent the morning time removing snow from the decking in preparation to continue installing Oak planks on the West Ramp.

The crew spent the remainder of the day finishing the Oak planks on the West Ramp. West Ramp now complete.

A truck brought a load of Oak from Goodfellows.

Contractor Information

Contractor ID: 11015056 **Contractor Name:** WRIGHT CONSTRUCTION CO INC. **Hrs Worked:** 0.000

Nbr of Supervisors: 1 **Nbr Of Workers:** 3

Supervisor/ Foreman :

Name	Hrs. Worked
Rich Butrimas	0.000

Variable Labor:

Personnel Title	Qty	Hrs.Worked
Intermediate	3	0.000

Equipment:

Description	Qty	Qty Used	Hrs. Used
Fork Lift, Gradall 534D-9	1	0	0.000
Skidsteer, Bobcat 873	0	0	0.000

DAILY WORK REPORT FOR CONTRACT: 14022103

Contractor ID: 11001574 **Contractor Name:** MILLER CONSTRUCTION INC. **Hrs Worked:** 0.000

Nbr of Supervisors: **Nbr Of Workers:** 1

Variable Labor: Personnel Title	Qty	Hrs.Worked
foreman	1	0.000

Equipment: Description	Qty	Qty Used	Hrs. Used
backhoe, Cat, 325CL, 02	1	0	0.000

Daily Staff Information

Staff Member	Work Code	S/C	Reg. Hrs.	OT. Hrs.	Vehicle ID	Start M/km	End M/km
Schmitt, Sandy		S	0.000	0.000			
Harding, Charlie		S	0.000	0.000			

Work Item Information

Item Code: 522.20 **Description:** STRUCTURAL LUMBER AND TIMBER, UNTREATED

Supp Desc 1:
Supp Desc 2:

Project Nbr	Line Item Nbr	Catg.	Plan Pg Nbr	Place Qty	Units	Contractor Name	Contractor ID Measured	Instld Qty
12E134	0305	1211	0	.090	MFBM	11015056 WRIGHT CONSTRUCTION CO INC.	No	9.41

Location: West Ramp remainder of qty owed

	Station	Offset	Distance		Station	Offset	Distance
From:	+ 0.000		0.000	To:	+ 0.000		0.000

West Ramp complete today. Already paid 90% of 0.92 MFBM = 0.828 MFBM. Pay 0.09 MFBM today.

See Calculation Binder for breakdown of calculation (by SES).

INSPECTOR'S DAILY REPORT

Weather: _____ Date: _____

Project Name: _____ Project No: _____

Work Assignment: _____

_____

CONTRACT PAY ITEMS COMPLETED

ITEM NO.	ITEM CODE	STA TO STA	QUANTITY

REMARKS: _____

_____

_____

_____

_____

SIGNED: _____

SKETCHES

(BELOW OR ON BACK)

Highway Division/Construction & Materials Bureau/Regional Section
Emergency Contact & 511 Information
Input Form

Instructions:
Tab Through Form, completing all Gray fields that apply. When Complete please send an electronic version to your Regional office.

Project Name & Number:				
Resident Engineer:	Name		Field Office #	
	Cell #		Fax #	
	Pager #		Reg Office #	
Project Field Office Address:				
Description of Project:				
State Route, Interstate, or Bridge Number(s)				
Location Specifics: Use a MM, Exit No., or other identifier when possible. Include Town or City.				
Lane Closure or Roadway Restrictions:				
Type of Detour (Choose One)	All Traffic		Cars Only	
	Trucks Only		Other	
Details & Specifics:				
Duration of Construction or Restriction(s)	Anticipated Begin Date		Anticipated End Date	
Days of Operation (including weekends)				
Hours of Operation (specify day or night hours)				
Traffic Control or Restrictions In-Place	Flaggers		Temporary Signal	
Please check all that apply with an "X"	Speed Enforcement		Other	
Delay Status (Choose One)	Short		Long	
Regional Construction Engineer	Name			
Contact Information	Cell #		Regional Office	
Construction and Materials Bureau Director	David Hoyne 802-828-2593 (Main Desk)			
Name & Address of Contractor				
Superintendent	Name		Contact #	
Emergency Contact Information (after hours)	Name		Contact #	
Contractors Competent Person	Name		Contact #	
Contractors Safety Officer	Name		Contact #	
Public Relations Contact	Name		Contact #	
Miscellaneous Information				

Any changes during the course of the project should be directed to Transportation Operations Center at 828-2648. Also, please send an electronic version to your Regional Office.

Distribution List:

Municipality (Town or City):
Operations Communications Center: AOT.OPSTOC@state.vt.us
Operations Maintenance District(s):
Headquarters Project Files
Regional Office Project File
State Police Barracks via this email address: PSAPSUPERV@dps.state.vt.us

DMV ~ Oversized Permits Section: Donna Earle / Kim Plante
donna.earle@state.vt.us
kim.plante@state.vt.us

Other:

(This Email for Distribution Purposes ONLY)

Z:\Highways\ConstructionMaterials\Construction\Forms\2015 Construction Field Forms\General\2015 Emergency Contact-511 Form

VERMONT

State of Vermont
Northeast Regional Construction Office
347 Emerson Falls Road, Suite 5
St.Johnsbury, VT 05819-8501
www.aot.state.vt.us

Agency of Transportation

[phone] NE 802-748-2447
[fax] NE 802-751-3297

Contractor
Address
City, State Zip Code

Subject: Project Name and Number – Authorization to Proceed with Submittals

Dear :

This letter is to advise you that the Contract Documents, for the above mentioned project, were satisfactorily completed by all parties in the Contract on . This letter dated will serve as the "Authorization to Proceed with Submittals" date**.**

The "Authorization to Proceed with Submittals" date is the date that work can commence on the Administrative Submittals including, but not limited to, the baseline schedule, the Erosion Prevention and Sediment Control Plan, the Traffic Control Plan, the Safety Plan, and obtaining environmental clearances for waste, borrow, and staging areas. This Notice does not supersede or waive any requirements in these documents.

No physical work will be allowed prior to the Preconstruction Conference and the acceptance of the Administrative Submittals, unless authorized by a Written Order.

Sincerely,

Ronald D. Gray, P.E.
Regional Construction Engineer

c Montpelier Project File
Regional Project File
Resident Engineer,
Contract Administration, Pete Daye

VERMONT

State of Vermont
Northeast Regional Construction Office
347 Emerson Falls Road, Suite 5
St.Johnsbury, VT 05819-8501
www.aot.state.vt.us

Agency of Transportation

[phone] NE 802-748-2447
[fax] NE 802-751-3297

Date

Contractor
Address
City, State Zip Code

Subject: Project Name and Number – Notice to Proceed with Construction

Dear :

This letter is to advise you that the Administrative Submittals for the above mentioned project were satisfactorily completed and accepted on . In accordance with the "2011 Vermont Agency of Transportation Standard Specifications", this letter dated , will serve as the "Notice to Proceed with Construction" date**.**

The "Notice to Proceed with Construction" date is the date that work can commence, subject to seasonal limitations and other restrictions indicated in the Contract documents. The "Notice to Proceed with Construction" date will be used in calculations of liquidated damages. This Notice does not supersede or waive any requirements in these documents. The Anticipated Contract Completion Date is .

Sincerely,

Ronald D. Gray, P.E.
Regional Construction Engineer

c Montpelier Project File
Regional Project File
Resident Engineer,
Contract Administration, Pete Daye

VERMONT

State of Vermont
Construction & Materials Bureau
1 National Life Drive
Montpelier, VT 05663-5001
www.aot.state.vt.us

[phone] 802-828-2593
[fax] 802-828-2795
[ttd] 800-253-0191

Agency of Transportation

Notification of Roadway Restrictions

PROJECT NAME: _____ PROJECT NUMBER: _____

EXACT LOCATION: _____
_____

ROUTE No. _____ BRIDGE: _____

LENGTH OF PROJECT: _____

WIDTH OF LANE AT NARROWEST POINT: (SEE NOTE 1 BELOW) _____FEET

TWO-WAY TRAFFIC ON BRIDGE AND TWO-WAY DETOUR: _____

WHICH LANE IS CLOSED: _____

NATURE OF CONSTRUCTION: _____

SPEED LIMIT THROUGH PROJECT AREA: _____M.P.H.

SURFACE-PAVED or UNPAVED?: _____

EXPECTED DURATION FROM: _____ TO _____
(month/day/year) (month/day/year)

CURVE INVOLVED? YES _____ NO _____

RECOMMEND SHORTER LENGTH OF TRUCK? _____ FEET

OTHER COMMENTS: _____
_____
_____
_____
_____

BE SURE TO TURN OVER AND FILL OUT THE BACK OF THIS SHEET ALSO. THANKS.

PROJECT NAME: _____ PROJECT NUMBER: _____

RESIDENT ENGINEER: _____

WORK TRAILER PHONE NUMBER: _____

IS RESTRICTION DAYTIME ONLY, OR DAY AND NIGHT? _____

NOTES:

When giving the width of lane DO NOT build in an allowance for safety, etc. as this is done in Engineering. For example: If you have jersey barrier on both sides and there is a measured distance of 14' 0" between the two sides, do not put in less than the 14' distance under width of lane at narrowest point. Engineering has set standards for various load types for the required width needed for these moves.

Restrictions must be completed and sent to the Construction office. Resident Engineer to fax a copy to Motor Vehicles' Oversize Permit Section. **The Resident Engineer is responsible for submitting these with enough lead time to ensure that DMV has a MINIMUM of two weeks notice prior to the restriction taking effect.**

This sheet is intended to be used for long term restrictions such as one-way traffic on bridges and one-way detours, but not for daily restrictions controlled by flaggers of Uniformed Traffic Officers UNLESS oversize vehicles will not be able to pass through.

When in doubt, ASK. If you have questions or concerns please call 828-2593.

c Communications/Operations – National Life Building
(Larry Dodge larry.dodge@state.vt.us and Gregory Fox gregory.fox@state.vt.us
Headquarter's Project Files
Motor Vehicle Oversize Permit Section (Fax Number 828-5418)
(Donna Earle donna.earle@state.vt.us; Kim Plante kim.plante@state.vt.us; and
Kevin Andrews kevin.andrews@state.vt.us)
Project File/Regional Administrative Services Technician – Original
Resident Engineer
Structures Section, Pam Thurber
Traffic Operations, Bruce Nyquist
Traffic Operations, Amy Gamble and Mario DuPigny-Giroux

Certificate for Construction and Maintenance Work Zone

STATE OF VERMONT

CERTIFIED STATEMENT DESIGNATING A TEMPORARY

SPEED LIMIT ON THE INTERSTATE, STATE OR U.S. HIGHWAY SYSTEM

In accordance with Title 23, Vermont Statutes Annotated, Section 1006a, a temporary speed limit is hereby designated for the section of highway described below.

Project or Town Name: _____

Project Number (if Applicable) _____

Route No. _____

Current Posted Speed Limit _____

Proposed Temporary Speed Limit _____

Approximate Milepoints Dir _____ Begin M.P. _____ End M.P. _____
Dir _____ Begin M.P _____ End M.P. _____

Anticipated Dates From _____ Thru _____

Requested By _____ Date _____

The official signs designating the foregoing speed limit will be erected and removed as directed by the Agency of Transportation. The temporary speed limit will be in effect when the related signs are posted. Removal or covering of the signs by the Agency shall return the speed limit to its previous status. The anticipated from/thru dates indicated may be extended thirty days without a new certificate.

Approved by _____ Date _____
Title Director of Project Delivery Bureau or
Director of Construction & Materials Bureau or
District Transportation Administrator

Original to: Amy Gamble, Traffic Operations Engineer

Copy to : Major Walter Goodell, Field Force Commander, Dept. of Public Safety
Sgt. Eric Albright and Lt. Garry Scott, Dept. of Public Safety
**, District Transportation Administrator # ___
Geri Waldo, Construction Section
**, Regional Construction Engineer
Captain William Elovirta, DMV Commercial Enforcement Unit
Name of Requestor** , Title

Z:\Highways\ConstructionMaterials\Construction\Forms\2015 Construction Field Forms\General\2015 Temp Speed Limit Form Dual Sites

Certificate for Construction and Maintenance Work Zone

STATE OF VERMONT

CERTIFIED STATEMENT DESIGNATING A TEMPORARY

SPEED LIMIT ON THE INTERSTATE, STATE OR U.S. HIGHWAY SYSTEM

In accordance with Title 23, Vermont Statutes Annotated, Section 1006a, a temporary speed limit is hereby designated for the section of highway described below.

Project or Town Name: _____

Project Number (if Applicable) _____

Route No. _____

Current Posted Speed Limit _____

Proposed Temporary Speed Limit _____

Approximate Mile points **SEE ATTACHED LIST**

Anticipated Dates From _____ Thru _____

Requested By _____ Date _____

The official signs designating the foregoing speed limit will be erected and removed as directed by the Agency of Transportation. The temporary speed limit will be in effect when the related signs are posted. Removal or covering of the signs by the Agency shall return the speed limit to its previous status. The anticipated from/thru dates indicated may be extended thirty days without a new certificate.

Approved by _____ Date _____

Title Director of Project Delivery Bureau or
Director of Construction & Materials Bureau or
District Transportation Administrator

Original to: Amy Gamble, Traffic Operations Engineer

Copy to Major Walter Goodell, Field Force Commander, Dept. of Public Safety
Sgt. Eric Albright, Dept. of Public Safety
Lt. Garry Scott, Dept. of Public Safety
Captain William Elovirta, DMV Commercial Enforcement Unit
Gerry Waldo, Construction Section
**, Regional Construction Engineer
**, District Transportation Administrator # _____
**, (Requestor, Title)

Z:\Highways\ConstructionMaterials\Construction\Forms\2015 Construction Field Forms\2015 Temp Speed Limit Form with Addendum

The attached “Certificated Statement Designating a Temporary Speed Limit” applies to the following State Route sections.

Route	Town	Begin mm	End mm	Posted Speed Limit (mph)	Temporary Speed Limit (mph)

Records must be kept documenting the placement of Speed Limit signs, including the actual speed limit posted, date, time, and exact location of signs

VERMONT

State of Vermont
Construction and Materials Bureau Central Laboratory
2178 Airport Rd., Unit B
Berlin, VT 05641-8628
www.aot.state.vt.us

[phone] 802-828-2561
[fax] 802-828-2792
[ttd] 800-253-0191

Agency of Transportation

TO: Resident Engineer: Chris Barker
Regional Construction Engineer: Ann Gammell

FROM: Donal Morris, Supervisor, Certifications and Independent Assurance Unit

DATE: December 11, 2014

PROJECT: Weathersfield STP 2913(1) & Weathersfield NH 2948(1)

SUBJECT: MATERIALS MEMORANDUM – Internal Project Status Memo (IPSM)

This is to certify that:

The results of the tests used in the acceptance program indicate that the materials incorporated in the construction work, and the construction operations controlled by sampling and testing, were in conformity with the approved plans and specifications.

☒ Exceptions to the plans and specifications are explained on the attached sheet.
☐ There are no exceptions to the plans and specifications.

DJH: DGM

CC Carmen Neveau, Financial Operations
Meredith Asselin, Accounts Receivable
Eric Fontana, Finals Engineer
Ann Gammell, Regional Construction Engineer
Chris Barker, Resident Engineer
Project File

DATE: December 11, 2014

Attachment page 1 of 1

Project: Weathersfield STP 2913(1) & Weathersfield NH 2948(1)

Exceptions to plans and specifications as stated by the Resident Engineer except where noted.

Description of Exception	Determination of Investigation
Project 10C228 301.28 Subbase of Crushed Gravel, Fine Graded; line item 0035: lacking compaction and fractured faces testing to represent 21,453.30 TONS installed. 310.20 Reclaimed Stabilized Base; line item 0045: no compaction testing on file to represent 121,597.00 SY installed. Also, quantity installed exceeds quantity tested of 110,000.00 SY. 402.13 Aggregate Shoulders, RAP; line item 0055: no gradation testing on file to represent 1,847.00 TONS installed. 900.675 Special Provision – Emulsified Asphalt; line item 0400: lacking certification type A to represent 116,955.00 SY installed. 900.675 Special Provision – Superpave Bituminous Concrete Pavement; line item 0405: affirmation needed that 43.08 TONS tested fully represents 2,130.40 SY installed. 900.675 Special Provision; line item 0410: lacking reclaimed stabilized base testing (if used). Also, confirmation needed that 116,955.00 SY installed does not exceed 1,215,000.00 CY tested. 900.680 Special Provision – Bituminous Concrete Pavement, Medium Duty; line item 0415: no testing to represent 30,244.00 TONS installed. 900.680 Special Provision – Bituminous Concrete Pavement, Medium Duty; line item 0420: no testing to represent 1,322.53 TONS installed.	

VERMONT

State of Vermont
Northeast Regional Construction Office
347 Emerson Falls Road, Suite 5
St. Johnsbury, VT 05819
www.aot.state.vt.us

[phone] 802-748-2447
[fax] 802-751-3297

Agency of Transportation

TO: David Hoyne, Construction & Materials Bureau Director

FROM: Ronald D. Gray, Regional Construction Engineer

DATE:

SUBJECT: Completion & Acceptance – **PROJECT NAME AND NUMBER**

The actual work for the above-mentioned project was completed on **DATE COMPLETED** and accepted on **DATE ACCEPTED**. The substantial completion date was **DATE SUBSTANTIALLY COMPLETE**, and the anticipated contract completion date was **DATE FOUND ON CONTRACT COVER (REVISIONS TO COMPLETION DATE ADDED HERE IN PARENTHISIS IF CHANGED BY CHANGE ORDERS AND REFERENCE CHANGE ORDERS)**. An extension of time **IS/IS NOT (CHOOSE ONE)** necessary. This project has been completed in substantial conformance with the approved program and authorization.

The Final Inspection was held on **DATE OF MEETING** with the following persons present:
REPRESENTING AOT:
REPRESENTING CONTRACTOR:
RESPRESENTING CITY/TOWN:
OTHERS:

RDG:clh

VERMONT

State of Vermont
Northeast Regional Construction Office
347 Emerson Falls Road, Suite 5
St. Johnsbury, VT 05819
www.aot.state.vt.us

[phone] 802-748-2447
[fax] 802-751-3297

Agency of Transportation

TO: David Hoyne, Construction & Materials Bureau Director

FROM: Ronald D. Gray, Regional Construction Engineer

DATE:

SUBJECT: Completion & Acceptance – **PROJECT NAME AND NUMBER**

The actual work for the above-mentioned project was completed on **DATE COMPLETED** and accepted on **DATE ACCEPTED**. The substantial completion date was **DATE SUBSTANTIALLY COMPLETE**, and the anticipated contract completion date was **DATE FOUND ON CONTRACT COVER (REVISIONS TO COMPLETION DATE ADDED HERE IN PARENTHISIS IF CHANGED BY CHANGE ORDERS AND REFERENCE CHANGE ORDERS)**. An extension of time **IS/IS NOT (CHOOSE ONE)** necessary. This project has been completed in substantial conformance with the approved program and authorization.

The Final Inspection was held by memorandum with comments due by **DATE FINAL INSPECTION COMMENTS WERE REQUESTED TO BE RETURNED TO REGIONAL CONSTRUCTION ENGINEER BY VIA ELECTRONIC TASK REQUEST**.

RDG:clh

VTrans Working to Get You There
Vermont Agency of Transportation

State of Vermont
Agency Of Transportation
Construction Section

Inclement Weather Day Guidance

Introduction

This document provides guidance for determining inclement weather days.

Working Day

A working day is a calendar day on which construction operations could proceed, as determined by the Engineer, unless excepted, "Working Day" excludes Saturdays, Sundays, and Holidays, and the period from December 1 to April 15, exclusive; unless worked.

Determination of Extension of Contract Time for Completion

Subsection 108.11 Determination of Extension of Contract Time for Completion of the Standard Specifications for Construction specifies procedures to follow whenever the work is delayed or suspended through no fault of the Contractor.

A completion date extension will be determined upon consideration of the following:

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

Other Considerations:

1) Consideration of an inclement weather day must occur on the *actual day to be worked*. No prior arrangements for weather days shall be made in anticipation of inclement weather.
2) The Contractor must have suspended work on a major (Critical Path) item.
3) The Contractor must be unable to work for at least 50% of the normal daylight shift hours, due to inclement weather conditions or causes of inclement weather such as high water. This can be determined by looking at the hours worked on previous days, and comparing it to the actual amount of down time.

Examples:

The Contractor states "We were going to work tomorrow, but since they are predicting rain, I called the crew off. Can we have a credit for a rain day?"

- Regardless of whether it rains or not the next day – **No Credit**

The Contractor shows up for work and begins their paving operations. They work from 6:30 AM until 1:00 PM at which time they are rained out. They had worked previous days from 6:30 AM to 6:00 PM. On this day they worked 6 hrs out of a possible 11.5 hrs or 52.2% of the day.

- Since the Contractor worked for more than 50% of the day – **No Credit**

The Contractor shows up for work to find that water has flooded the cofferdam and silted in the forms. The contractor spends from 7:00 AM to 11:30 AM cleaning out their forms, resuming progress after a half-hour lunch. On previous days the contractor had worked from 7:00 AM to 3:30 PM (with a half- hour off for lunch for a total of 8 hrs). On this day they worked 3.5 hrs out of a possible 8 hrs or 43.8% of the day.

- Since the Contractor worked for less than 50% of the day – **Credit Day**

The Contractor plans on working on a Saturday and shows up at the project. It is raining, but the extended forecast is for clearing later in the day. The contractor waits for 2 hours, it is still raining, and they decide to call off work for the day.

- The Contractor is entitled to receive credit for the day – **Credit Day**

The Contractor arrives on the project to find that heavy rains through the night have caused the river to rise above the top of the sheets of the cofferdam, though the current weather is sunny, the contractor cannot work until the water recedes.

- The Contractor is entitled to receive credit for the day – **Credit Day**

Critical Dates and Weather Days

1) Weather days shall be formally credited (including within in *SiteManager*) until Substantial Completion is granted; even when Substantial Completion occurs after the adjusted contract completion date.

2) Weather days need not be credited (including within *SiteManager*) from December 1st and April 15th; exclusive.

3) No weather days are credited after Substantial Completion is granted.

Critical Dates and Liquidated Damages:

1) Liquidated damages apply to any normal work day beyond the adjusted contract completion date except:

    a. Where inclement weather days are granted

    b. Saturdays, Sundays, and Holidays; unless actually worked

    c. Days beyond December 1st; unless actually worked

    Only until the date Substantial Completion is granted.

State of Vermont
Agency Of Transportation
Construction Section

Request for Extension of Time

TO THE CONSTRUCTION & MATERIALS BUREAU DIRECTOR
1 National Life Drive
MONTPELIER, VERMONT 05633 –5001

(date)

Dear Ladies and Gentlemen:

The undersigned Contractor under a Contract with the State of Vermont, dated **Date of Contract** and known as **Project Name**, Project No. **Project Number** in the Town(s) of **Towns**, was not able to complete the work of said Contract within the time provided therein, to wit: **Date** (Anticipated Completion Date / Adjusted Completion Date, via Change Order) for the following reasons:

_____

_____

_____

_____

_____

_____

_____

Said Contractor hereby requests that the time for completion of such Contract be extended to:

_____.

In consideration of such Extension of Time, the said Contractor hereby agrees:

That said Contract and bonds shall remain in full force until the completion and acceptance of the work.

That the granting of such Extension of Time shall not constitute an acceptance of any imperfect work or material, nor waiver of any right of the State of Vermont under the Contract and Contractor's bonds, nor release or discharge of the Contractor and Surety from any obligation of said Contract and bonds.

_____.

Title: _____.

Contractor: _____.

Recommend Extension to: _____

_____ _____

David J Hoyne, Construction & Materials Bureau Director Date

APPROVED: For an Extension of Time from_____ to _____, inclusive, which will leave ___ days of liquidated damages at a rate of _____ per day for a total of _____.

_____

Richard M. Tetreault, Chief Engineer

_____

Date

Approved: _____ _____

Division Administrator for Federal Highway Administration

State of Vermont
Northeast Regional Construction Office
347 Emerson Falls Rd, Suite 5
St. Johnsbury, VT 05819

Agency of Transportation

(Phone) 802-748-2447
(Fax) 802-751-3297

SUBCONTRACT INSTRUCTION & CHECKOFF SHEET

_____ Letter(s) requesting permission to (re)sublet from the Prime Contractor, which shall include a List of Contract Item Number(s),Description of Item(s), and Percentage of each item to be performed by the Subcontractor. The letter must also contain the Company Name, Contact Name, Address, Telephone Number, FAX Number and e-mail address of the intended Subcontractor, as well as the intended start and completion dates. The following statement and attachments must also be included:

> "It is hereby certified that the following D/WBE Subcontractor(s) has/have been solicited for their interest, capability and prices prior to this request." List the names and enclose a copy of the reply or, if no reply was received, a copy of your solicitation letter. (This statement is not required if the Subcontractor is a D/WBE.)

____ If the proposed Subcontractor has not worked previously for VAOT, a *Letter of Performance* from the Prime Contractor shall be submitted with the request stating that the intended Subcontractor is equipped and specifically experienced to perform the work being subcontracted. Prime will also be notified if the new Subcontractor is required to supply a W-9 form to the Agency. If so, the Prime will notify the Subcontractor to fax their W-9 to Financial Operations at (802) 828-2024, Attention: AOT – Vendor Numbers. If Subcontractor has questions, they are to be directed to Financial Support Services at (802) 828-2631.

____ The Subcontractor must be registered with the Secretary of State, for all subcontracts regardless of the amount of the subcontract. Under NO circumstances can a Subcontractor work on ANY State of Vermont project without being registered with the Vermont Secretary of State.

____ An executed Contractor's Equal Opportunity Statement Form (CA-109) completed by the subcontractor, must accompany the subcontract. This form is required for all subcontracts valued at $10,000.00 or more; using contract unit prices, not subcontract unit prices.

____ A copy of the subcontract agreement with all attachments; executed by both parties of the subcontract, namely the Prime Contractor and the Subcontractor, shall be submitted to this Office.

____ The subcontract shall contain the following written statement and any applicable forms shall be attached to the subcontract:

> "The Required Provisions Form FHWA-1273 and the Special Provisions pertaining to Specific Equal Opportunity Responsibilities, Women/Disadvantaged Business Enterprise Policy, and the Wage Determination Decision of the Secretary of Labor are attached to, and are made part of, the subcontract."

____ The subcontract shall contain a copy of the Disadvantaged Business Enterprise (DBE) Policy (CA-110). This form shall be included in all subcontracts regardless of whether the subcontractor is a DBE.

___ Subcontract requests, accompanying documentation as listed above, and a completed copy of this check-off sheet shall be forwarded to the Regional Construction Office at the address listed above.

___ Workers Compensation: State Contracts Compliance Requirement – Subcontract Reporting Form. This form should be updated to include information related to the Subcontract being submitted and included with the subcontract packet.

Other information to observe:

A Prime Contractor cannot subcontract more than 50% of the contracted work. This percentage is based off contract unit prices NOT subcontracted unit prices. Specialty Items (those clearly marked as such in the contract) do not count toward the 50% limit. Items added, or quantities increased, by Change of Design do not count toward the 50% limit.

Subcontractors are not permitted to work on a project until formal subcontract approval has been given by the Regional Office; except in situations where the Resident Engineer deems it necessary. In these situations, an Interim Subcontract Approval form MUST be completed the first day the subcontractor is on-site. Under NO circumstances shall a Prime be paid for work performed by a subcontractor until formal subcontract approval has been given by the Regional Office. See *Subsection 108.01 Subletting or Assignment of Contract* of the Standard Specifications for Construction for more information.

VERMONT

State of Vermont
Northeast Regional Construction Office
347 Emerson Falls Road, Suite 5
St. Johnsbury, VT 05819
www.aot.state.vt.us

Agency of Transportation

[phone] 802-748-2447
[fax] 802-751-3297

DATE

PRIME CONTRACTOR NAME &
ADDRESS

Ladies and Gentlemen:

Subject: **PROJECT NAME AND NUMBER**

In reply to your letter of **(Date of Letter of Request from Contractor)** requesting consent to sublet a certain item(s) on the above project to **SUBCONTRACTOR NAME AND ADDRESS**, I wish to advise that approval is given for the subletting of the following item(s):

This approval in no way relieves you of any of the requirements of your contract and bonds with the State of Vermont.

This approval is granted on the condition that the subcontractor does not again sublet any of the work without further permission from the Agency of Transportation.

Your understanding with your subcontractor must be documented by the contract agreement executed by both parties to the contract, namely, the prime contractor and the subcontractor. The subcontract shall include either by attachment or incorporation by reference all of the specifications and requirements contained in the prime contract and which will be pertinent to the subcontract. This incorporation shall include a copy of the required provisions, form PR-1273, Required Contract Provisions all Federal-Aid Construction Contracts, the Special Provisions, Specific Equal Employment Opportunity Responsibilities, Minority Business Enterprise Policy, a copy of the Wage Determination Decision of the Secretary of Labor, incorporated in the prime contract, and identification of the items to be sublet together with the Special Provisions and Modifications pertaining thereto.

A copy of the executed subcontract should be retained in the files on the project and available in case of audit by the State or the Federal Highway Administration. Another copy of the subcontract should be retained in the files of the subcontractor.

Please advise the subcontractor of the necessity for complying with labor requirements, furnishing payrolls, weekly statements and Record of Materials and Supplies, if required.

It is your responsibility to see that the subcontractor carries out all the requirements of the contract which pertain to the work performed by him as well as the payment of all his bills for labor and materials.

Any time the subcontractor does not perform the work to the satisfaction of the Agency of Transportation, the Agency may require the contractor to take over and complete the work of the subcontractor.

Sincerely,

Ronald D. Gray, P.E.
Regional Construction Engineer

RDG:clh
Enclosure
cc: Civil Rights, Sonya Boisvert/Laurie Demingware
Director of Compliance, Tax Department, Frank Partsch
Materials Bureau, Mladen Gagulic/Donal Morris
Montpelier Project Files
Regional Project File
Resident Engineer

VERMONT

State of Vermont
Northeast Regional Construction Office
347 Emerson Falls Road
Suite 5
St. Johnsbury, VT 05819
www.aot.state.vt.us

Agency of Transportation
Highway Division

[phone] 802-748-2447
[fax] 802-751-3297

DATE

Prime Contractor Name
Address
City, State, Zip

Ladies and Gentlemen:

Subject: **PROJECT NAME AND NUMBER (Lower Tier Sub)**

In reply to your letter of DATE requesting consent to allow your primary subcontractor, Sub Contractor Name, to re-sublet certain items on the above-referenced project to Lower Tier Subcontractor name and address, I wish to advise that approval is given for the re-subletting of the following items:

This approval in no way relieves you or your primary subcontractor of any of the requirements of your contract and bonds with the State of Vermont.

This approval is granted on the condition that the prime subcontractor does not again sublet any of the work originally subcontracted to his/her firm without further permission from the Agency of Transportation. Please be reminded that any future requests to re-sublet any items from a primary subcontractor to a lower-tier subcontractor, will be reviewed on a case-by-case basis.

Your understanding with your primary subcontractor must be documented by the subcontract agreement executed by both parties to the subcontract, namely, the prime subcontractor and the lower-tier subcontractor. The subcontract shall include by attachment, all of the specifications and requirements contained in the prime contract and which will be pertinent to any and all subcontracts. This incorporation shall include a copy of the required provisions, form PR-1273, Required Contract Provisions for all Federal-Aid Construction Contracts, the Special Provisions, Specific Equal Employment Opportunity Responsibilities, Minority Business Enterprise Policy, a copy of the Wage Determination Decision of the Secretary of Labor (which can be found on the Agency's Web Page and as indicated in the Special Provision No. 1, Vermont Minimum and Labor Truck Rates, incorporated in the prime contract, and identification of the items to be sublet together with the Special Provisions and Modifications pertaining thereto.

A copy of the executed subcontract should be retained in the files on the project and available in case of audit by the State or the Federal Highway Administration. Another copy of the subcontract shall be retained in the files of the prime subcontractor and lower-tier subcontractor.

Please advise the prime subcontractor that it is their responsibility to insure that the lower-tier subcontractor is required to comply with labor requirements, furnishing payrolls, weekly statements and Records of Materials and Supplies, if required.

It is your responsibility to see that the lower-tier subcontractor carries out all the requirements of the contract which pertain to the work performed by him/her as well as the payment of all his/her bills for labor and materials.

Any time the lower-tier subcontractor does not perform the work to the satisfaction of the Agency of Transportation, the Agency may require the contractor, or the prime subcontractor to take over and complete the work of the lower-tier subcontractor.

Sincerely,

Ronald D. Gray, P.E.
Regional Construction Engineer

RDG:clh

cc: Civil Right, Sonya Boisvert/Lori Demingware
Director of Audits/Tax Department: Frank Partsch
Material Bureau, Mladen Gagulic/Donal Morris
Montpelier Project Files: Gerry Waldo
Regional Project File
Resident Engineer:

VERMONT

State of Vermont
Northeast Regional Construction Office
347 Emerson Falls Road, Suite 5
St. Johnsbury, VT 05819
www.aot.state.vt.us

Agency of Transportation

[phone] 802-748-2447
[fax] 802-751-3297

TO: Ronald D. Gray, Regional Construction Engineer

FROM: Cindy Hastings, Administrative Services Tech

DATE:

SUBJECT: Subcontractor Request # (CES #)

Request of (PRIME CONTRACTOR) to sublet an item (see attached list) on the (PROJECT NAME AND NUMBER) project to (SUBCONTRACTOR NAME AND ADDRESS)

Telephone No. :	
Email Address:	
Anticipated Start Date:	
Anticipated Completion Date:	

Summary of Request (s):

1)	
Total	

Total Percent Subcontracted: ___%

Attachments (2)

RDG:clh

cc: Materials Bureau, Mladen Gagulic/Donal Morris
Civil Rights, Sonya Boisvert/Lori Demingware
Director of Audits, Tax Department, Frank Partsch
Project File
Resident Engineer,
Montpelier Project Files

State of Vermont
Construction and Materials Bureau
1 National Life Drive
Montpelier, VT 05663-5001
www.aot.state.vt.us

[phone] 802-828-2593
[fax] 802-828-2795
[ttd] 800-253-0191

Agency of Transportation

INTERIM SUBCONTRACTOR APPROVAL FORM

This interim Subcontractor Approval Form to the Contract dated_____, for Project No. _____in the Town of ___, made this _____**, 2015**, between the State of Vermont, by the Agency of Transportation, party of the first part and of _____ , party of the second part, hereinafter called the contractor.

Prior to the contractor subletting any portion of the contract, the contractor agrees that:

(a) The subcontractor who is performing the work is particularly experienced and equipped for such work:

(b) The subcontractor has been made aware by the prime contractor of all requirements and provisions as set forth in the contract and has agreed to comply with all said requirements.

Based on the above, permission is granted to sublet the following item(s):

Subcontractor Name and Address	Item No. and/or Description of Work	Percentage of each item Subcontract Work

Upon verification that said Subcontractor is registered with the Vermont Secretary of State's office, this form will represent an **interim** approval to use said Subcontractor for the Items stated herein. Submission of standard contractor's request to sublet Contract Items and approval by the Construction & Materials Bureau's Construction Regional Section will follow as soon as possible. No payment for work accomplished under this subcontract will be made until all subcontractor approval documents have been processed by the Agency's Construction & Materials Bureau Division Construction Regional Section.

IN WITNESS WHEREOF, the parties have hereunto set their hands on the day and year first above written.

SUBCONTRACTOR	PRIME CONTRACTOR
_____	_____
Name of corporation, Co-partnership/Individual	Name of Corporation, Co-partnership/individual
_____	_____
Name of Individual Signing the Form	Name of Individual Signing the Form
_____	_____
Title of Individual Signing the Form	Title of Individual Signing the Form

State of Vermont, Agency of Transportation

By _____
Resident Engineer

Z:\Highways\ConstructionMaterials\Construction\Forms\2015 Construction Field Forms\General\2015 Interim Subcontractor Approval Form

Note: This form may not be utilized to circumvent the requirement that the prime contractor must perform at least 50% of the total initial contract cost, except that any items designated as "Specialty Items" may be performed by subcontract and the cost of any such "Specialty Items" so performed may be deducted from the total current contract cost.

Instructions:

The purpose of the Interim Subcontractor approval form is to permit the prime contractor to subcontract work under the following conditions only:

- Situations whereby the prime contractor and agency do not have sufficient time to process and approve the necessary standard subcontract documents prior to the subcontractor commencing work.

- Emergency situations whereby it is necessary for the prime contractor to employ a subcontractor on immediate notice and for a short duration. (Examples: installation of temporary guardrail, critical equipment breakdown, etc.)

This form shall be signed by the contractor's authorized representative on the project, party of the second part and the Resident Engineer, party of the first part. Signature of the subcontractors' authorized representative is also required.

This form shall be made out and distributed to the following:

Original copy – Contractor
Photocopy – Construction Project Files, Montpelier
Photocopy – Regional Project Files
Photocopy – Resident Engineer's file
Photocopy – Subcontractor's file
Photocopy – Materials Section, Mladen Gagulic/Donal Morris
Photocopy – Director of Compliance, Tax Department, Frank Partsch

However, prior to any payment for work accomplished under this Interim Agreement form, standard subcontractor approval must be granted by the Regional Construction Engineer.

This document and its attachments present all provisions and requirements of the prime contract and must be satisfied prior to any work being performed by the subcontractor.

State of Vermont
Agency Of Transportation
Construction Section

Materials Sampling Checklist Report

The *Sampling Checklist Report* is included in the *Bi-weekly Estimate* package that is generated by the Regional Technician. The *Bi-weekly Estimate* package is sent to the Resident Engineer and the Contractor with every estimate, details, material requirements, installed quantities, certified quantities, and the certification date.

The report is also used by the Materials Section when writing the *Materials Memo* for the project.

The Sampling Checklist Report can be run by following the steps listed under *Subsection 9-100.60 SiteManager Materials*.

Sample Report:

Rpt-ID: RMMSMPCL

Vermont
Agency of Transportation
Sampling Checklist Report

Date: 02/26/2013

Contract ID: 10041602
Vendor ID: 11008644

Description: BENNINGTON AC NH 019-1 (54)
Vendor Name: J. A. MCDONALD INC.

County: BENNINGTON

Project / Material Code / Sample ID	Line Item / Material Name	Item Code / Sampled by	Item Description / Mat CD	Smpl Type	Acpt Method	Test Method	Unit	Contract Qty	Qty Installed	Qty Tested / Represented Qty	Sample Qty (Total) / Authorized Date	Status
06B176	0025	203.31	SAND BORROW				CM	34,100.000	**34,438.070**	**0.000**		
703.03	SAND BORROW AND CUSHION			aa	Test	AG-COMB07					0.000	1
jdomey124R100553		jdomey	703.03	bia	Test	AG-COMB07	CM			0.000	0	PREA
703.03	SAND BORROW AND CUSHION			aa	Test	AG-COMP00					0.000	1
jdomey124R100553		jdomey	703.03	bia	Test	AG-COMB07	CM			0.000	0	PREA
06B176	0065	301.26	SUBBASE OF CRUSHED GRAVEL, FINE GRADED				CM	0.000	**0.000**	**0.000**		
704.05	CRUSHED GRAVEL FOR SUBBASE			aa	Test	AG-COMB07					0.000	1
704.05	CRUSHED GRAVEL FOR SUBBASE			aa	Test	AG-COMP00					0.000	1
06B176	0070	301.35	SUBBASE OF DENSE GRADED CRUSHED STONE				CM	51,184.000	**53,619.620**	**0.000**		
704.05	CRUSHED GRAVEL FOR SUBBASE			aa	Test	AG-COMP00					0.000	1
704.06	DENSE GRADED CRUSHED STONE FOR SUBBASE			aa	Test	AG-COMB07					0.000	1
06B176	0075	402.12	AGGREGATE SHOULDERS				T	3,314.340	**1,477.970**	**0.000**		
704.12	AGG. FOR SURFACE COURSE AND SHOULDERS			aa	Test	AG-COMB07					0.000	1
06B176	0080	404.65	EMULSIFIED ASPHALT				KG	11,589.000	**42,577.500**	**93,758.260**		
702.04	Emulsified Asphalt			ecrt	CrtA	CT-TYPEA00					84,200.000	1
bearls12BT144714		rlemaire	702.04	ecrt	CrtD	CT-TYPEA00	KG			42,100.000	20121129	ACPT
bearls12C3144335		rlemaire	702.04	ecrt	CrtA	CT-TYPEA00	KG			42,100.000	20121203	ACPT
bearls1317120751		rlemaire	702.04	ecrt	CrtA	CT-TYPEA00	KG			42,100.000	20130107	ACPT

State of Vermont

Agency Of Transportation

Construction Section

Daily Work Report

Guidance and Procedures

General

This document is a step-by-step guide on how to prepare and authorize a *Daily Work Report* in *SiteManager*. The process includes entering project comments, contractor equipment, personnel, staffing, item quantities, and, if applicable, recording the loss of contract time because of weather conditions or other circumstances.

Contents

This document has four sections:

- Introduction
- Entering a *Daily Work Report*
  a. *Daily Work Report* Info Tab
  b. Remarks Fields
  c. Contractors Tab
  d. Contractors Equip Tab
  e. Daily Staff Tab
  f. Work Items Tab
  g. Force Accounts Tab (currently not used)
- Authorizing a Diary
  a. Authorize Tab
  b. Charge Tab

Introduction

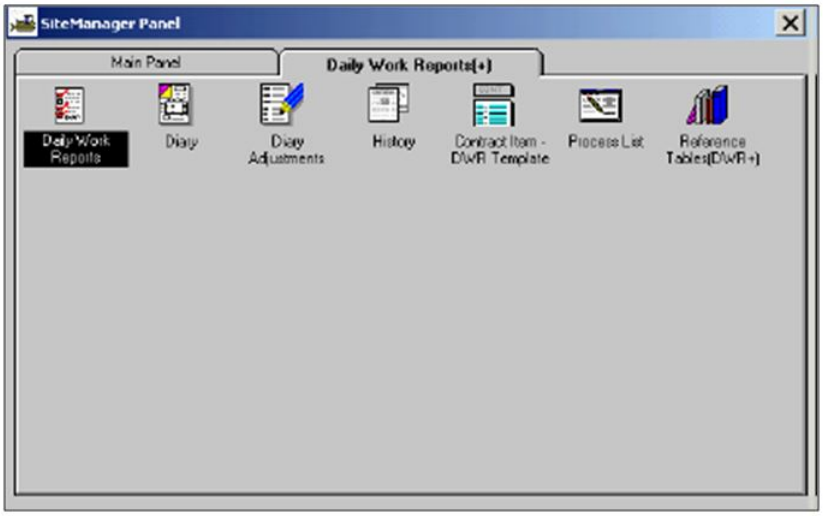
Each Resident Engineer or their delegate shall prepare and authorize a *Daily Work Report* within *SiteManager* for their respective project(s) on a daily basis.

The *Daily Work Report* installment data automatically populates the *Contract Item Placement Report* and *Estimate Item Detail Report* but does not automatically populate the *Contract Item Summary Report*. That report is populated only after the *Daily Work Report* is authorized. The authorization of the *Daily Work Report* on the Diary tab releases any installed quantities documented in the *Daily Work Report*, which will be paid on a subsequent *Bi-weekly Estimate*. The *Daily Work Report* serves as a composite work record of all the individual *Inspector Daily Reports* done on a project or projects.

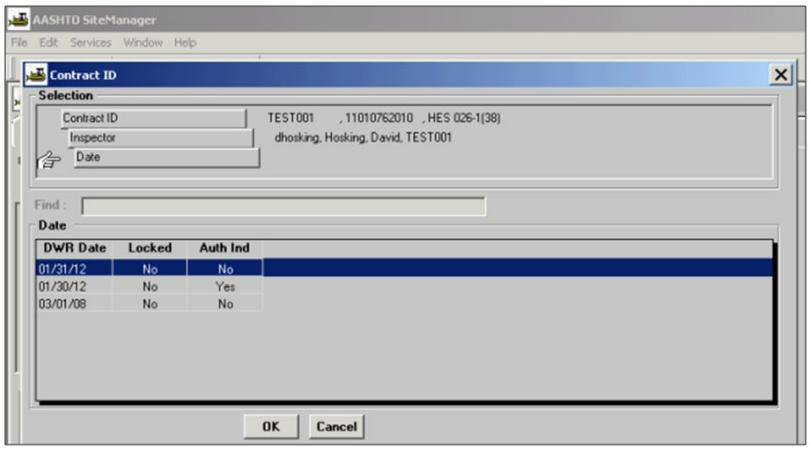
The daily preparation of the *Daily Work Report* and the subsequent authorizing of the *Daily Work Report* on the Diary tab are critical to the accurate generation of the *Bi-weekly Estimate* and its respective *SiteManager* reports.

Entering a Daily Work Report

- Log into *SiteManager* – Login and Password
- Navigate to the Daily Work Reports window: Main Panel → Daily Work Reports(+) → Daily Work Reports
- Choose the proper contract and open a Daily Work Report

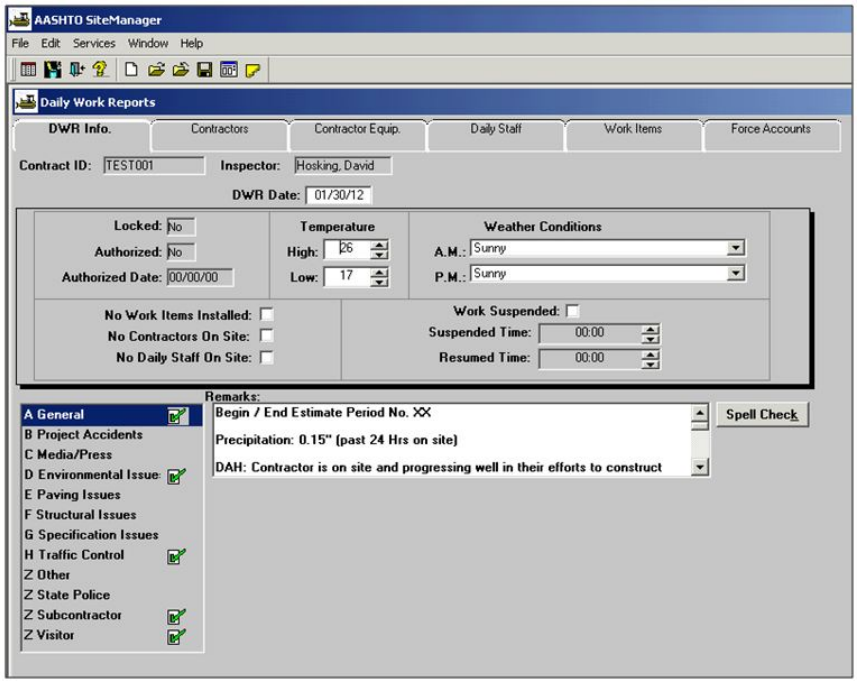


- The user may then either create a new *Daily Work Report* date from scratch or select a previous *Daily Work Report* date in which to begin their entries. The user will need to utilize Services → Choose Keys → Select Contract if they are creating the very first *Daily Work Report* for the project. If the user selects a previously authorized *Daily Work Report*, they will be prompted as to whether or not they would like to copy the previous *Daily Work Report*'s Contractors, Contractors Equipment, and Daily Staff information.



Note: If the user elects to use the Copy Contractor Information option, they shall review and update the Contractors, Contractors Equip, and Daily Staff Tabs accordingly for the active *DAILY WORK REPORT* date.

a. <u>"Daily Work Report Info." Tab</u>



Contract ID field (CES Number): This is the eight (8) digit number that precedes your project(s) description in *SiteManager*, which represents the sequence and call order of the projects that were let on a specific day [i.e., 98011203: 98 (Year) 01 (Month) 12 (Day) 03 (Call Order - the third project let that given day)]. This field is automatically populated.

Inspector field: This field reflects the individual who authored the *Daily Work Report*. This field is automatically populated.

***Daily Work Report* Date field:** This field reflects the date chosen by the author for work to be reported within the *Daily Work Report*. The user will double click on the field and a calendar will display from which to choose the date. The date cannot be later than the actual date the *Daily Work Report* is being created. The user should also be aware that a *Daily Work Report* can be created for an earlier date, so the user shall be diligent in entering the correct date.

Locked field: This field automatically populates with a "Yes" when the *Daily Work Report* has been included in a *Bi-Weekly Estimate*. Otherwise "No" will show in this field.

Authorized: This field automatically populates with a "Yes" when the *Daily Work Report* has been authorized on the Diary tab. Otherwise "No" will show in this field.

Authorized Date: This field automatically populates with the date the *Daily Work Report* was authorized on the Diary tab. Otherwise the field will show 00/00/00.

Temperature: An accurate attempt shall be made to document the daily "High" and "Low" temperature experienced on the project throughout the day of the *Daily Work Report*.

Weather Conditions: An accurate attempt shall be made to document the observed weather conditions in both the morning "AM" and afternoon (or evening) "PM" timeframes.

For Projects let under the 2006 <u>Standard Specifications for Construction</u>: The procedure for the crediting of inclement "weather days" has not changed. The Contractor shall be given credit for a weather day when the majority of the work day is suspended due to inclement weather conditions. In order for a weather day to be granted, the Contractor must show up at the work site able to perform contract work as they normally would, before a weather day can be granted by the Resident Engineer or their designee.

For Projects let under the 2011 Standard Specifications for Construction: Just as with the 2006 Standard Specifications for Construction, the user should always be detailed in their notes regarding weather events in *SiteManager*. However, for projects let with the 2011 edition, the Rain (credit day) weather condition option shall no longer be used. If there is inclement weather, it should be thoroughly noted in the *Daily Work Report*, the appropriate weather condition selected from the drop-down menu (except for the Rain or Snow (Credit Day) options), precipitation amounts, and whether any Written Orders specific to weather were issued. In addition, the user should note in the general remarks field whether the Contractor arrived on project, anticipating and prepared to perform normally scheduled work.

With the 2011 specification, Contractors will be able to dispute inclement weather conditions on a more cumulative basis (i.e., an inordinate amount of rain during a particular construction season) so it is important to keep detailed weather related documentation.

No Work Items Installed: This toggle is automatically populated with a ☑ when no work items have been "installed" as part of the *Daily Work Report* on the Work Items tab.

No Contractors On Site: This toggle is automatically populated with a ☑ when neither the Prime Contractor nor any of their Subcontractors have been associated to the *Daily Work Report* on the Contractor's tab.

No Daily Staff On Site: This toggle is automatically populated with a ☑ when no VTrans staff members associated to the *Daily Work Report* on the Daily Staff tab.

b. Remarks Fields

Daily Work Report comments or remarks shall be documented and separated into the following categories (or fields): General, Project Accidents, Media/Press, Environmental Issues, Paving Issues, Structural Issues, Specification Issues, Traffic Control, Other, State Police, Subcontractor, and Visitor. Guidance on how to complete these fields is outlined below:

General: Inclusion of the following information is recommended in the General Field.

- Daily precipitation measurement on project (24 hour period)
- Simple statements to define the beginning or end of a bi-weekly estimate period
- General description of the day's events related to the Contractor's performance of the contract [i.e., daily construction efforts]
- Approximate location on project of construction efforts
- Daily assignment(s) of any inspectors (Agency, Temporary, or Consultant) assigned to the project(s)
- A brief summary of each Inspector's Daily Report or activities

- Statements to the fact of whether or not any Contractor/Sub-Contractor, inspection or other critical staff members were not present on site that day
- Notation should also be made if work efforts begin or end in the evening or over-night hours.

Project Accidents (Safety): This field should reflect specific information on any accidents that have occurred on project.

- Motor vehicle accidents within the project or in the vicinity of the work zone.
- Any accidents to project staff, either Agency or Contractor, that require medical attention of some form.
- Any safety concerns observed on the project shall also be documented here, as well any enforcement measures that were utilized.

Media/Press: This field should document any interview requests made by the media or press concerning your project(s). Any and all media requests received by a Resident Engineer in the field shall be forwarded to the Agency's Public Information Officer at Headquarters.

Environmental Issues: This field should document any environmental concerns observed on your project(s). This includes, but is not limited to, the following:

- Permit conditions and compliance or lack thereof
- Initiation of permit amendments due to changes in the scope of work
- Any Off-Site Activity submittals (if the Resident Engineer is included) and/or the type and destination of materials (including hazardous materials) being moved (wasted) off site
- Implementation of erosion control measures
- On-site monitoring of the *EPSC* Plan
- Precipitation amounts
- A brief summary of any Environmental Inspector or Regulator site visits and any enforcement measures utilized

The Resident Engineer shall also forward any environmental concerns along to the Construction Environmental Engineer at Headquarters.

Paving Issues: This field should document any paving concerns observed on your project(s).

- Review and approval of asphalt mix designs
- Material testing requirements of the Hot Mix Asphalt (HMA) batched from the plant
- Workmanship of the HMA lay down train including compaction efforts
- Any on site quality control testing done by the Contractor
- Any quality assurance measures performed by the Agency
- Any mechanical issues experienced with paving equipment or HMA delivery vehicles
- Any HMA specification issues

The Resident Engineer shall forward any paving issues along to the Construction Paving Engineer at Headquarters.

Structural Issues: This field should document any structural issues observed on your project(s). This is primarily for bridge construction or rehabilitation projects, as well as structural bridge painting projects. Typical issues experienced are:

- Review and acceptance of steel erection plans
- Shop drawings
- Containment and disposal plans
- Cleaning and painting of structural steel plans
- Structural steel placement
- Bolt torquing results
- Skidmore testing
- Review and approval of structural concrete mix designs for a project submitted by the concrete supplier
- Installation of reinforcing steel
- Quality of the structural concrete batched to the project(s)
- Workmanship of the structural concrete placement efforts
- Any on-site quality control testing done by the Contractor
- Any quality assurance measures performed by the Agency
- Any mechanical issues experienced with concrete batching or placement equipment

- Structural concrete specification issues

The Resident Engineer shall forward any structural issues along to the Construction Structures Engineer.

Specification Issues: This field should document any specific specification issues experienced during the construction of a project. There are currently two Standard Specifications for Construction editions that are in use depending on the age of the project; the 2006 "Green Book" and the 2011 "White Book". Please check your project special provisions to determine with which specification the project was advertised. The Resident Engineer shall forward any specification issues along to the Construction Services Engineer at Headquarters.

Traffic Control: This field should reflect any observations made by the Resident Engineer regarding traffic control measures utilized on their project(s).

- Review and approval of Traffic Management Plans (TMP)
- Use of Flaggers or Uniformed Traffic Control Officers (UTO) within the work zone
- Use of proper safety apparel by workers
- Placement, erection, and use of traffic control features such as advance warning signage and traffic cones, barrels, or barrier, and any use of Portable Changeable Message Signs (PCMS) by the Contractor on project(s).
- If a detour is part of the project, the Resident Engineer should note any issues regarding function and operation of the detour.

The Resident Engineer shall forward any traffic control issues to the Construction Safety Officer at Headquarters.

Other: This field should contain any information that does not easily translate into any of the other fields mentioned.

State Police (Speed Enforcement): This field should document the use of Vermont State Police (VSP) Troopers on the project for speed enforcement efforts. The project shall have a *Certified Statement Designating a Temporary Speed Limit on the Interstate, State or U.S. Highway System* signed by the Director of the Construction & Materials Bureau along with all the required speed reduction signage correctly installed within the work zone, before any VSP enforcement can be requested.

The Trooper should notify the Resident Engineer when they arrive on project so that they can be properly deployed. The Resident Engineer shall document begin and end times of all VSP enforcement efforts, along with where on the project they were enforcing the temporary speed reduction. The Resident Engineer shall forward any State Police issues to the Construction Executive Services Coordinator at Construction Headquarters.

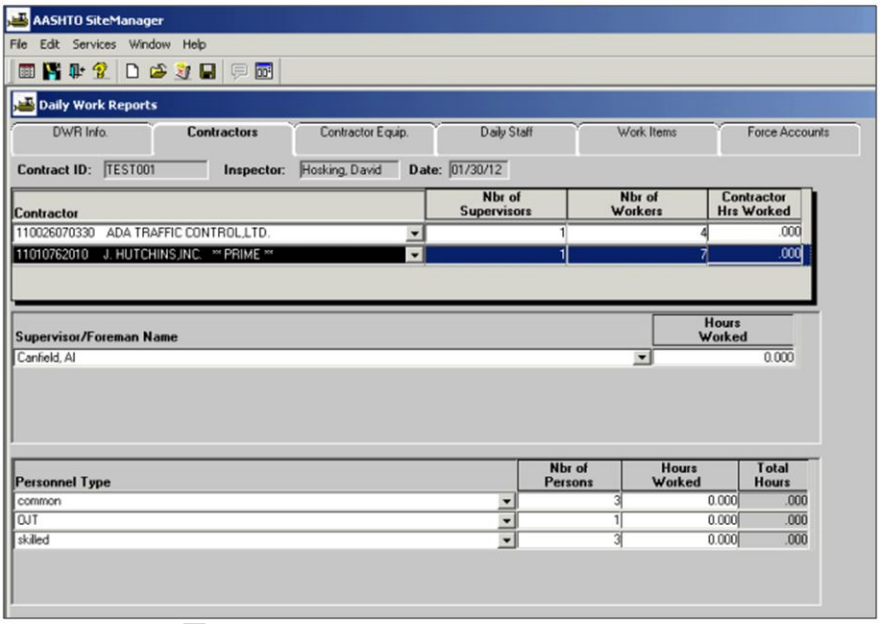
Subcontractor: This field should document any observations made by the Resident Engineer regarding Subcontractors approved to work on their project(s). Typical information would consist of:

- The need for an Interim Subcontractor Agreement prior to sublet work beginning
- Documentation of the Subcontractors working on the project(s) and their respective staff and equipment usage.
- Whether or not the Subcontractor is performing the work authorized in their *Approved Subcontractor Agreement.*
- Whether or not the Subcontractor is performing a "Commercially Useful Function (CUF)" on the project(s)
- Any observations regarding safety in regards to a Subcontractor
- Any issues regarding certified payrolls for any given Subcontractor.

The Resident Engineer shall forward any Subcontractor issues to their respective Regional Construction Technician at the Regional Office.

Visitor: This field should document any visitors to the project during the day. A visitor is anyone not who is not formally assigned to the project(s), nor authorized to be on site on a daily basis. All visitors shall report to the Resident Engineer first before entering the project. Visitors can be both Agency and Non-Agency personnel and their name, title, and nature of business shall be recorded in this field.

c. "Contractors" Tab



This tab is where the *Daily Work Report* author will record the basic information related to the Prime Contractor and/or Subcontractor(s) working on the project each day.

Contractor Window: The user will click inside the Contractor window and then click on the "New" ( ) button on the tool bar. The *Daily Work Report* author will then select the appropriate Contractor or Subcontractor from the drop-down menu.

Supervisor/Foreman Name Window: The user will click inside the Supervisor/Foreman Name window and then click on the "New" ( ) button on the tool bar. The *Daily Work Report* author will select the appropriate Contractor personnel from the drop-down menu within the Supervisor/Foreman Name window.

The full names of the superintendents and forepersons for both the Prime Contractor and any Subcontractors will appear on this list. However, only the names that are stored in the master database will show on this list. If an update to the master list is required, the Regional Construction Technician must be notified so they can see to it that the project-specific information is added to the master list.

Personnel Type Window: The user will click inside the Personnel Type window and then click on the "New" ( ) button on the tool bar. The *Daily Work Report* author will select the appropriate personnel type from the drop-down menu within the Personnel Type Window. Personnel types are broken down into the following categories; Common, Flagger, Foreman, Laborer, Operator, Project Manager, Skilled, Truck Driver, and Uniformed Traffic Officer.

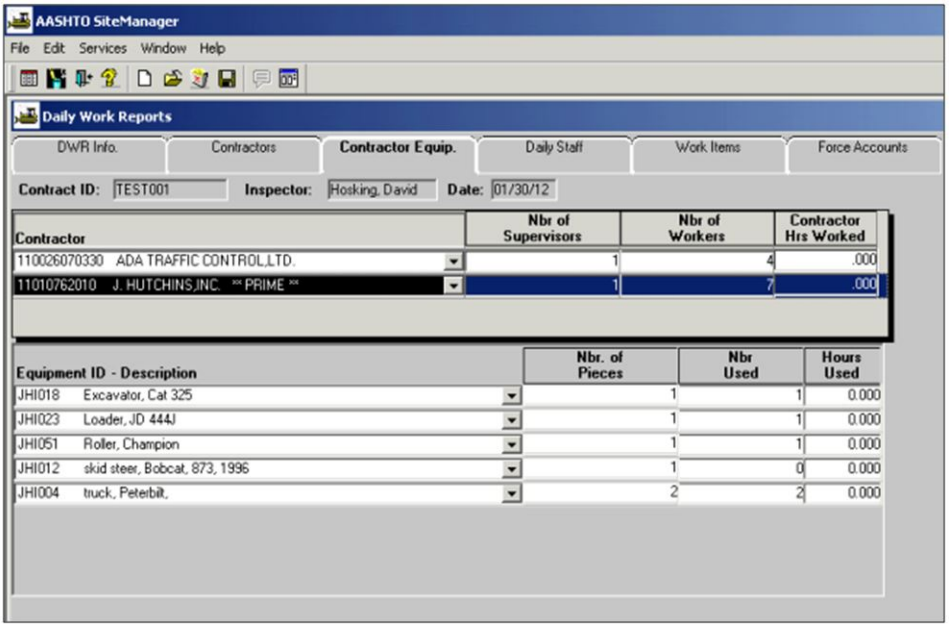
To add more than one personnel type, the user must repeat the initial steps for adding personnel. Please note that these categories are listed for the Prime Contractor, but they must also be listed for any Subcontractors working on the project, on this same tab.

Subcontractors are added by the Regional Construction Technician as part of the Subcontractor approval process. If you are on a project where an Interim Subcontractor Agreement is in place, you will not see that Subcontractor on this tab. The Regional Construction Technician must enter the required Subcontractor approval information before any such Subcontractor(s) appear.

If the user has elected to use the Copy Contractor Information option when creating the *Daily Work Report* date, the user shall be sure to review and update the daily information in each Contractor and Subcontractor's Tab accordingly for the selected *Daily Work Report* date.

While the Resident Engineer can edit which personnel are available to enter into the *Daily Work Report* from the master list, the Supervisor/Foreman and Personnel master lists cannot be modified by the Resident Engineer. The master list shall be loaded at the same time the project is activated by the Regional Construction Technician.

d. "Contractor Equip" Tab



This tab is where the *Daily Work Report* author will record the basic information related to the Prime Contractor and/or Subcontractor(s) equipment working on the project each day.

Contractor Window: The user will click inside the Contractor window and then click on the "New" button on the tool bar. The *Daily Work Report* author will select the appropriate Contractor or Subcontractor from the drop-down menu within the Contractor Window.

Equipment ID - Description window: The user will click inside the Equipment ID - Description window and then click on the "New" ( ) button on the tool bar. The *Daily Work Report* author will select the appropriate Contractor equipment from the drop-down menu within the Equipment ID - Description Window.

Equipment shall be broken down to include:

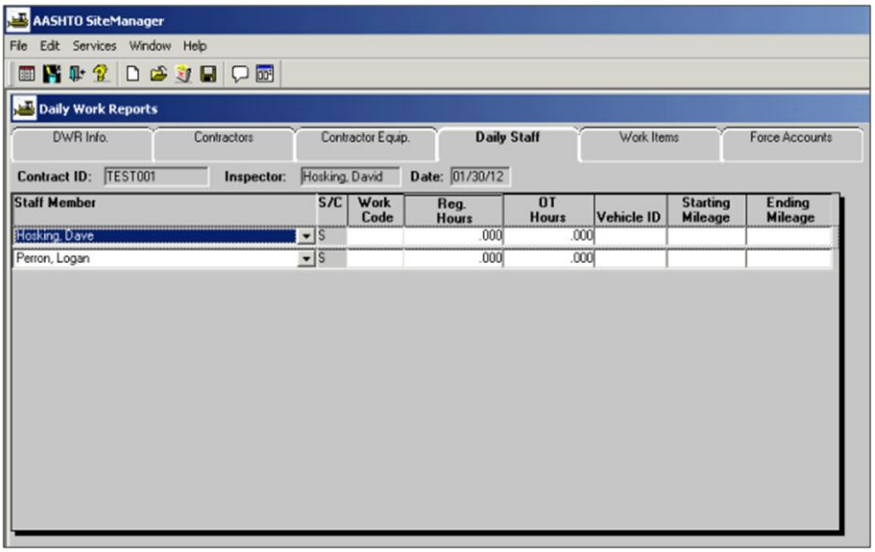
- Each piece of equipment physically present on the project, whether active or idle, along with an approximation of the hours used on any active equipment.
- The make, model, and year of each piece of equipment will be displayed under the Equipment ID – Description window. Often this additional information is required and used when tracking a claim on project or if contract work is being done through the Force Account method.

Note that only the names that are stored in the master database will show up on this list. If an update to the master list is required, the Regional Construction Technician should be notified so that they can add the project-specific information to the master list.

If the user has elected to use the Copy Contractor Information option when creating the *Daily Work Report*, the user shall be sure to review and update the daily information in the Contractors Equip Tab accordingly for the selected date.

While the Resident Engineer can edit which equipment is available to enter into the *Daily Work Report* from the master list, the Equipment ID master list cannot be modified by the Resident Engineer. The master list shall be loaded at the same time the project is activated by the Regional Construction Technician.

e. <u>"Daily Staff" tab</u>



This tab is where the *Daily Work Report* author will record the basic information related to the field staff assigned to the project each day.

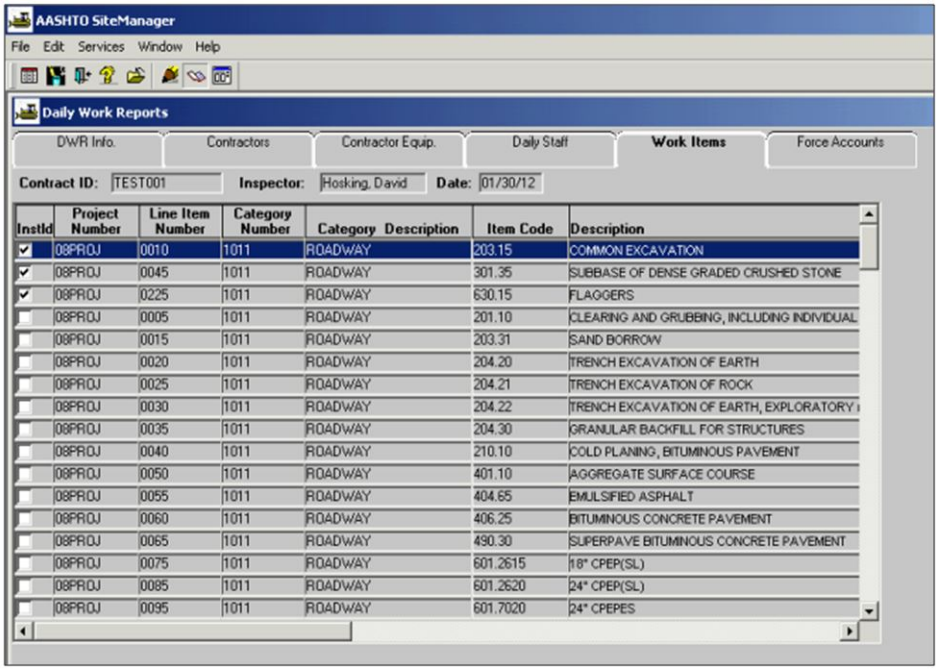
Staff Member Window: The user will click inside the Staff Member window and then click on the "New" button on the tool bar. The *Daily Work Report* author will select the appropriate staff member from the drop-down menu within the Staff Member Window.

The appropriate name of the staff member assigned to the project shall be selected. The S/C field will populate itself. Information for the Work Code, Regular Hours, Overtime Hours, Vehicle ID, Starting Mileage, and Ending Mileage fields does not need to be entered. The staff member list shall be loaded at the same time the project is activated by the Regional Construction Technician. Therefore, it is important to make sure the Regional Construction Technician is aware of the staff requirements of the project.

If the user has elected to use the Copy Contractor Information option when creating the *Daily Work Report*, the user shall be sure to review and update the daily information in the Daily Staff Tab accordingly for the selected date.

The Staff Member master list cannot be modified by the Resident Engineer. The master list shall be loaded at the same time the project is activated by the Regional Construction Technician.

f. **“Work Items” Tab**



InstId	Project Number	Line Item Number	Category Number	Category Description	Item Code	Description
☑	08PROJ	0010	1011	ROADWAY	203.15	COMMON EXCAVATION
☑	08PROJ	0045	1011	ROADWAY	301.35	SUBBASE OF DENSE GRADED CRUSHED STONE
☑	08PROJ	0225	1011	ROADWAY	630.15	FLAGGERS
☐	08PROJ	0005	1011	ROADWAY	201.10	CLEARING AND GRUBBING, INCLUDING INDIVIDUAL
☐	08PROJ	0015	1011	ROADWAY	203.31	SAND BORROW
☐	08PROJ	0020	1011	ROADWAY	204.20	TRENCH EXCAVATION OF EARTH
☐	08PROJ	0025	1011	ROADWAY	204.21	TRENCH EXCAVATION OF ROCK
☐	08PROJ	0030	1011	ROADWAY	204.22	TRENCH EXCAVATION OF EARTH, EXPLORATORY
☐	08PROJ	0035	1011	ROADWAY	204.30	GRANULAR BACKFILL FOR STRUCTURES
☐	08PROJ	0040	1011	ROADWAY	210.10	COLD PLANING, BITUMINOUS PAVEMENT
☐	08PROJ	0050	1011	ROADWAY	401.10	AGGREGATE SURFACE COURSE
☐	08PROJ	0055	1011	ROADWAY	404.65	EMULSIFIED ASPHALT
☐	08PROJ	0060	1011	ROADWAY	406.25	BITUMINOUS CONCRETE PAVEMENT
☐	08PROJ	0065	1011	ROADWAY	490.30	SUPERPAVE BITUMINOUS CONCRETE PAVEMENT
☐	08PROJ	0075	1011	ROADWAY	601.2615	18" CPEP(SL)
☐	08PROJ	0085	1011	ROADWAY	601.2620	24" CPEP(SL)
☐	08PROJ	0095	1011	ROADWAY	601.7020	24" CPEPES

This tab is where the *Daily Work Report* author will record the detailed information related to the work items installed on the project each day.

The user will first select the appropriate work item from the list shown. Click on the appropriate work item and you will notice a new window appears. This is the window in which the detailed information for the work items installed this day will be entered.

The basic information regarding the description of a work item, along with the cumulative quantity installed, will populate itself and display in the upper third of the window.

The user will click on the "New" ( ) button on the tool bar and a series of empty fields will appear on the bottom third of the window.

- In the Placed Qty field, the user will enter the work item quantity installed this day.
- The Plan Page Nbr field is normally not completed, but the user can choose to complete this field if required.
- In the Contractor field, the user will select either the Prime Contractor or the appropriate Subcontractor who installed the work item.
- The Pvmt Course field shall be completed if the user is entering a hot-mix asphalt work item.
- The Loc Seq Nbr will populate itself according to the number of specific installation entries made for the work item on this day.
- In the Location field, the user shall enter the appropriate description of the work installed, or they shall enter if not themselves, as to who has Field Measured or Inspected the Placed Qty. (i.e., Abut#1: FM BY DC or 3 @ 7:00am to 3:30pm; FM BY LFK.)
- In the respective "From" and "To" Station, Offset, and Distance fields, the user will enter detailed information on the location in which the work item was installed this day. For example: (English Units) From (Station) 100 + 50 (Offset) LT=Left, RT=Right, CL=Centerline, (Distance) 37.25. (Metric Units) From 003 + 064 (Offset) LT=Left, RT=Right, CL=Centerline, (Distance) 11.354.
- In the Measured Information field, the user shall select either Calculated or Estimated. The Calculated option should be used if the installed work item quantity was determined by a field measurement or through a series of specific and detailed calculations. The Estimated field should be used if the installed work item quantity is a progress payment. These progress payments will have supporting documentation after the work on the item has been completed and more specific and detailed calculation will be completed at the completion of the Item. The user must choose one of these two options or the Work Item tab will not allow the user to save the data.

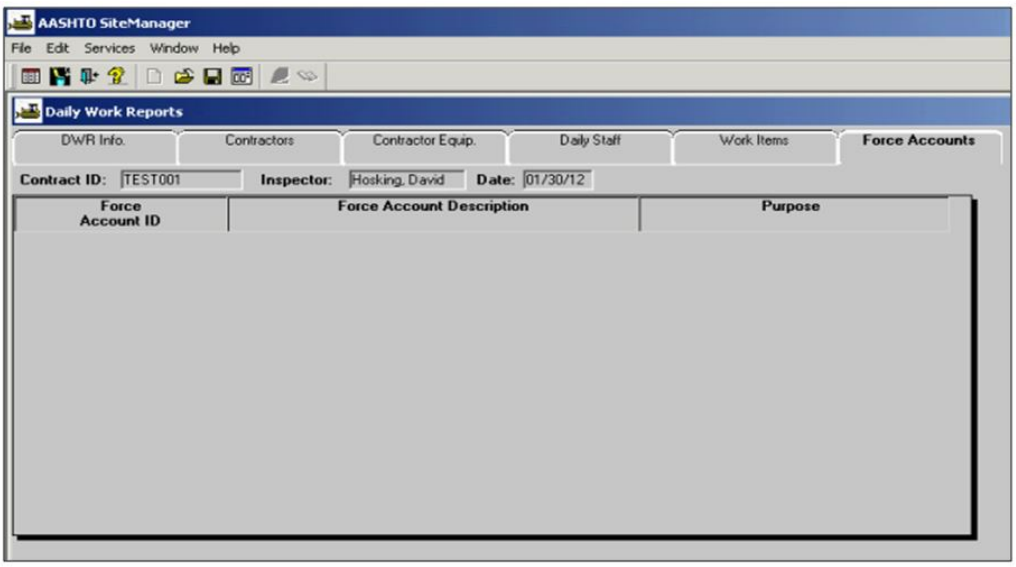
  When the user has additional information that needs to be tied to the Placed Qty., the information shall be placed in the "Remarks" button. The information placed in this area shall be simple calculation, additional locations, time of work or referencing where the supporting documentation is located.

- The bottom portion of the window labeled Material Inspection Detail will show any material testing requirements specific to the work item the user selected Material Component gives a brief description of the work item material, Const Est Matrl Qty shows the estimated design or Change of Design quantity of the material, Satisf Repr Matrl Qty shows how much of the estimated material quantity needs material inspection reporting (i.e., the amount of the work item quantity that requires material testing or related certifications), Report Matrl Qty shows how much of the required reporting quantity has been installed to date, and Matrl Unit is the unit of measure for the work item.

Note of Interest: The field labeled Project Nbr in the upper left corner of the Work Item tab, under the Contract ID field, is actually the *Project Payment Management System* or "*PPMS*" number. This six (6) digit number is often included alongside the Contract Identification Number and Project description. This number is generated by the Finance Department when the project is first conceived and follows the project throughout its lifetime. The first two digits represent the year the project was added to PPMS (or the earlier system). The third digit is always a letter, and somewhat defines the project type: A = Interstate, B = former Primary system, C = former Secondary system, D = Urban, E = Other Highway categories, F = Bikepaths & Enhancements, G = Rail, H = Airports, J = Off-System Town Highway Bridges, and K = Miscellaneous Other Projects. The last three digits are numeric, starting over each year.

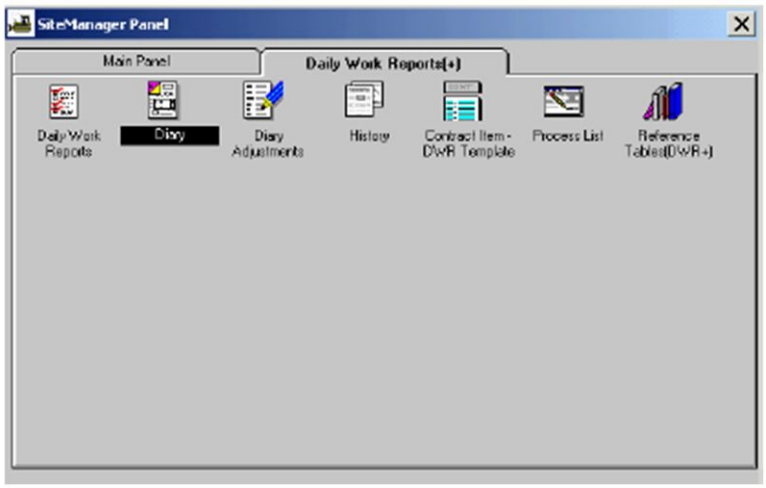
Due to the way records are created in PPMS, the PIN will always be recorded as an even number. Using 08B126 as an example: (08) the project was added to PPMS in 20<u>08</u> (B) the project is on the former Primary system (VT15) and (126) the project was the 63rd even numbered PIN set up in 2008. One Contract Identification Number may contain multiple PPMS numbers if the Contract is a composite of individual projects in any given geographic area of the State.

g. <u>"Force Accounts" Tab</u>



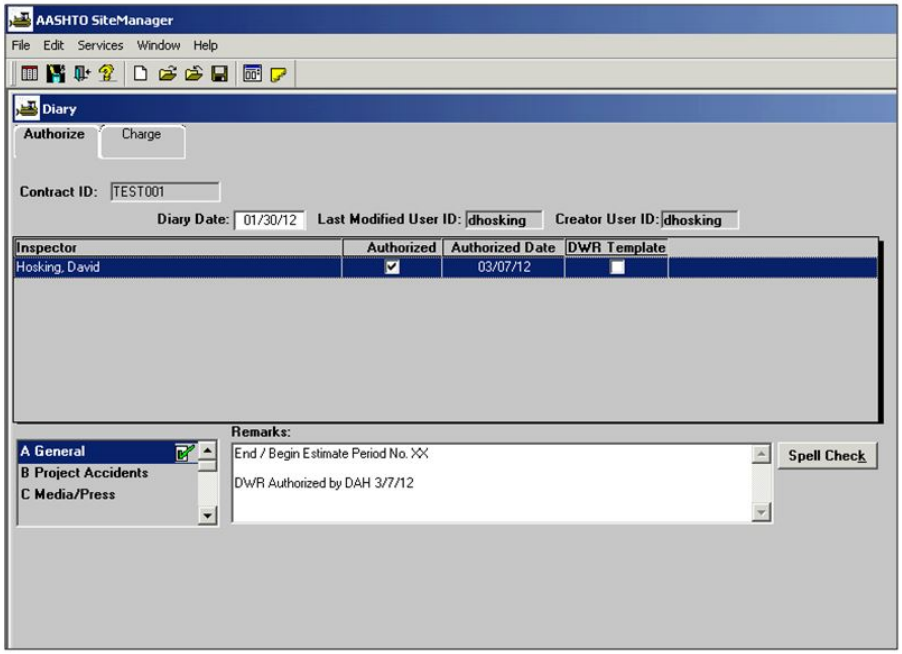
This tab is where the *Daily Work Report* author would record the detailed information related to an active force account on the project each day. It should be noted however that the Agency does not currently use this tab, thus the user can ignore it.

Authorizing a Diary



- Log into *SiteManager* – Login and Password
- Navigate to the *Daily Work Report*s window: Main Panel → *Daily Work Report*s(+) → Diary
- Choose the proper contract and open a Diary

a. "Authorize" Tab



Contract ID field (CES Number): This is the eight digit number that precedes a project description in *SiteManager*, which represents the sequence and call order of the projects that were let on a specific day. [i.e., 98011203, breakdown: 98 (Year) 01 (Month) 12 (Day) 03 (Call Order - the third project let that given day)}. This field is automatically populated.

Diary Date field: This field reflects the date chosen by the author for work to be authorized within the Diary. The user will double click on the field and a calendar will appear from which to choose the Diary date. The date cannot be later than the actual date the Diary is being created. The Diary shall be the same as the *Daily Work Report* date for the purpose of authorizing the installed work.

Last Modified User ID field: This field reflects the last user to authorize or modify the Diary.

Creator User ID field: This field reflects the user who originally created the Diary. This user is usually the same user that authored the accompanying *Daily Work Report*.

Inspector field: This field reflects the full name of the user who had originally authored the Dairy or the user who last modified the Diary. This field will automatically populate itself.

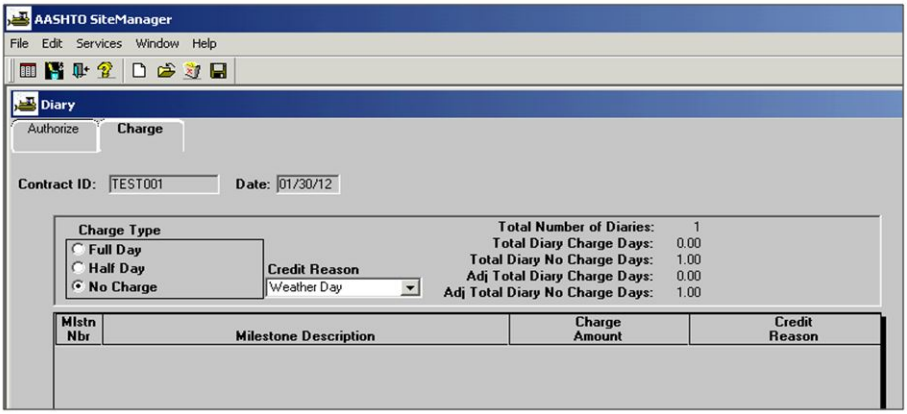
Authorized field: This is the field in which the user will populate with a ☑ when s/he wishes to authorize the work items Installed and project remarks made in the accompanying *Daily Work Report*.

Authorized Date field: This field will automatically populate with the date the Diary was last authorized or modified by the user.

***Daily Work Report* Template field:** This field shall only be populated with a ☑ by the user if a *Daily Work Report* Template was used. This field is normally not populated by the user.

Remarks field: This field is where the user would elect to place additional information related to the Diary. Note that the same choices for remark fields are available to the user much like those of the *Daily Work Report* remark fields. The “Spell Check” button at the right of the Remarks field is available to the user as well. The user shall then click the “Save” button on the tool bar.

b. <u>"Charge" Tab</u>



Contract ID field (CES Number): This is the eight (8) digit number that precedes a project description in *SiteManager*, which represents the sequence and call order of the projects that were let on a specific day. [i.e., 98011203, breakdown: 98 (Year) 01 (Month) 12 (Day) 03 (Call Order - the third project let that given day)}. This field is automatically populated.

Date field: This field populates automatically to show the date the Diary was last authorized by the user.

Charge Type field: This field is where the user will choose what Charge Type will be associated with the authorized Diary Date. The Charge Types are "Full Day", "Half Day", and "No Charge".

- Full Day shall be selected with a ☑ if the Contractor was able to perform productive work on the project for the entire normally scheduled work day or for a majority of a normally scheduled work day.
- Half Day shall not be selected by the user as the Agency only recognizes Full Day or No Charge.
- No Charge shall be selected with a ☑ if the Contractor was unable to perform productive work on project for a majority of a normally scheduled work day due to inclement weather or other causes.

Credit Reason field: This field shall be completed by the user anytime the "No Charge" type is selected. The user shall select either "User Defined" or "Weather Day" from the drop-down menu.

- "Weather Day" means inclement weather was the reason for the credit day.
- "User Defined" means an event other than weather was the reason for the credit day. The Extension of Time Analysis (EOT) done at the completion of a project shall expand upon and clarify any credit reasons determined in the Diary. The user shall then click the "save" button from the tool bar.

The five fields to the right of the Charge Type field show a cumulative total of all Diaries and Charge Days to date. These fields populate automatically.

Changes can be made to any aspect of the *Daily Work Report* up to the point it is authorized with a Diary. Once the Diary is authorized, the *Daily Work Report* is then "Locked" and *SiteManager* will not allow further modifications to it. If a *Daily Work Report* needs to be modified after the Diary has been authorized, the user will need to "Unauthorize" the Diary associated with the accompanying *Daily Work Report*.

Modifications to a *Daily Work Report* may be done by:

- Removing the ☑ from the Authorized field
- Saving the Diary
- Performing the required modifications to the *Daily Work Report*
- Reauthorizing the Diary by placing a ☑ in the Authorized field
- Save the Diary again

Once an estimate has been generated for said *Daily Work Report*, any further modifications to the *Daily Work Report* or Diary cannot be performed. Any such modifications or adjustments would need to be made on a new *Daily Work Report*.

Rpt-ID: RCPCSUM1 | **Vermont** | **Date: 01/23/2009**

Agency of Transportation

Estimate Summary to Contractor

Contract ID: 08031401 | **Estimate Number: 0005** | **Pay Period:**

Vendor ID: 11010762010 | **Vendor Name: J. HUTCHINS,INC.** | **08/28/2008-09/10/2008**

Contract Location:

INTERSECTION OF US 302, VT 110 AND TH 30 IN BARRE TOWN

No Charge: 0 days

Total No Charge: 1 days

Contractor:

J. HUTCHINS,INC.
88 ROGERS LANE
RICHMOND, VT 05477
Phone: 802-434-3500

Date Let:	03/14/2008
Date Awarded:	03/25/2008
Date Contract Executed:	04/09/2008
Date Notice to Proceed:	04/15/2008
Date Work Began:	07/16/2008
Date Adjusted Completion:	10/16/2009

Escrow Agent:

Surety Co: Surety

Counties: BARRE TOWN

Project Number	PCT	Fed State Project Number	Description
04B198	100.00	BARRE TOWN HES 026-1(38)	CONSTRUCTION OF A ROUNDABOUT,MINOR REALIGNMENT,NEW SIDEWALKS

			Total to Date	Prev to Date	This Estimate
Current Contract Amount	$1,254,923.65	**Participating**	$239,845.57	$193,475.44	$46,370.13
Original Contract Amount	$1,254,923.65	**Non-Participating**	$13,667.50	$0.00	$13,667.50
Percent Complete	20.20 %	**Total Earnings**	**$253,513.07**	**$193,475.44**	**$60,037.63**
		Stockpiled Materials	$0.00	$0.00	$0.00
		Gross Earnings	**$253,513.07**	**$193,475.44**	**$60,037.63**
		Retainage	$0.00	$0.00	$0.00
		Escrow Amount	$0.00	$0.00	$0.00
		Securities Encumbered	$0.00	$0.00	$0.00
		Net Earnings	**$253,513.07**	**$193,475.44**	**$60,037.63**
		Liquidated Damages	$0.00	$0.00	$0.00
		Incentives	$0.00	$0.00	$0.00
		Disincentives	$0.00	$0.00	$0.00
		Fuel Adjustment	$0.00	$0.00	$0.00
		Bituminous Adjustment	$0.00	$0.00	$0.00
		Autopay Adjustment	$0.00	$0.00	$0.00
		Amount Due	**$253,513.07**	**$193,475.44**	**$60,037.63**
		Other Adjustments	$-21,483.10	$-9,483.10	$-12,000.00
		Payment	**$232,029.97**	**$183,992.34**	**$48,037.63**

Approved for Payment By: _____ **Date:** _____

Name **Title**

Appendix B-18 - Estimate Summary to Contractor - 2015

Agency of Transportation

Estimate Summary to Contractor

Contract ID: 08031401 **Estimate Number: 0005** **Pay Period:**

Vendor ID: 11010762010 **Vendor Name: J. HUTCHINS,INC.** **08/28/2008-09/10/2008**

Project Name: **BARRE TOWN HES 026-1(38)**

Line Item	Category	Item Code	Description	Unit Price	Qty This Est	Unit	Quantity Paid	Cumulative Amount
0010	1011	203.15	COMMON EXCAVATION	$12.000	596.100	CY	$7,153.20	$7,153.20
0015	1011	203.31	SAND BORROW	$15.000	213.800	CY	$3,207.00	$3,207.00
0020	1011	204.20	TRENCH EXCAVATION OF EARTH	$25.000	49.340	CY	$1,233.50	$1,233.50
0025	1011	204.21	TRENCH EXCAVATION OF ROCK	$120.000	24.680	CY	$2,961.60	$2,961.60
0045	1011	301.35	SUBBASE OF DENSE GRADED CRUSHED STONE	$30.000	152.950	CY	$4,588.50	$4,588.50
0060	1011	406.25	BITUMINOUS CONCRETE PAVEMENT	$95.000	6.510	TON	$618.45	$618.45
0065	1011	490.30	SUPERPAVE BITUMINOUS CONCRETE PAVEMENT	$104.500	132.140	TON	$13,808.63	$13,808.63
0155	1011	608.25	ALL PURPOSE EXCAVATOR RENTAL, TYPE I	$95.000	3.000	HR	$285.00	$285.00
0220	1011	630.10	UNIFORMED TRAFFIC OFFICERS	$52.000	30.500	HR	$1,586.00	$1,586.00
0225	1011	630.15	FLAGGERS	$27.500	176.500	HR	$4,853.75	$4,853.75
0235	1011	641.10	TRAFFIC CONTROL	$25,000.000	0.022	LS	$550.00	$550.00
0240	1011	641.15	PORTABLE CHANGEABLE MESSAGE SIGN	$5,000.000	0.040	EACH	$200.00	$200.00
0245	1011	641.16	PORTABLE ARROW BOARD	$5,000.000	0.060	EACH	$300.00	$300.00
0370	1011	900.608	SPECIAL PROVISION	$200.000	8.500	CY	$1,700.00	$1,700.00
0395	1031	634.10	EMPLOYEE TRAINEESHIP	$35.000	13.500	HR	$472.50	$472.50
0400	1041	651.15	SEED	$5.000	2.400	LB	$12.00	$12.00
0405	1041	651.18	FERTILIZER	$2.500	10.000	LB	$25.00	$25.00
0415	1041	651.35	TOPSOIL	$35.000	7.400	CY	$259.00	$259.00
0510	1051	651.25	HAY MULCH	$650.000	0.040	TON	$26.00	$26.00
0520	1051	652.20	MONITORING EPSC PLAN	$50.000	1.000	HR	$50.00	$50.00
0530	1051	653.20	TEMPORARY EROSION MATTING	$3.000	80.000	SY	$240.00	$240.00
0570	1081	629.23	SEAMLESS COPPER WATER TUBE	$40.000	42.500	LF	$1,700.00	$1,700.00
0595	1081	629.39	CORPORATION STOP	$300.000	1.000	EACH	$300.00	$300.00
0670	1083	204.20	TRENCH EXCAVATION OF EARTH	$25.000	66.700	CY	$1,667.50	$1,667.50
0695	1083	900.640	SPECIAL PROVISION	$150.000	80.000	LF	$12,000.00	$12,000.00
0715	1999	631.25	FIELD OFFICE TELEPHONE (N.A.B.I.)	$3,000.000	0.080	LU	$240.00	$240.00
			Project Current Amount				$60,037.63	$60,037.63
			Contract Current Amount				$60,037.63	$60,037.63

Agency of Transportation

Estimate Summary to Contractor

Contract ID: 08031401 **Estimate Number: 0005** **Pay Period:**

Vendor ID: 11010762010 **Vendor Name: J. HUTCHINS,INC.** **08/28/2008-09/10/2008**

Other Adjustments (Total to Date detail):

Line Item	Category	Item Code	Description	Unit Price	Quantity	Unit	Quantity Paid
0145	1011	605.20	6 INCH UNDERDRAIN CARRIER PIPE,	$10.000	-22.000	LF	$-220.00
0500	1051	649.51	GEOTEXTILE FOR SILT FENCE,	$3.000	-487.700	SY	$-1,463.10
0615	1081	678.30	ELECTRICAL CONDUIT SLEEVE,(8")(PVC)	$50.000	-126.000	LF	$-6,300.00
0620	1081	679.21	LIGHT POLE BASE,	$750.000	-2.000	EACH	$-1,500.00
0695	1083	900.640	SPECIAL PROVISION,(POLYETHYLENE PIPE SLEEVE)(1 X 18")	$150.000	-80.000	LF	$-12,000.00
					Total		**$-21,483.10**

Agency of Transportation

Estimate Summary to Contractor

Contract ID: 08031401 Estimate Number: 0005 Pay Period:

Vendor ID: 11010762010 Vendor Name: J. HUTCHINS,INC. 08/28/2008-09/10/2008

Other Adjustments Detail:

Line Item	Category	Item Code	Description	Unit Price	Quantity	Unit	Quantity Paid	Estimate
0400	1041	651.15	SEED ,	$5.000	-12.000	LB	$-60.00	0002
0405	1041	651.18	FERTILIZER ,	$2.500	-58.000	LB	$-145.00	0002
0500	1051	649.51	GEOTEXTILE FOR SILT FENCE,	$3.000	-384.700	SY	$-1,154.10	0002
0615	1081	678.30	ELECTRICAL CONDUIT SLEEVE,(8")(PVC)	$50.000	-126.000	LF	$-6,300.00	0002
0400	1041	651.15	SEED ,	$5.000	12.000	LB	$60.00	0003
0405	1041	651.18	FERTILIZER ,	$2.500	58.000	LB	$145.00	0003
0500	1051	649.51	GEOTEXTILE FOR SILT FENCE,	$3.000	-103.000	SY	$-309.00	0003
0600	1081	678.23	WIRED CONDUIT,(2")(PVC)	$12.500	-101.000	LF	$-1,262.50	0003
0620	1081	679.21	LIGHT POLE BASE,	$750.000	-2.000	EACH	$-1,500.00	0003
0145	1011	605.20	6 INCH UNDERDRAIN CARRIER PIPE,	$10.000	-22.000	LF	$-220.00	0004
0600	1081	678.23	WIRED CONDUIT,(2")(PVC)	$12.500	101.000	LF	$1,262.50	0004
0695	1083	900.640	SPECIAL PROVISION,(POLYETHYLENE PIPE SLEEVE)(1 X 18")	$150.000	-80.000	LF	$-12,000.00	0005
0615	1081	678.30	ELECTRICAL CONDUIT SLEEVE,(8")(PVC)	$50.000	-123.000	LF	$-6,150.00	0006
0145	1011	605.20	6 INCH UNDERDRAIN CARRIER PIPE,	$10.000	22.000	LF	$220.00	0007
0325	1011	675.20	TRAFFIC SIGNS, TYPE A,	$13.200	-26.000	SF	$-343.20	0007
0340	1011	675.301	FLANGED CHANNEL SIGN POST,	$6.050	-99.000	LF	$-598.95	0007
0615	1081	678.30	ELECTRICAL CONDUIT SLEEVE,(8")(PVC)	$50.000	-81.000	LF	$-4,050.00	0007
0135	1011	604.415	REHAB. DROP INLETS, CATCH BASINS, OR MANHOLES, CLASS II,	$2,000.000	-0.750	EACH	$-1,500.00	0008
0500	1051	649.51	GEOTEXTILE FOR SILT FENCE,	$3.000	487.700	SY	$1,463.10	0008
0615	1081	678.30	ELECTRICAL CONDUIT SLEEVE,(8")(PVC)	$50.000	330.000	LF	$16,500.00	0008
0620	1081	679.21	LIGHT POLE BASE,	$750.000	2.000	EACH	$1,500.00	0008
0635	1081	679.47	BRACKET ARM, (10' TRUSS ARM)	$385.000	-1.000	EACH	$-385.00	0008
0650	1081	679.50	LUMINAIRE ,	$550.000	-1.000	EACH	$-550.00	0008
0695	1083	900.640	SPECIAL PROVISION,(POLYETHYLENE PIPE SLEEVE)(1 X 18")	$150.000	80.000	LF	$12,000.00	0008
0150	1011	605.95	UNDERDRAIN FLUSHING BASIN,	$100.000	-1.000	EACH	$-100.00	0009
0320	1011	649.31	GEOTEXTILE UNDER STONE FILL,	$3.000	-16.700	SY	$-50.10	0009
0325	1011	675.20	TRAFFIC SIGNS, TYPE A,	$13.200	26.000	SF	$343.20	0009
0340	1011	675.301	FLANGED CHANNEL SIGN POST,	$6.050	99.000	LF	$598.95	0009
0635	1081	679.47	BRACKET ARM, (10' TRUSS ARM)	$385.000	1.000	EACH	$385.00	0009

0650	1081	679.50	LUMINAIRE ,	$550.000	1.000	EACH	$550.00	0009
0135	1011	604.415	REHAB. DROP INLETS, CATCH BASINS, OR MANHOLES, CLASS II,	$2,000.000	0.750	EACH	$1,500.00	0010
0150	1011	605.95	UNDERDRAIN FLUSHING BASIN,	$100.000	1.000	EACH	$100.00	0010

Rpt-ID: RCPESPRJ	**Vermont**	**Date: 05/08/2008**
User: bcodling	**Agency of Transportation**	**Page 1 of 3**
	Estimate Summary By Project	
Contract ID: 08020103	**Estimate Number:** 0001	**Pay Period:** 02/28/2008 **to** 05/07/2008

Contract Location:
IN CABOT ON TH 41 0.105 KM EAST OF THE JUNCTION OF VT 215 GO EAST ON TH 41 FOR 50 METERS

Region: NE **Residency:**

Time Allowed:	268	**Days**
Time Charged:	1	**Days**
Elapsed Calender Days:	70	**Days**
Percent Time:	26.12	

Contractor:
TREMBLAY CONSTRUCTION, LLC
P.O. BOX 63
50 FIREHOUSE LANE

WASHINGTON VT 05675
Phone: 802-883-2353

Escrow Agent:
Surety Co: Surety

Date Let:	02/01/2008
Date Awarded:	02/07/2008
Date Contract Executed:	02/19/2008
Date Notice to Proceed:	02/28/2008
Date Work Began:	00/00/0000
Date Time Stopped:	00/00/0000
Date Accepted:	00/00/0000
Adjusted Completion Date:	11/21/2008

Current Contract Amount	$535,257.00
Original Contract Amount	$535,257.00
Funds Available	$504,257.00
Percent Complete	5.79%

Counties:
CABOT

Construction Engineer

Estimate Summary By Project

Contract ID: 08020103 | Estimate Number: 0001 | Pay Period: 02/28/2008 to 05/07/2008

Project Number: 96J270 REPLACEMENT OF BRIDGE NO. 37 ALONG WITH I APPROACH WORK

Federal State Project Number: CABOT BRO 1446(27)

	Total to Date	Prev to Date	This Estimate
Participating	$31,000.00	$0.00	$31,000.00
Non-Participating	$0.00	$0.00	$0.00
Total Earnings	**$31,000.00**	**$0.00**	**$31,000.00**
Stockpiled Materials	$0.00	$0.00	$0.00
Gross Earnings	**$31,000.00**	**$0.00**	**$31,000.00**
Payment Adjustment 1	$0.00	$0.00	$0.00
Payment Adjustment 2	$0.00	$0.00	$0.00
Payment Adjustment 3	$0.00	$0.00	$0.00
Other Adjustments	$0.00	$0.00	$0.00
Retainage	$0.00	$0.00	$0.00
Escrow Amount	$0.00	$0.00	$0.00
Securities Encumbered	$0.00	$0.00	$0.00
Liq Dam/Incent/Disincent	$0.00	$0.00	$0.00
Total:	**$31,000.00**	**$0.00**	

Total Payable: **$31,000.00**

Estimate Summary By Project

Contract ID: 08020103 | Estimate Number: 0001 | Pay Period: 02/28/2008 to 05/07/2008

Project Number 96J270

LIN	Item Code	Item Description 1 Item Description 2 Supplemental Description 1 Supplemental Description 2	Units	Auth Qty Unit Price	Prev Qty Qty This Period Qty To Date	Amount This Period	Cumulative Amount
Category Number:	1011	ROADWAY					
0070	635.11	MOBILIZATION/DEMOBILIZATION	LS	1.000	.000		
				37000.000	.500		
					.500	$18,500.00	$18,500.00
0075	641.10	TRAFFIC CONTROL	LS	1.000	.000		
				11000.000	.500		
					.500	$5,500.00	$5,500.00
					Category Amount:	$24,000.00	$24,000.00
Category Number:	1051	EROSION CONTROL					
0150	652.10	EPSC PLAN	LS	1.000	.000		
				6000.000	.500		
					.500	$3,000.00	$3,000.00
					Category Amount:	$3,000.00	$3,000.00
Category Number:	1999	FULL C.E. ITEMS					
0300	631.10	FIELD OFFICE, ENGINEERS	LS	1.000	.000		
				16000.000	.250		
					.250	$4,000.00	$4,000.00
					Category Amount:	$4,000.00	$4,000.00
					Project Total Amount:	$31,000.00	$31,000.00

Contract Item Summary Report

Contract ***07042701*** ***HARTFORD RS 0113(40)***

Project ***86C027*** ***HARTFORD RS 0113(40)***

Category Number: **1011** **ROADWAY**

Item	Item Code	Description	Unit	Unit Price	Contract Qty	Paid to Date
0005	201.10	CLEARING AND GRUBBING (INCL. INDV. TREES & STUMPS)	LS	$40,000.00	1	1
0010	203.15	COMMON EXCAVATION	CY	$8.00	40194	38996.44
0015	203.16	SOLID ROCK EXCAVATION	CY	$15.00	1800	1399.35
0020	203.28	EXCAVATION OF SURFACES AND PAVEMENTS	CY	$12.00	130	69.9
0025	203.31	SAND BORROW	CY	$8.00	4500	3614.91
0030	203.40	FINE GRADING-SUBGRADE	SY	$1.00	31000	30053.42
0035	204.20	TRENCH EXCAVATION OF EARTH	CY	$30.00	10100	7914.75
0040	204.21	TRENCH EXCAVATION OF ROCK	CY	$175.00	130	196.29
0045	204.25	STRUCTURE EXCAVATION	CY	$25.00	155	153.9
0050	204.30	GRANULAR BACKFILL FOR STRUCTURES	CY	$35.00	1235	992.72
0055	210.10	COLD PLANING-BIT.PAVEMENT	SY	$12.00	975	314.88
0060	301.35	SUBBASE OF DENSE GRADED CRUSHED STONE	CY	$20.00	25300	21409.94
0065	404.65	EMULSIFIED ASPHALT	CWT	$200.00	70	55.376
0070	406.50	PRICE ADJUSTMENT ASPHALT CEMENT (N.A.B.I.)	LU	$1.00	1	100431.21
0075	490.30	SUPERPAVE BITUMINOUS CONCRETE PAVEMENT (PG 58-	TON	$95.00	11470	11719.61
0080	501.25	CONCRETE, CLASS B	CY	$1,200.00	15	54.135
0085	501.31	CONCRETE CLASS D (MOD. - FLOWABLE FILL)	CY	$125.00	200	105

Estimate Item Detail

Estimate Begin Date: 8/21/2008
Estimate End Date: 9/3/2008

Contract ID: **07042701** **HARTFORD RS 0113(40)**

Project ***86C027*** ***HARTFORD RS 0113(40)***

Category ***1011*** ***ROADWAY*** *Contractor:* ***PIKE INDUSTRIES, INC.***

Item Code: **0010 203.15** **COMMON EXCAVATION**

DWR Date	Reported Qty	Location Installed	Station		to	Station		
20080821	41.5	reconstruct drive @ 3+00 Worcester Ave.	+	0			+ 0	
20080903	2338	21+45-24+00 rt & 21+45-24+00 rt estimate	+	0			+ 0	
Total Installed for	2,379.500	CY						

Item Code: **0025 203.31** **SAND BORROW**

DWR Date	Reported Qty	Location Installed	Station		to	Station		
20080903	583.2	box cut	21 +	45		rt 24	+ 0	rt
Total Installed for	583.200	CY						

Item Code: **0030 203.40** **FINE GRADING-SUBGRADE**

DWR Date	Reported Qty	Location Installed	Station		to	Station		
20080903	777.6	box cut	21 +	45		rt 24	+ 0	rt
Total Installed for	777.600	SY						

Item Code: **0035 204.20** **TRENCH EXCAVATION OF EARTH**

DWR Date	Reported Qty	Location Installed	Station		to	Station		
20080829	1.56	UDS #6	25 +	22		rt 25	+ 26	rt

State of Vermont
Agency Of Transportation
Construction Section

Independent Cost Analysis for New Items added by Change Order

Guidance and Procedures

General

This document provides the Resident Engineer and Regional Staff with the specific information and guidance to be followed when conducting independent cost analyses for new items added by a *Change in Design/Supplemental Agreement*, also referred to as a *Change Order* (Appendix A-1).

This document has four sections, as follows:

1. Introduction
2. Title 23 CFR § 635 CONSTRUCTION AND MAINTENANCE
3. FHWA Guidance
4. Summary

1. Introduction

In order to implement the proper procedures for ensuring that an independent cost analysis is executed for new items added to the contract, through the execution of *Change in Design/Supplemental Agreement*, States are required to follow the procedures outlined in *U.S. Code: Title 23 – Highways, 23 CFR § 635.120 - Changes and extra work.*

> *States are required to perform and document a cost analysis for each negotiated change order or extra work order. This requirement is contained in* 23 CFR § 635.120(e). *The purpose of this estimate is to provide the Resident Engineer with a basis for negotiating with the Contractor to ensure that the State is paying a fair price for the required work.* Change Orders *should not be based solely on the Contractor's price quote.*

The following section provides direction to its Resident Engineer and Regional Staff on the requirement for an independent State's estimate and should provide guidance on how to prepare such an analysis.

The timing of an independent cost analysis is not addressed in the findings or the regulations. However, the cost analysis for an item should be performed before the receipt of the Contractor's price for that item. The estimate produced by the cost analysis may then be used in negotiating with the Contractor or in a decision to use the force account method of payment.

2. Title 23 CFR § 635 - CONSTRUCTION AND MAINTENANCE

The following items are quoted directly from *Title* ***23 CFR § 635.120- Changes and extra work:***

(a) Following authorization to proceed with a project, all major changes in the plans and contract provisions and all major extra work shall have formal approval by the Division Administrator in advance of their effective dates. However, when emergency or unusual conditions justify, the Division Administrator may give tentative advance approval orally to such changes or extra work and ratify such approval with formal approval as soon thereafter as practicable.

(b) For non-major changes and non-major extra work, formal approval is necessary but such approval may be given retroactively at the discretion of the Division Administrator. The STD [State Transportation Department] should establish and document with the Division Administrator's concurrence specific parameters as to what constitutes a non-major change and non-major extra work.

(c) Changes in contract time, as related to contract changes or extra work, should be submitted at the same time as the respective work change for approval by the Division Administrator.

(d) In establishing the method of payment for contract changes or extra work orders, force account procedures shall only be used when strictly necessary, such as when agreement cannot be reached with the contractor on the price of a new work item, or when the extent of work is unknown or is of such character that a price cannot be determined to a reasonable degree of accuracy. The reason or reasons for using force account procedures shall be documented.

(e) The STD shall perform and adequately document a cost analysis of each negotiated contract change or negotiated extra work order. The method and degree of the cost analysis shall be subject to the approval of the Division Administrator.

(f) Proposed changes and extra work involved in nonparticipating operations that may affect the design or participating construction features of a project, shall be subject to review and concurrence by the Division Administrator.

3. FHWA Guidance

The following information from the Federal Highway Administration provides background and guidance on the subject of independent cost analysis and *Change Orders* in general. Information regarding the Contract Administration Core Curriculum Manual 2014 may be found at the following URL:

http://www.fhwa.dot.gov/programadmin/contracts/coretoc.cfm

Contract Changes and Time Extensions

Background

Establishing a strict set of rules to govern policy on change orders is not practicable since applying the rules would be subject to the specific circumstances that created the need for the change order.

It is unrealistic to expect that a construction project could be built without deviating from the project plans. Although project designers should be diligent and exercise due care in developing the plans, they are not omniscient. There are many anomalies, including unforeseen site conditions, utility conflicts, changes in the geology, etc., that may arise during construction and virtually every project should expect changes. Only the construction engineer is in a position to judge the adequacy of the project's design and respond to needed changes.

Frequently, *Change Orders* are used to make the design a better fit for the actual field conditions. Also, a change order may result in a better product at no substantial increase in cost or time, or an equivalent product with savings in cost, time, or both. Generally, *Change Orders* are classified by purpose, as follows:

- Plan changes
- Specification changes
- Cost changes
- Time changes

Guidance

Major extra work or major changes in the contract plans and provisions need to be formally approved in advance by the FHWA. This approval is needed in advance to ensure that other documents are modified (Environmental document, TIP/STIP, etc.) or to determine that the work is eligible, and/or to determine if the work should be advertised as a separate contract. However, when emergency or unusual conditions justify, FHWA may give advance verbal approval and ratify such approval with formal approval, as soon as is practicable.

Non-major changes and non-major extra work also require formal approval; however such approval can be given verbally. The *Daily Work Report* (DWR) should be used to document verbal approvals and noted on the *Change Order*. Non-major changes and non-major extra work on non-oversight projects do not require FHWA's approval pursuant to the *Stewardship & Oversight Agreement.*

A major change or major extra work shall hereby mean a change which does the following:

1. Extends the project limits beyond those stated in the environmental document

2. Significantly affects the cost of the project by increasing or decreasing the project cost by more than 25% or $250,000, whichever is less. This does not apply to commodity price adjustments such as APA and FPA

3. Adds work to the project that is not within the original character or scope of work that would require a change to the environmental document (for those projects with an environmental document)

4. Adds work to the project that is not within the original character or scope of work that would require a change to the environmental permit

Coordination between VTrans and FHWA is essential in the review of *Change Orders*. There are four basic components that will be considered during review of *Change Orders* as follows:

1. Federal-aid eligibility
2. Impact on the original "Scope of the work"
3. Basis of payment
4. Time adjustments

<u>Federal-aid Eligibility</u>

Typically, if the proposed change is eligible for Federal-aid reimbursement, then full participation logically follows. There may be situations where only parts of the *Change Order* are eligible. FHWA is prohibited from participating in costs related to routine or recurring maintenance such as snow removal, graffiti removal, litter pickup, mowing, roadside vegetation control, etc., however, FHWA may participate in preventive maintenance work that is shown to be cost effective such as pavement joint repair, crack sealing, drainage clean-out work, etc.

Participation in design or construction engineering errors in general is determined on case-by-case basis, considering each on its own merits. Participation in errors that may reasonably be expected to occasionally occur (despite the exercise of normal diligence) may be justified, as long as there was no carelessness, negligence, incompetence, or under-staffing as the contributing factor.

Participation in consultant design errors is generally limited to the additional construction costs resulting from such errors and the consultant should pay for the cost of the new design as long as the errors are not a result of gross negligence or carelessness. Refer to the *Consultant Design Errors and Omission* document for additional guidance.

The *Participation in Engineering Errors* memo may be found at the following URL:

http://www.fhwa.dot.gov/programadmin/contracts/071263.cfm

The *Participation in the Cost of Corrective Work Resulting from Construction Engineering Errors* memo may be found at the following URL:

http://www.fhwa.dot.gov/programadmin/contracts/090878.cfm

In order for an accurate assessment of Federal-aid eligibility, proper documentation of basis of payment and time extensions should be made available to FHWA. This documentation should remain in the project files for the entirety of the project.

Impact on the Original "Scope of the Work"

Typically, if the proposed change falls within the previously authorized scope of work, then FHWA participation follows.

There may be circumstances in which participation in the full scope of the *Change Order* work is precluded. For example, a *Change Order* on a pavement rehabilitation project may involve the installation of additional edge drains at and beyond the project limits. A change of the project limits, modification of the project agreement, or environmental document re-evaluation (if Federally funded) would be needed in order for the cost of edge drains outside of the project limits to be eligible Otherwise, participation would be limited to the cost of edge drains up to the original project limits.

There may be other circumstances where major contract modifications are proposed which are beyond the original scope of work. In those cases it must determine whether the additional work is a modification of the original scope or a significant change that would benefit from competitive bidding. The individual circumstances associated with the magnitude and quality of the change as well as the cumulative impact upon the whole project should be reviewed. Among the considerations are:

- Have the contract work elements changed?
- How does the additional work impact quantities and cost?
- Does the proposed change impact the complexity of the work?
- What is the cumulative impact on the project?
- Would the public benefit from competitive bidding rather than a negotiated change?

Basis of Payment

A cost analysis must be performed and suitably documented for each negotiated work *Change Order*. The method and degree of analysis is dependent on the type and cost of the work to be done. The following guidance is to be used for non-major changes and non-major extra work *Change Orders*:

- For known defined types of work, average unit bid prices can be used to analyze and document the reasonableness of the cost of the work. A defined type of work is considered to be one that has a pay item with substantial bid history. Payment may be by lump sum or unit of measurement.

- For unknown types of work, the estimated usage of labor, equipment, and materials shall be used to analyze and document the reasonableness of the cost of the work. This work estimate can be an effort as submitted by the contractor or an estimate developed by VTrans. Payment may be by lump sum or unit of measurement.

- Force account procedures should only be used as a last resort when agreement cannot be reached on the price of a new work item, or when the extent of the work is unknown or of such character that a price cannot be determined to a reasonable degree of accuracy.

For major changes and major extra work *Change Orders*, an estimate from the Chief Engineer, Highway Division should be used to analyze and document the reasonableness of the cost of the work. Payment may be by lump sum or unit of measurement.

Time Extensions

The *Change Order* should also include the time required to accomplish the work. If work covered by a *Change Order* affects a controlling operation, a change in the contract time may be warranted. If the controlling operation is unaffected, a change in the contract time is not warranted. In order to establish the time required to perform the work, an estimate of the time should be developed as the other components, such as labor, equipment, and materials, are estimated.

Occasionally, there are events that are beyond the power of the contractor that affect the controlling operation. Such events include the following:

- Labor strikes (including job pickets)
- Public protests (to the project)
- General riot
- Declaration of war
- “Acts of God”
- Traffic accidents, including hazardous spills

Events that are normally considered to be under the control of the Contractor and, therefore do not warrant a time extension, include:

- Shutdowns for maintenance
- Shutdowns for construction accidents
- Breakdowns
- Suspensions or Stop Work orders for violation of safety or pollution regulations
- Material delivery delays

The Contractor is responsible for the timely order and delivery of materials for the project. A delay in delivery of materials does not in itself generally support an extension of contract time. However, if an unusual market condition occurs, such as an industry-wide strike, natural disaster, or area-wide shortage, a time extension may be in order.

Delays due to inclement weather should be expected and should generally not be the basis for a change in contract time except in extreme cases.

Delays due to utility and/or railroad operations generally do not justify a time extension. Whenever the railroad or utility is permitted to adjust its facilities coincidentally with contract operations, such activities must be clearly addressed in the contract provisions. It should be understood that any interference by the utility or railroad to the contractor's operations generally will not constitute an allowable delay.

Budgetary problems may lead to an inability to pay the Contractor or provide adequate inspection staff. Federal participation has been refused in such costs based on the assurances required in *23 U.S. Code § 302 – State transportation department* that require States to be adequately staffed to carry out Federal-aid highway programs.

23 U.S. Code § 302 states the following:

> *(a) Any State desiring to avail itself of the provisions of this title shall have a State transportation department which shall have adequate powers, and be suitably equipped and organized to discharge to the satisfaction of the Secretary the duties required by this title. In meeting the provisions of this subsection, a State may engage, to the extent necessary or desirable, the services of private engineering firms.*
>
> *(b) Effect of Compliance - Compliance with subsection (a) shall have no effect on the eligibility of costs.*

4. Summary

Each negotiated change to a contract shall have appropriate support documentation consistent with these guidelines. As the guidelines affirm, the required analysis is commensurate with the magnitude of the change. There are several resources available to the Resident Engineer to assist with the analysis. The Quality Assurance Unit has staff dedicated to the practice of estimating, with historic bid information available electronically, and the Project Manager and design team stand ready to support VTrans. The Regional Technician and Regional Construction Engineer also have expertise to offer.

There is no standard formula that will apply to every situation. Each situation is unique and requires a careful assessment of the circumstances to determine an equitable adjustment for extra work. The Resident Engineer is uniquely positioned to have an overall sense of the work and the unique characteristics of the project that will enable a fair analysis to be performed.

The Resident Engineer has the lead role in conducting independent cost analyses, but the available resources should be used to augment the effort. As always, the chain of command should be prepared to assist and consult as necessary.

State of Vermont
Agency Of Transportation
Construction Section

Drafting and Executing Change Orders

Guidance and Procedures

General

This document provides the Resident Engineer and Regional Staff with the specific steps and guidance that are to be followed when drafting and executing a Change Order.

Contents

Each step listed below includes the position typically involved with that particular task. The Resident Engineer is listed as (RE), the Regional Technician is listed by (RT). Tasks that require entries to be made in *SiteManager* are also listed.

1) Introduction
2) Verbal Approvals (RE)
3) Supplemental Item Numbers (RE)
4) Drafting the *Change Order* (RE)
5) Price analysis for new items added to the contract (RE/RT)
6) Reason Codes (RE/RT)
7) Review of the draft *Change Order* (RT)
8) Entering the draft *Change Order* into *SiteManager* (RT)
    a. To enter the *Change Order* into *SiteManager*
    b. To run the *Change Order* process and save and/or view the *Change Order* in PDF format
    c. To view the *Change Order Report* in *SiteManager*
    d. To review specific information entered into *SiteManager* that is on the *Change Order Report*
9) Review of the draft *Change Order* (Change Order Review Team)
10) Addressing comments on the Draft *Change Order* (RT/RE)
11) Saving and distributing the final *Change Order* for approval (RT)
    a. To set Change Order Approval Levels in SiteManager

12) Approval of the Change Order (VTrans and FHWA)

    a. Approval of the *Change Order*

13) Approval of the *Change Order* – Contractor (Regional Administrative Services Technician)

14) Saving and distributing the fully executed *Change Order* (Programs Services Clerk)

1. Introduction

The following guidance provides a step-by-step guide and procedure for both the Resident Engineer and Regional Staff to follow in developing and executing a Design Change/Supplementary Agreement (*Change Order*).

2. Verbal Approvals

For all proposed *Change Orders*, the Resident Engineer will discuss with, and obtain verbal approval from, the Regional Construction Engineer and Project Manager before proceeding with the *Change Order* or any of the additional work. This includes making both the Regional Construction Engineer and Project Manager aware of the anticipated cost of the additional work, as well as any additional time that may be granted by the *Change Order*.

When an FHWA signature is found in the title block of the project plan set, FHWA has oversight. If the change is considered a major change to the project, FHWA approval will also be necessary. A major *Change Order* is one that meets any of the following criteria:

1) Extends the project limits beyond those stated in the environmental document.

2) Significantly affects the cost of the project by increasing or decreasing the project cost by more than 25% or $250,000, whichever is less. This does not apply to commodity price adjustments such as APA and FPA.

3) Adds work to the project that is not within the original character or scope of work that would require a change to the environmental document (for those projects with an environmental document).

4) Adds work to the project that is not within the original character or scope of work that would require a change to the environmental permit.

   The Resident Engineer must obtain verbal approval from the FHWA Engineer, in addition to the Regional Construction Engineer and the Project Manager, before proceeding with the Change Order or any of the additional work.

3. Supplemental Item Numbers

When a *Change Order* adds an item that does not follow the standard specification for that item, the following list of items and units will be used to create the modified item. A Supplemental Description shall be included that adequately identifies the item and modification. This will provide a method in which to query the *SiteManager's* database at the end of the year, formulate reports that can be used by design sections to identify areas for improvement, and identify trends in item use and modifications:

Metric Supplemental Agreement Item List

Item #	Item Description	Unit	Unit Name
900.500	SUPPLEMENTAL AGREEMENT	HA	Hectares
900.508	SUPPLEMENTAL AGREEMENT	CM	Cubic Meters
900.510	SUPPLEMENTAL AGREEMENT	DAY	Days
900.515	SUPPLEMENTAL AGREEMENT	DL	Dollars
900.520	SUPPLEMENTAL AGREEMENT	EACH	Each
900.525	SUPPLEMENTAL AGREEMENT	L	Liters
900.530	SUPPLEMENTAL AGREEMENT	HR	Hours
900.535	SUPPLEMENTAL AGREEMENT	KG	Kilograms
900.540	SUPPLEMENTAL AGREEMENT	M	Meters
900.545	SUPPLEMENTAL AGREEMENT	LS	Lump Sum
900.550	SUPPLEMENTAL AGREEMENT	LU	Lump Unit
900.560	SUPPLEMENTAL AGREEMENT	KM	Kilometers
900.575	SUPPLEMENTAL AGREEMENT	SM	Square Meters
900.580	SUPPLEMENTAL AGREEMENT	T	Metric Tons

English Supplemental Agreement Item List

Item #	Item Description	Unit	Unit Name
900.500	SUPPLEMENTAL AGREEMENT	ACRE	Acres
900.505	SUPPLEMENTAL AGREEMENT	CF	Cubic Feet
900.508	SUPPLEMENTAL AGREEMENT	CY	Cubic Yards
900.510	SUPPLEMENTAL AGREEMENT	DAY	Days
900.515	SUPPLEMENTAL AGREEMENT	DL	Dollars
900.520	SUPPLEMENTAL AGREEMENT	EACH	Each
900.525	SUPPLEMENTAL AGREEMENT	GAL	Gallons
900.530	SUPPLEMENTAL AGREEMENT	HR	Hour
900.533	SUPPLEMENTAL AGREEMENT	IN	Inch
900.535	SUPPLEMENTAL AGREEMENT	LB	Pounds
900.540	SUPPLEMENTAL AGREEMENT	LF	Linear Feet
900.545	SUPPLEMENTAL AGREEMENT	LS	Lump Sum
900.550	SUPPLEMENTAL AGREEMENT	LU	Lump Unit
900.553	SUPPLEMENTAL AGREEMENT	MFBM	1000 Feet Board Measure
900.555	SUPPLEMENTAL AGREEMENT	MGAL	1000 Gallons
900.560	SUPPLEMENTAL AGREEMENT	MILE	Miles
900.563	SUPPLEMENTAL AGREEMENT	MLF	1000 Linear Feet
900.565	SUPPLEMENTAL AGREEMENT	MSY	1000 Square Yards
900.570	SUPPLEMENTAL AGREEMENT	SF	Square Feet
900.575	SUPPLEMENTAL AGREEMENT	SY	Square Yards
900.580	SUPPLEMENTAL AGREEMENT	TON	Tons
900.583	SUPPLEMENTAL AGREEMENT	CWT	Hundred Weight

Refer to the Standard Specifications for Construction for a description of supplemental items. For example, to add a modified version of Item 501.25 Concrete Class "B," use Item 900.508 Supplemental Agreement with a description of (501.25 Concrete Class "B" (Mod)), detailing the modification in the section of the *Change Order* labeled "New Items Not in Contract."

Note: A change in unit price alone, without a change in the Standard Specification for Construction, does not signify a modification.

4. Drafting the Change Order

Once all of the appropriate verbal approvals have been obtained, the Resident Engineer will prepare a draft of the *Change Order* in a Microsoft® Word document on the appropriate form. Only the designated form shall be used to prepare the *Change Order*. This form is available on the Construction Field Forms CD or can be e-mailed from Construction Headquarters or one of the Regional Construction Offices.

The Change Order shall not be numbered or dated by field personnel. It will be numbered and dated by the Regional Technician as the *Change Order* is being entered into *SiteManager*. This will ensure that the *Change Orders* are sequenced properly and that the number in *SiteManager*, on the signed hard copies, and in the Construction Tracking System program all match.

If time is to be added by the *Change Order*, the Resident Engineer and the Contractor will need to negotiate a "New Completion Date" and fill out this field in the form. This date will become the actual adjusted completion date for the project. It will be necessary for the Resident Engineer to include within the "Necessity for Revision" an explanation as to how the date was reached. In addition, the Resident Engineer shall indicate whether a "Contract Extension" has been granted.

The format of the *Change Order* includes three fields that require the Resident Engineer to provide specific written information: "Revision", "Necessity for Revision", and "New Items Not in Contract". The narrative under each section should be written in a manner that allows a reader with only a basic understanding of the contract work involved to understand the reason why the *Change Order* is needed. The Resident Engineer will also provide a brief explanation of why the change is necessary and a description of any new pay items that will be added to the contract.

The following lists each section and general guidance to assist the Resident Engineer in drafting a *Change Order*:

REVISION:

What: Describe the change that is being made in general terms. Are there items to be added or deleted? Include item numbers and item descriptions. If numerous items are being added or deleted, a general description may be used to reduce redundancy.

Are there quantities to be added or deleted? Include item numbers and item descriptions.

If there is time to be added or deleted to the contract, state the days that are being added or removed from the contract completion date (interim completion date).

Will contract language be modified, added, or deleted? Be sure to note this in this section so that it can be explained in detail in the "Necessity for Revision."

NECESSITY FOR REVISION:

Why: Explain the change. Provide enough detail so that someone unfamiliar with the project, but who understands engineering terms, can make sense of why the change is necessary. If applicable, reference contract plan sheets, revised design plans, other documents, and/or methods employed that support or help describe the nature of the change.

Where: If appropriate, explain where the change is located on the project (by Station, Feature [Wingwall #3], etc). Reference contract plan sheets, revised design plans, or other documents that may support or help describe the nature and/or location of the change.

When: Record the date of when the situation or realization for the need occurred.

Who: Include all parties involved in the decision and who recommended or recognized the necessity for the change. Is there a letter (from and date), e-mail (from and date), or *Written Order* (#) that can be referenced that documents the decision to make or request the change? If applicable, also list if time will be added or removed from the contract completion date and or any other constraints on contract durations.

NEW ITEMS NOT IN CONTRACT:

What: Include item number, description, written unit price, and numerical unit price per unit with the unit value listed. If applicable, include terms of the item so that it is clear what is included in the item. If an item has been modified, include the modifications for the item.

If the *Change Order* is for a multi-project contract, all project names and numbers shall be listed at the top of the form. The project name and number that the *Change Order* applies to is to be listed at the top of the form in bold and also noted in the information table. If the change applies to more than one project under that contract, the applicable project names and numbers should be listed at the top of the form in bold. The items should then be listed under the corresponding project names and numbers, separately.

If the *Change Order* item is to be done by a Subcontractor, it is the Contractor's responsibility to mark the field labeled "Sub Item" next to the appropriate item(s) and this should be done by the Contractor when they sign the document. If the Subcontractor is not already working on the project, the Contractor must submit a complete request to sublet for the item. If the Subcontractor has already been approved to work on the project, then the Prime Contractor must send a letter requesting that the item be added to the current Subcontract agreement.

Note: In either case, the subcontract request must be approved prior to the Subcontractor performing work on the item, and under no circumstances shall payment for these items be made until the subcontract request is approved. The *Change Order* amount does not count against the 50% limit on contract funds permitted to be sublet.

5. Price Analysis for new items added to the contract

The Resident Engineer is also responsible for completing, with assistance as needed, a Price Analysis for any new prices within the Change Order. For guidance on how to complete a Price Analysis refer to *Independent Cost Analysis for Change Orders – Guidance and Procedures* (Appendix B-22). Once the Price Analysis has been completed, the Resident Engineer will send a copy of the *Change Order* draft and any applicable attachments, including the Price Analysis, to the Regional Technician and Regional Administrative Services Technician, via e-mail, for review.

6. Reason Codes:

The Resident Engineer will select one Reason Code from the list that reflects the overall reason for the *Change Order*. This will be verified by the Regional Technician. A Reason Code should be selected for each item that more specifically addresses the reason for each item. If one Reason Code does not adequately apply to a majority of the items shown on the *Change Order* form, then multiple *Change Orders* should be prepared.

Reason Code categories were developed to quickly classify and illustrate the root causes of *Change Order* activity. With this Reason Code information, further evaluations of *Change Order* data may be performed. The findings from these evaluations can help determine whether or not the root causes are avoidable or unavoidable by the Agency. This, in turn, leads to beneficial feedback that can be utilized by Agency management for future planning and budgeting. A thorough understanding of the individual Reason Codes, as well as consistency in their use during *Change Order* submittals, is critical to the overall success of this practice.

The following Reason Codes should be employed:

- **Administrative (ADM)** – Use this code to cover any accounting or funding changes or adjustments, such as price adjustments, performance incentives, or agency funding modifications.

- **Contract Documents (DOC)** – Use this code when the actual Contract Document needs clarification due to ambiguous, incomplete, or conflicting information. Contract completion date modification is also included in this Reason Code.

- **Settlement of Claim (CLAM)** – Use this code to process payments or further actions required in the settlement of a Contract claim.

- **Value Engineering (VENG)** – Use this code to process payments related to Value Engineering proposals accepted by the Agency.

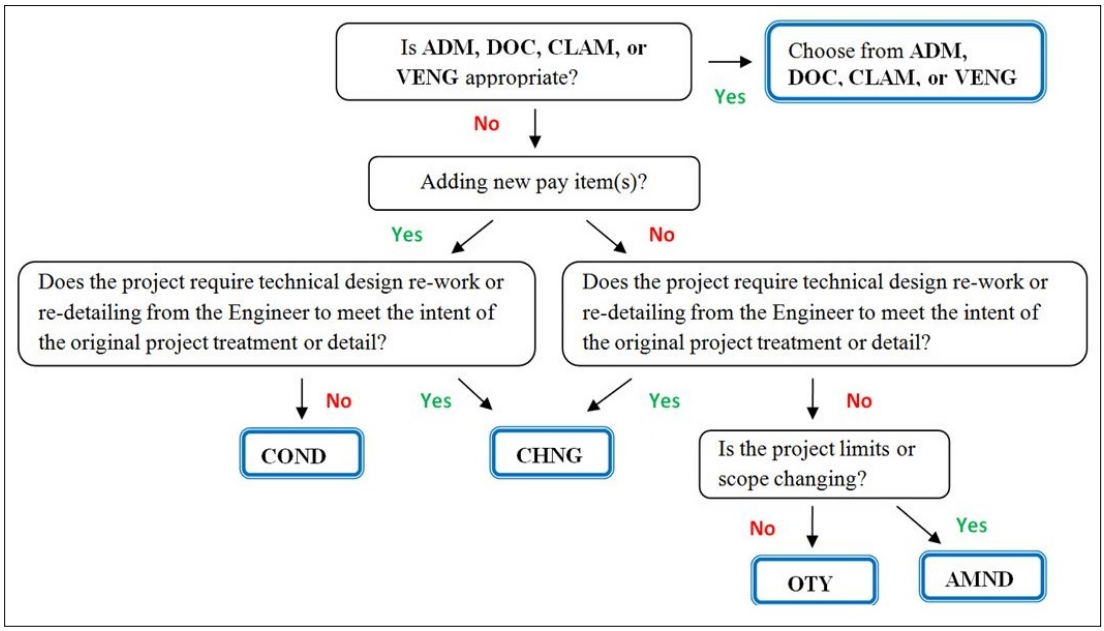
- **Design Quantity (QTY)** - Use this code when an existing pay item quantity is insufficient to compensate the Contractor for the actual scope of work depicted in the Contract.

- **Unforeseen Conditions (COND)** - Use this code when field conditions warrant the addition of new pay items to complete the work depicted in the Contract.

- **Construction Design Change (CHNG)** – Use this code when a project feature requires technical re-work or re-detailing from the Engineer. This may result in existing pay item changes or new pay item additions.

- **Amended Design (AMND)** – Use this code when the project limits or scope change.

The following chart shows the process for choosing the correct Reason Code:



7. <u>Review of the draft Change Order (Regional Technician)</u>

When the Regional Technician and Regional Administrative Services Technician receive the draft *Change Order*, they will check the following:

1) Contract ID number
2) Project Name(s) and Number(s)
3) An Overall Reason Code has been selected form the drop-down list
4) Appropriate Change Order/Force Account box is checked
5) Contractor's name
6) Revision: Item name(s), Item number(s), and readability (what is being done)

7) Necessity for Revision: content, accuracy, grammar, and readability (why is it being done, where is it being done, who wants it done, etc.), is the Contract completion date changing?

8) Check and make sure both the Project Manager's name and date of verbal approval are included, as well as FHWA name and date of verbal approval, if applicable.

9) New Items Not in Contract: Item number(s), Item name(s), unit price(s), unit(s). Ensure the proper units are used for the project Specification Year. If a modified item is being added, ensure the modification is clearly spelled out.

10) Table:

    a. Item Specific Reason Codes have been selected
    b. Contract Line No. for each item
    c. Category No. for each item
    d. Item Number
    e. Item Description
    f. Item Unit
    g. Unit Price
    h. Current Quantity
    i. Change Order Quantity

11) Check calculations for Cost Prior to this Change Order, Change in Cost, and Totals

12) Calculations for Additional Cost/Savings in Cost Column

13) Contract Extension Granted

14) New Completion Date (leave blank if no time granted)

15) Review all attachments including Price Analysis and/or added specifications or agreements.

8. <u>Entering the draft Change Order into SiteManager (Regional Technician)</u>

After the Regional Technician and Regional Administrative Services Technician check the draft Change Order, it will be entered into SiteManager by the Regional Technician. If any minor changes are necessary they will be corrected when the information is entered into SiteManager. At that time, the Regional Technician will run the Change Order process, and save a draft of the Change Order in PDF format in the following manner:

1) Go to Construction Z: drive
2) Select the "Project Correspondence" folder
3) Select the year project folder for the year that the project was let (i.e. project let in 2007 select "2007PROJ")
4) Select the project folder as listed by CES number and Project Name and Number

5) Select the “Change Orders” folder
6) Save the file in a consistent format (i.e. CES number description DRAFT.doc, [02011802_CO1_StreetLighting_DRAFT.doc])

If the “Change Orders” folder has not been established, create it, and save the *Change Order* as noted above.

a. <u>To enter the Change Order into SiteManager:</u>

HEADER

MAIN PANEL > Change Orders > Change Orders MAINTENANCE > HEADER

Select Services and then Choose Keys to select the contract.

1) Enter the Change-in Design/Supplementary Agreement in the Description field.
2) Enter the date that FHWA approval was obtained in the Federal field, and enter in the date that the Project Manager gave verbal approval in the Project Manager field.
3) Select one applicable Reason Code from the drop-down list. Definitions of the Reason Codes may be found under Section 6 of this document.
4) Select the appropriate choice for Change Order Type (Either “Change Order” or “Supplemental Agreement”).
5) Check appropriate Functions.
6) Select Services, and then Change Order Items to add items to the Contract.
7) Enter the item description in the Change Order Item Description field.
8) Enter the item quantity in the Change Order field.
9) Go to the New Contract Item tab.
10) Select the Project Nbr and Category Nbr.
11) Enter the Line Item Nbr, and the Proposal Line Nbr, starting with 9000 and incrementing by 5 with each new item. Verify that these two numbers match.
12) Fill the Item Code by placing your cursor in the Item Code field, and when the magnifying glass icon displays, right click and select Search. A list of items will appear. Highlight the appropriate item and click OK (Note: Select the proper unit system and specification year).
13) Enter the Unit Price.

14) Enter information in the Supplemental Descriptions fields as follows:

a. <u>If adding an item from the spec book with no modifications</u>:

Leave the first field blank.

b. <u>If adding a modified spec book item</u>:

In the first field, enter the item number and description from the specifications that correspond to the work being performed, and Mod. (i.e., "508.15 Shear Connectors – Mod").

c. <u>If adding an item that doesn't specifically correspond with an item and unit in the spec book</u>:

In the first field, enter the section number from the specifications that corresponds with the type of work begin performed and a description of the work being performed, for example, "629 Waterline and Sleeve."

15) Select Services, then Change Order Explanation.

a. From the drop-down list choose "Revision". Cut and paste the revision statement off of the Change Order Word document.

b. From the drop-down list choose "Necessity for Revision". Cut and paste the necessity for revision statement from the Change Order Word document.

c. From the drop-down list choose "New Items Not in Contract". Cut and paste the new items not in contract statement off of the Change Order Word document.

d. If there are other comments that are specific to a particular item, from the drop-down list, select Explanations Applied to Specific Items, and enter text in the field at the bottom of the window.

e. If there are electronic documents or extensive amounts of information that need to be included with the Change Order, cut and paste the language into the "Attachments" option from the drop-down list.

16) Click Save and close the window return to the Change Order Items window, then close that window to return to the Header.

17) Select Service, then Change Order Time Adjustments

a. In the "Adjusted Completion Date" field, fill in the new completion date.

b. In the "Explanation" window, cut and paste the explanation from the necessity for revision statement provided by the Resident Engineer on the Change Order Word document.

18) Click Save and close the window to return to the Change Order Header window.

19) Select Services, and then forward to:

a. Select the desired user from each group as indicated by approval levels and click "Add." Repeat until all review team members have been added.

b. Click OK to close the window and then click the Save button.

b. <u>To run the Change Order process and save and/or view the Change Order in PDF format:</u>

MAIN PANEL > Change Orders > PROCESS LIST

1) Double Click on the Change Order Report.
2) Sort the Cont Id field by clicking on the header once.
3) Select the Contract from the list by clicking on it, then click Submit.
4) Wait for the system to process the request:
    a. Client Job Monitor – click OK
    b. DPS Status Monitor – click OK
5) Select Services, then Process Status.
6) Scroll to the bottom of the list, find the RCOCORPTC report.
    a. Note the date and time you ran the report to find the correct one.
7) Double click the report, then double click the OUTPUT.PDF file.
8) The Change Order will open in Adobe Reader.
9) Select File, then Save a Copy (save as directed above).

c. <u>To view the Change Order Report in SiteManager:</u>

MAIN PANEL > Change Orders > REPORTS > Change Orders REPORT

To locate a contract, place your cursor in the Contract field, and when the magnifying glass icon displays, right click and select Search. Select a contract from the list by clicking on it. To select a Change Order number, place your cursor in the Change Order field, and when the magnifying glass icon displays, right click and select Search. Select the Change Order from the list by clicking on it. Verify that the information in the report is correct.

d. <u>To review specific information entered into SiteManager that is on the Change Order Report:</u>

MAIN PANEL > Change Orders > Change Orders MAINTENANCE > HEADER

1) Click the Open button and select the contract and Change Order.
    - Verify the information entered.
2) Select Services, then Change Order Items to open the items that have been added/changed.
    - Verify the information entered on the Change Order Item and New Contract Item tabs.

3) Select Services, then Change Order Explanation.
    - Verify the information entered.
4) Close all of the open windows until you get back to the Main Panel.

9. <u>Review of the draft Change Order by the Review Team:</u>

Once the *Change Order* has been entered into *SiteManager*, the Regional Technician will e-mail the draft PDF of the *Change Order* to the Review Team. The following is a list of the Review Team members, the areas of emphasis of their review, and who has the final decision making on review comments:

Regional Construction Engineer: The Regional Construction Engineer grants the final regional approval. It is their job to check sentence structure, that the information/data is correct, the adequate cost analysis has been performed, the supporting documentation is available/included, the necessity for revision is justifiable/understood, that the Change Order is warranted/reasonable, that the appropriate verbal approvals have been granted, the unit prices and new items are sensible, and, if the contract completion date is revised, that the period of time the Contractor has been given is legitimate. The Regional Construction Engineer has the authority for deciding which comments, if any, from the Review Team are incorporated at the Regional level.

Regional Technician: The Regional Technician, before the Change Order is entered into SiteManager, will provide the initial review of grammar, spelling, coherency, will ensure that the narrative pieces of the Change Order answer the questions who, what, where, why, when, and will verify a cost analysis has been completed.

Regional Administrative Services Technician: Regional Administrative Services Technician will review comments and suggestions, check grammar, readability, math, item name and numbers.

Finals Engineer, Construction Services Engineer, and, when warranted, the **Construction Engineer:** These members of Construction Headquarters will review comments and suggestions, general content and narrative, contract time extensions for justification, potential issues that could lead to additional costs or claims, that consistency with specification language is retained, and the possibility for precedent setting issues. The Construction Engineer has the ultimate authority for deciding which comments, if any, from the Review Team are incorporated.

Construction Executive Services Coordinator: The Construction Executive Services Coordinator should review comments and suggestions for content, highlight portions of the *Change Order* that are lacking in clarity, and check grammar, spelling, and math.

Resident Engineer: As the *Change Order* author, the Resident Engineer should verify that the overall purpose of the *Change Order* is still the same upon review. The items, quantities, and dollar amounts should all be double checked.

C&IA Supervisor: The C&IA Supervisor should review for notice of additional items that may require certification and/or material testing.

The Project Manager: The Project Manager should be kept apprised of the *Change Order* status and review process for informational purposes only.

Quality Assurance Engineer: The Quality Assurance Engineer should review and verify the use of proper Reason Codes.

The Review Team will also include the Chief Engineer and FHWA Engineer when approval levels are such that they will be signing the final document.

Any *Change Orders* that deal with claims shall be copied to the Assistant Attorney General.

All Review Team members should make it a point to review not only the language in the email body, but should review the attachments of the email as well.

The email shall contain the following information with the following format:

1) The date that comments are due back to the Regional Technician
2) When new unit prices are part of the *Change Order*, acknowledgement that an independent cost analysis was completed to support the listed prices (Refer to *Independent Cost Analysis for Change Orders – Guidance and Procedures* (Appendix B-22) for more information)
3) Reason Code for the overall *Change Order*
4) Revision
5) Necessity for Revision
6) Approval Dates
7) New Items Not In Contract
8) Cost Savings Amount/Additional Cost Amount
9) New Completion Date
10) Quantity Costs as per Plans/Revisions Table
11) The cost analysis either through a description in the e-mail message for by an attachment to the e-mail

The last email in the chain should be saved to the Z:\...\Project Core\Change Order subfolder to capture the comments and price analysis review. Email should be saved with similar naming convention, the same as the *Change Order* (i.e., 02011802_CO1_StreetLighting-emailDRAFTforreveiw).

Once they have received the *Change Order*, the Review Team has a minimum of two days and a maximum of five days to review the draft *Change Order*. Review Team comments and suggested revisions may be entered into *SiteManager* under Change Order Review/Approve. However, entering comments in this field will not be sufficient review procedure. All comments shall be emailed back to the Regional Technician, with a cc: to the rest of the Review Team, within the specified time frame.

10. <u>Addressing comments on Draft Change Orders (Regional Technician)</u>

If the Review Team's comments initiate minor rewrite and/or revisions such as capitalized letters, punctuation, grammatical corrections, etc., then the draft *Change Order* will be edited by the Regional Technician.

If the Review Team's comments suggest the need for a major rewrite and/or revisions such as changes in unit prices, expanded explanations, additional work to be included, etc. then the Resident Engineer will be provided the opportunity to author those changes. If major changes are made to the draft, the Resident Engineer will send a copy of the revised draft *Change Order* back to the Regional Technician, via e-mail, so that it can go through the review process again. The review period for the revised draft by the Review Team will follow the same process as stated above.

11. <u>Saving and distributing the final CO for approval (Regional Technician)</u>

If the Regional Technician hears from all Review Team members prior to the two day minimum review time, then the Regional Technician can change the *Change Order* from "draft" to "pending" and set signature approval levels in *SiteManager*. Once the two day minimum review time has elapsed, and the Regional Technician has heard from at least two of the Review Team members, the Regional Technician can change the *Change Order* from "draft" to "pending" and set signature approval levels in *SiteManager*.

If by the fourth day of the review period, the Regional Technician has not heard from at least two of the Review Team members, a reminder e-mail will be sent out to the Review Team letting the Review Team know that there is only one more day to review the *Change Order* (for time sensitive, large dollar value, or claim *Change Orders*). Once the maximum five day review time has elapsed, the Regional Technician can change the Change Order from "draft" to "pending" in *SiteManager* and set signature approval levels as defined below:

Amount	Approval Levels
$0 - $19.999.99	Resident Engineer, Regional Construction Engineer
$20,000 - $49,999.99	Resident Engineer, Regional Construction Engineer, Construction Engineer
$50,000 +	Resident Engineer, Regional Construction Engineer, Construction Engineer, Chief Engineer
Project has FHWA Oversight	Follow amount requirements detailed above and leave the FHWA block open

For any *Change Order* that is over $50,000, notifications shall be sent to the Construction Engineer and the Regional Construction Engineer at least a day before the *Change Order* is to be sent to the Review Team.

1) Any *Change Order* that adds time must be signed by the Construction Engineer and Chief Engineer.

2) Any *Change Order* created by administrative staff to settle a claim must be signed by the Chief Engineer.

3) Any *Change Order* that adds Non-Participating utility work must include, in the Necessity for Revision statement, a reference to the specific Utility Relocation Agreement (URA) and, when applicable, the Supplemental Utility Relocation Agreement as well as the name of the authorizing individual from the Utility Company. In addition, a copy of the URA and the Supplemental URA shall be included with the *Change Order*.

4) When a *Change Order* is prepared for extra work done by Force Account, the Force Account Summation spreadsheet shall be included with the *Change Order*.

5) When there are local funds associated to the project, the Resident Engineer shall inform the local entity of the Non-Participating Items added by the *Change Order*.

6) Regardless of whether or not the project has full FHWA oversight, the FHWA must approve the *Change Order* if it is considered a major Change Order as defined by the following:

    a. Extends the project limits beyond those stated in the environmental document (for those projects with an environmental document).

    b. Significantly affects the cost of the project by increasing or decreasing the project cost by more than 25% or $250,000, whichever is less. This does not apply to commodity price adjustments such as APA and FPA.

    c. Adds work to the project that is not within the original character or scope of work that would require a change to the environmental document (for those projects with an environmental document).

    d. Adds work to the project that is not within the original character or scope of work that would require a change to the environmental permit.

a. <u>To set Change Order Approval Levels</u>

MAIN PANEL > Change Orders > Change Orders MAINTENANCE > HEADER

Open and select the contract and Change Order:

1) Click the Open button and select the contract and Change Order.

2) Change the status to Pending, and click Save.

   - A message box should display "Are you sure you want to change the status to Pending?" Click Yes to continue.

3) Select the Resident Engineer from the Contractor list, and click Add.

4) Select the Construction Regional Construction Engineer group, then select the Regional Construction Engineer and click Add.

5) If displayed, select the Construction Engineer group, then select the Construction Engineer and click Add.

If the required approval groups are different than the previous, then do the following:

1) Check the Override Approval Rules box.
2) Change the status to Pending, and click Save
   - A message box should display "Are you sure you want to change the status to Pending?" Click Yes to continue.
3) Click New to add a new line and select the appropriate group from the list.
4) Select the appropriate user from the user dropdown list
5) Repeat steps 3 through 5 until all approvers have been added and click OK.

12. <u>Approval of the Change Order – Electronic approvals (VTrans and FHWA)</u>

Once all signature approval levels have been set, those individuals will be prompted via email to go into SiteManager and "sign" the Change Order. The following is an example:

From: oracle.aot@ [mailto:state.vt.usoracle.aot@state.vt.us]
Sent: Monday, July 1, 2015 1:15 PM
To: Judy.Gilmore@
Subject: SiteManager CO approval required
Importance: High

jgilmore

Contract	CO Nbr	Description
11031102	005	WINHALL STP CULV (22)

This message was automatically generated DO NOT REPLY

When the individual has received the Oracle email notification that the *Change Order* is awaiting approval, they will perform the following steps to approve the *Change Order*. This process shall be completed in a timely manner, within two days or less, upon receipt of the email.

a. <u>Approval of the Change Order</u>

MAIN PANEL > Change Orders > Change Orders MAINTENANCE > Change Orders REVIEW/APPROVE

1) Select the Contract and Change Order.

2) Click on a Recommendation (Approved or Denied)

3) Enter any remarks by clicking on the Remarks button.

4) Click on the Remarks button again to close the remarks window.

5) Click on Save, a window will come up asking to confirm the recommendation. Click Yes or No.

13. <u>Approval of the Change Order – Contractor (Regional Administrative Services Technician)</u>

After the document is finalized, all relevant information is updated in *SiteManager*, and all Agency and FHWA signatures have been obtained, the Regional Administrative Services Technician shall email the document to the Contractor as a protected PDF file, with a cc: to the Resident Engineer and to the Regional Technician. Instructions shall be included asking the Contractor to mark any items on the *Change Order* that are to be done by a Subcontractor, return one signed and dated original directly to the appropriate Regional Construction Office, and keep one signed and dated copy for their records.

When the Contractor has signed and returned the *Change Order* to the appropriate Regional Construction Office, the following should occur:

1) The Regional Administrative Services Technician will check the contract to ensure that the Contractor's signor is authorized to do so. This is usually contained in the minutes of the Contractor's Executive Meeting stapled just inside the front cover of the Contract. If there is not a copy of the minutes from the Contractor's Executive Meeting in the Regional Office's copy of the contract, then contact the Construction Executive Services Coordinator or the Finals Engineer and they can provide a copy of the minutes from the Contractor's Executive Meeting from the original contract.

2) The Regional Administrative Services Technician will compare the *Change Order* against what was entered into *SiteManager* and verify that they match. If the Contractor has made any changes to the document, then a new document shall be drafted and the process of review and approvals starts over.

3) Once verified, the Regional Administrative Services Technician will go into *SiteManager* and approve the *Change Order* at the Contractor level.

4) The Regional Administrative Services Technician will then run the final, signed *Change Order* report in PDF format.

14. <u>Saving and distributing the fully executed Change Order (Regional Administrative Services Technician)</u>

Once the signed *Change Order* has been received from the Contractor and duly processed in *SiteManager* by the Regional Administrative Services Technician, the last step is to send a copy of the final *Change Order* to all necessary parties and to save a copy of the completed work in the project folder. Sending the final *Change Order* via email will allow personnel to finalize any procedures, documentation, and will allow work on the items in question to proceed.

a. <u>To run the Change Order process and save and/or view the Change Order in PDF format</u>

MAIN PANEL > Change Orders > PROCESS LIST

1) Double Click on the Change Order Report.
2) Sort the "Cont Id" field by clicking on the header once.
3) Select the Contract off the list by clicking on it, then click "Submit"
4) Wait for the system to process the request
    a. Client Job Monitor – click "OK"
    b. DPS Status Monitor – click "OK"
5) Select Services, then Process Status
6) Scroll to the bottom of the list, find the RCOCORPTC report
    a. Note the date and time you ran the report to find the correct one
7) Double click the report, then double click the OUTPUT.PDF file
8) The Change Order will open in Adobe Reader
9) Select File, then Save a Copy.

Filing in Z: drive: The Regional Administrative Services Technician will save the final copy of the *Change Order* to the Construction Z: drive in the following manner:

a) Go to Construction Z: drive

b) Select the "Project Correspondence" folder

c) Select the folder for the year that the project was let (i.e. project let in 2007 select "2007PROJ")

d) Select the project folder as listed by Letting Number, and Project Name and Number

e) Select the "COs" folder

f) Save the file in a consistent format (for example: Letting number, CO number, description, Final Signed [02011802_CO1_StreetLighting_FINALSigned.doc])

Distributing the fully executed Change Order: The Regional Administrative Services Technician will distribute the approval letter, a copy of the *Change Order* and any attachments, via email, to the following parties:

- Construction Project Files/Finals Engineer (Pink Mail the Contractor's original signature)
- Regional Project Files
- Resident Engineer
- FHWA (when they have oversight)
- Quality Assurance Engineer
- Financial Manager 1, Program Development Business Office
- C&IA Unit Supervisor, Materials and Research Lab
- Contract Specialist 1, Contract Administration
- Program Manager/Project Manager of the Project

And, when applicable:

- Civil Rights (when items are marked as to be done by a subcontractor)
- Utility Company (if a Utility Relocation Agreement is involved)
- Local Entity (if there are local funds associated with the project)

Entries into CTS: The Regional Administrative Services Technician will enter the Construction Tracking System (CTS) and enter appropriate dates into the "Change-in-Design Date" and "Supplemental Agreement Date" fields. They will also fill in the "Signed" box for the individual with the highest level of approval and fill in the date corresponding with that signature.

If there is FHWA oversight, then dates will also be entered into the "To FHWA" and "From FHWA" boxes. The "Distributed" box should be populated with the date that they distributed the approval letter and copies of the *Change Order* as outlined above.

The ultimate approval date will be the date that the Contractor signs the *Change Order* (since not all Contractors date their *Change Order*, the date that the Regional Administrative Services Technician approves the *Change Order* is an acceptable alternative). The final approval date is the date indicated on the *Bi-weekly Estimate* that indicates when the item and/or quantity was approved.

VTrans
Force Account Summation

Contract No.:	Project Name and No.:	Contractor:

Item No. and Description:

LABOR	Actual Wages	Wages & Overhead
Day 1	$0.00	$0.00
Day 2	$0.00	$0.00
Day 3	$0.00	$0.00
Day 4	$0.00	$0.00
Day 5	$0.00	$0.00
Day 6	$0.00	$0.00
Day 7	$0.00	$0.00
Day 8	$0.00	$0.00
Day 9	$0.00	$0.00
Day 10	$0.00	$0.00
Day 11	$0.00	$0.00
Day 12	$0.00	$0.00
Day 13	$0.00	$0.00
Day 14	$0.00	$0.00
Day 15	$0.00	$0.00
Day 16	$0.00	$0.00
Day 17	$0.00	$0.00
Day 18	$0.00	$0.00
Day 19	$0.00	$0.00
Day 20	$0.00	$0.00
Day 21	$0.00	$0.00
SUBTOTAL	$0.00	$0.00
Profit: 10% of Actual Wages	-	$0.00
Admin & Other Costs: 10% of Actual Wages	-	$0.00
TOTAL LABOR	-	$0.00

MATERIAL	
Date	**Material Cost**
Day 1	$0.00
Day 2	$0.00
Day 3	$0.00
Day 4	$0.00
Day 5	$0.00
Day 6	$0.00
Day 7	$0.00
Day 8	$0.00
Day 9	$0.00
Day 10	$0.00
Day 11	$0.00
Day 12	$0.00
Day 13	$0.00
Day 14	$0.00
Day 15	$0.00
Day 16	$0.00
Day 17	$0.00
Day 18	$0.00
Day 19	$0.00
Day 20	$0.00
Day 21	$0.00
SUBTOTAL	$0.00
P.& O. 10%	$0.00
Total Materials	$0.00

EQUIPMENT	
ID No.	**Cost**
Day 1	$0.00
Day 2	$0.00
Day 3	$0.00
Day 4	$0.00
Day 5	$0.00
Day 6	$0.00
Day 7	$0.00
Day 8	$0.00
Day 9	$0.00
Day 10	$0.00
Day 11	$0.00
Day 12	$0.00
Day 13	$0.00
Day 14	$0.00
Day 15	$0.00
Day 16	$0.00
Day 17	$0.00
Day 18	$0.00
Day 19	$0.00
Day 20	$0.00
Day 21	$0.00
Total Equip.Cost	$0.00

TOTAL CALCULATIONS		
Subcontract Total	$0.00	
Labor	$0.00	
Materials	$0.00	
Equipment	$0.00	
TOTAL	**$0.00**	

CERTIFICATION - I certify, to the best of my knowledge and belief, that the equipment used on this work was of the proper size, that the material was taken from stock as designated above is charged at fair market value, and that the account herein shown is an accurate statement of the materials and equipment used.

Signed: _____ _____

Date: _____ _____

State of Vermont
Agency of Transportation

Extra Work - Force Account

Contractors Payroll Burden & Bond Premium Worksheet

Project Name: _____
Project Number: _____
Contractor: _____

Re: Extra Work Order #: _____

Classification: _____

Labor Burden Breakdown:

Classification		%
Fica		%
Federal Unemployment		%
State Unemployment		%
Workers Comp / Employer Liability		%
Retirement		%
Health Insurance		%
Life Insurance		%
Other		%
Other		%
Other		%
Other		%
Other		%
Other		%
Other		%
Other		%
	TOTAL:	0 %

All Percentages Subject to Audit by VAOT
Evidence of Rates Paid Shall be Furnished by Contractor
For Insurances, Contractor to supply a notarized insurance rate schedule from Insurance Agent

Certified By: _____
Title: _____

VTrans
Subcontractor Invoices

Subcontractor Name	Invoice Date	Invoice Amount
	SUBTOTAL	$0.00
	10% for Overhead, Profit and Other Costs	$0.00
	TOTAL LABOR	$0.00

Vermont Agency of Transportation / Highway Division / Construction Section

Force Account Summation Form

Daily Record of Work Authorized, Not Included in Contract

Contract No.:	Project Name and No.:	Contractor:	Date:

Item No. and Description:

LABOR								MATERIALS			EQUIPMENT			
		Hours			Overhead									
Name	Wage *	Regular	O.T.	Actual Wages	Classification	Rate	Wages & Overhead	Material	Invoice	Cost	Description	Rate	Hours	Cost
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
				$0.00			$0.00							$0.00
Total for Day:				$0.00			$0.00	Total for Day:		$0.00	Total for Day:			$0.00

Statement of Work Accomplished:

Certification:

Signed: _____ For Contractor

_____ Date

_____ For VTrans

* Agency may cap compensation at 125% of Davis-Bacon wage rate.

VTrans

Daily Record of Work Authorized, Not Include

Contract No.:	Project Name and No.:	Contractor:

Item No. and Description:

LABOR								MATE
		Hours			Overhead			
Name	Wage *	Regular	O.T.	Actual Wages	Classification	Rate	Wages & Overhead	Material
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
				$0.00			$0.00	
Total for Day:				$0.00			$0.00	Total for Day:

Statement of Work Accom

Certification:

Signed: _____

For Contractor

* Agency may cap compensation at 125% of Davis-Bacon wage rate.

d in Contract

	Date:

RIALS		EQUIPMENT			
Invoice	**Cost**	**Description**	**Rate**	**Hours**	**Cost**
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
					$0.00
	$0.00	**Total for Day:**			$0.00

_____ _____

Date For VTrans

State of Vermont

Agency Of Transportation

Construction Section

Force Account – Extra Work

Guidance

General

This document provides guidance for Force Account and extra work procedures. It has two sections, Introduction and Guidance. The Guidance section has four subsections:

1. Labor
2. Material
3. Equipment
4. Subcontracted work

Introduction

When extra work is required on a VTrans construction project, there are three methods by which the extra work may be paid: Unit Price, Lump Sum, and Force Account. Force Account payment is used when the Contractor and the State cannot agree on a Unit Price or Lump Sum price. This document provides guidance for situations in which Force Account payments may be necessary.

Guidance

The Resident Engineer should use the following procedure to implement a Force Account payment for extra work:

1. Issue a *Written Order* (Appendix A-3) to the Contractor stating that the extra work will be accomplished through Force Account. Refer to the Field Forms directory for a sample *Written Order*.

2. Track time and materials used for the extra work per *Subsection 109.06 Extra and Force Account Work* of the Standard Specifications for Construction. These specifications allow for payment in four categories: Labor, Material, Equipment, and Subcontracted work.

Refer to the *Field Forms/Calculations* folder for the *Force Account Summation Form* (Appendix B-24) that may be used by the Resident Engineer and the Contractor to tabulate calculations for the extra work. The Resident Engineer and the Contractor shall agree daily on time and equipment expenditures by adding their signatures to the *Force Account Summation Form*.

A. **Labor:** The Contractor is entitled to be reimbursed for:

i. Actual wages of Employees. The State can cap this amount at 125% of Davis-Bacon rates found in the employee contract.

ii. Overhead, including Workers Compensation, unemployment, Social Security and other insurances. This is usually 40 to 60 percent, depending on the Contractor. This percentage is applied to the actual wage.

Different employee classifications may have different rates. Overhead can be difficult to verify. The contractor must supply proof of their billed rates.

The insurance rate schedule is provided by the Contractor to Contract Administration when the contract is signed, and kept at Construction Headquarters. Contact the Construction Executive Services Coordinator for the insurance rate schedule.

iii. 10% Profit on Actual Wages. Note: This is *not* 10% of Actual Wages plus Overhead.

iv. 10% of Actual Wages for Administration and Other Costs. Note: The Superintendant does not get paid directly, but their work is included under this provision.

B. **Materials:** The Contractor is entitled to be reimbursed for:

i. Actual cost of material, to including any shipping charges validated by original receipted bills.

ii. 10% for overhead, profit, and any other costs. Note: Payment for sales tax is not allowed.

C. **Equipment:** The Contractor is entitled to be reimbursed at Blue Book Rates for equipment used on the project. The Contractor will provide the IT Support Technician with the following information:

- All equipment – year, make, and model
- Dump trucks – the number of axles and body size
- Cranes – lifting capacity

The IT Support Technician will provide the hourly FHWA rate which can be charged by the Contractor, as well as the cut sheet and the breakdown of the rates, as per the following definitions:

- Ownership Cost = "Idle Time"
- Operating Cost = "Working"
- FHWA Rate = Total Cost = Ownership Cost + Operating Cost

i. Contractor-Owned Equipment: If the Contractor uses their own equipment, they are entitled to be paid the FHWA Rate for the time the equipment is in use and for idle time for the remainder of an eight-hour day, but only if the piece of equipment was specifically brought in for the Force Account work, and was not previously on the project.

ii. Rented Equipment: If the Contractor rents the equipment, they are entitled to the actual cost as submitted by invoice. The State can limit the hourly rate to Blue Book rates if the Prime and Subcontractors are closely-related companies.

iii. Mobilization of Equipment: The Contractor is entitled to be paid for transportation costs to and from the project for Contractor-owned and rented equipment. This applies only if the equipment is brought in. The Contractor is entitled to be paid for the cost of the truck and/or trailer bringing in the equipment, the labor to do it, and idle time for the piece of equipment being transported.

Observe the following conditions regarding equipment:

1. Equipment rates do not include the cost of the operator, which is paid under "Labor"
2. Profit is not paid on the use of equipment

3. There will be no payment made for equipment downtime
4. The maximum reimbursable amount for a piece of equipment, which is unlikely to occur, is its original cost

D. **Subcontracted Work:** The Contractor is entitled to be reimbursed for:

i. Actual cost of work subcontracted to others, validated by original receipted bills.

ii. 10% for overhead, profit and any other costs. Note: If the costs provided for subcontract work are not considered reasonable by the State, the Force Account procedures provided in this document should be used for subcontracted work as well.

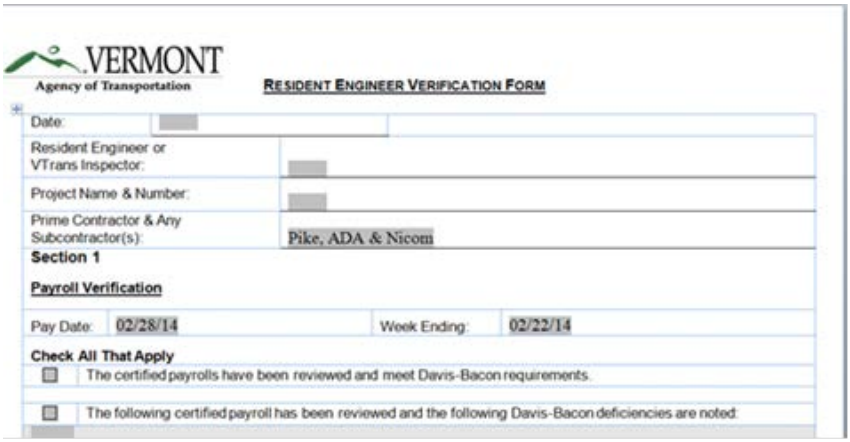
E. **Change Order:** The Resident Engineer shall submit a *Change Order* summarizing all of the extra work, time, and costs.

Instructions for using the Resident Engineer Verification Form

Open the document and save it. Please use the following naming convention when saving the form: REVerficationContractorNameWeekEndingDate for example: REVerificationPikeWE041514. **This is how they should be sent to the Labor Compliance Program Manager, Sonya Boisvert: sonya.boisvert@state.vt.us** .

Please complete the form **once** a week. You may include more than one payroll (prime and subs) per form. For an example if there are payrolls in there for the prime and two subs with the same week ending date, you can use just one form for all 3 of those payrolls. If more subcontractor(s) payroll comes in after the form has been sent to me then you should send a new verification form for just those subs. I have listed below step by step instructions for completing this form.

1. Enter date, RE/Inspector name, and the project name and number.
2. Enter contractors/subcontractors name. For example: Pike (Prime) ADA and L&D(subs), the form would look like this:



VERMONT
Agency of Transportation

RESIDENT ENGINEER VERIFICATION FORM

Date:	
Resident Engineer or VTrans Inspector:	
Project Name & Number:	
Prime Contractor & Any Subcontractor(s):	Pike, ADA & Nicom

Section 1

Payroll Verification

Pay Date:	02/28/14	Week Ending:	02/22/14

Check All That Apply

- ☐ The certified payrolls have been reviewed and meet Davis-Bacon requirements.
- ☐ The following certified payroll has been reviewed and the following Davis-Bacon deficiencies are noted:

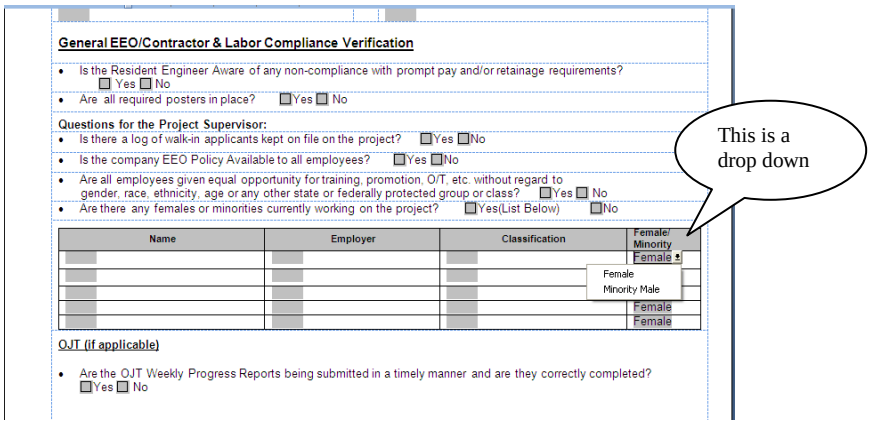
3. Enter week ending date and pay date for all payrolls you are submitting the payroll for.

Section 1 - Payroll Verification:

4. Note any discrepancies and employee interviews.
5. OJT info if applicable.

Section 2 -

6. **General EEO/Contractor & Labor Compliance Verification**
   Some of these questions are for you to answer and some you will need to ask the project supervisor. You only have to ask/check periodically there is no need to do it with every form.



General EEO/Contractor & Labor Compliance Verification

- Is the Resident Engineer Aware of any non-compliance with prompt pay and/or retainage requirements? ☐ Yes ☐ No
- Are all required posters in place? ☐ Yes ☐ No

Questions for the Project Supervisor:

- Is there a log of walk-in applicants kept on file on the project? ☐ Yes ☐ No
- Is the company EEO Policy Available to all employees? ☐ Yes ☐ No
- Are all employees given equal opportunity for training, promotion, O/T, etc. without regard to gender, race, ethnicity, age or any other state or federally protected group or class? ☐ Yes ☐ No
- Are there any females or minorities currently working on the project? ☐ Yes(List Below) ☐ No

Name	Employer	Classification	Female/ Minority
			Female
			Female
			Female

Female
Minority Male

This is a drop down

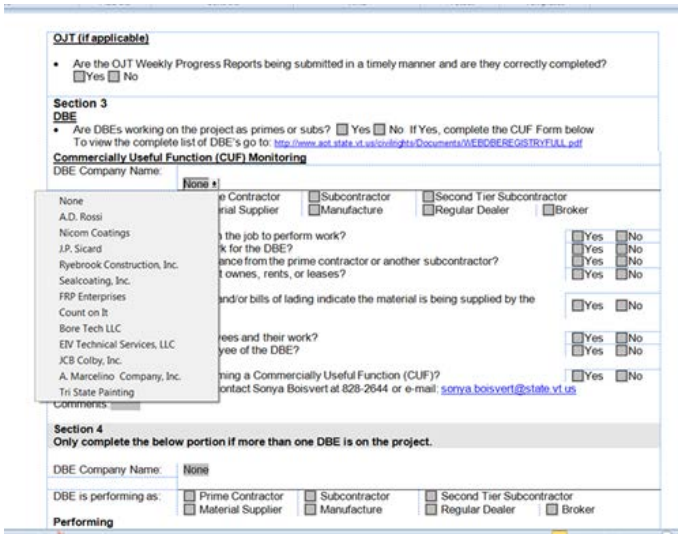
OJT (if applicable)

- Are the OJT Weekly Progress Reports being submitted in a timely manner and are they correctly completed? ☐ Yes ☐ No

Section 3 – DBE and Commercially Useful Function (CUF) Monitoring:

If there is a DBE working on the project as a prime or sub then you need to complete the rest of the form.

7. Enter company name. To make this easier we have added a drop down box that list the most commonly used DBE's. To view a complete list of DBE's go to our website: http://www.aot.state.vt.us/civilrights/Documents/WEBDBEREGISTRYFULL.pdf



Section 4:

8. You will only need to complete section 4 of the form if there is more than one DBE subcontractor on the project.

Please complete the entire form weekly and send to sonya.boisvert@state.vt.us . Thank you!

VERMONT
Agency of Transportation

RESIDENT ENGINEER VERIFICATION FORM

Date: _____

Resident Engineer or VTrans Inspector: _____

Project Name & Number: _____

Prime Contractor & Any Subcontractor(s): _____

Section 1

Payroll Verification

Pay Date: Week Ending:

Check All That Apply

☐ The certified payrolls have been reviewed and meet Davis-Bacon requirements.

☐ The following certified payroll has been reviewed and the following Davis-Bacon deficiencies are noted:

☐ The following employees were interviewed:

_____ _____

_____ _____

_____ _____

Section 2

General EEO/Contractor & Labor Compliance Verification

- Is the Resident Engineer Aware of any non-compliance with prompt pay and/or retainage requirements? ☐ Yes ☐ No
- Are all required posters in place? ☐Yes ☐ No

Questions for the Project Supervisor:

- Is there a log of walk-in applicants kept on file on the project? ☐Yes ☐No
- Is the company EEO Policy Available to all employees? ☐Yes ☐No
- Are all employees given equal opportunity for training, promotion, O/T, etc. without regard to gender, race, ethnicity, age or any other state or federally protected group or class? ☐Yes ☐ No
- Are there any females or minorities currently working on the project? ☐Yes(List Below) ☐No

Name	Employer	Classification	Female/ Minority
			Female
			Female
			Female
			Female
			Female
			Female

OJT (if applicable)

- Are the OJT Weekly Progress Reports being submitted in a timely manner and are they correctly completed?
  ☐Yes ☐ No

Section 3

DBE

- Are DBEs working on the project as primes or subs? ☐ Yes ☐ No If Yes, complete the CUF Form below
  To view the complete list of DBE's go to: http://www.aot.state.vt.us/civilrights/Documents/WEBDBEREGISTRYFULL.pdf

Commercially Useful Function (CUF) Monitoring

DBE Company Name: None

DBE is performing as: ☐Prime Contractor ☐Subcontractor ☐Second Tier Subcontractor ☐Material Supplier ☐Manufacture ☐Regular Dealer ☐Broker

Performing

Does the DBE have employees on the job to perform work?	☐Yes	☐No
Do the DBE's employees only work for the DBE?	☐Yes	☐No
Is the DBE working without assistance from the prime contractor or another subcontractor?	☐Yes	☐No
Is the DBE only using equipment it ownes, rents, or leases?	☐Yes	☐No

Materials

Does a review of the load tickets and/or bills of lading indicate the material is being supplied by the DBE?	☐Yes	☐No

Supervising

Is the DBE supervising it's employees and their work?	☐Yes	☐No
Is the supervisor a full-time employee of the DBE?	☐Yes	☐No

CUF

Does the DBE appear to be perfoming a Commercially Useful Function (CUF)?	☐Yes	☐No

If DBE is **not** performing a CUF, contact Sonya Boisvert at 828-2644 or e-mail: sonya.boisvert@state.vt.us

Comments:

Section 4

Only complete the below portion if more than one DBE is on the project.

DBE Company Name: None

DBE is performing as: ☐ Prime Contractor ☐ Subcontractor ☐ Second Tier Subcontractor ☐ Material Supplier ☐ Manufacture ☐ Regular Dealer ☐ Broker

Performing

Does the DBE have employees on the job to perform work?	☐Yes	☐No
Do the DBE's employees only work for the DBE?	☐Yes	☐No
Is the DBE working without assistance from the prime contractor or another subcontractor?	☐Yes	☐No
Is the DBE only using equipment it ownes, rents, or leases?	☐Yes	☐No

Materials

Does a review of the load tickets and/or bills of loading indicate the material is being supplied by the DBE?	☐Yes	☐No

Supervising

Is the DBE Supervising it's employees and their work?	☐Yes	☐No
Is the supervisor a full-time employee of the DBE?	☐Yes	☐No

CUF

Does the DBE appear to be performing a Commercially Useful Function (CUF)?	☐Yes	☐No

If DBE is **not** performing a CUF, contact Sonya Boisvert at 828-2644 or e-mail: sonya.boisvert@state.vt.us

Comments:

State of Vermont
Construction and Materials Bureau
1 National Life Drive
Montpelier, VT 05663-5001
www.aot.state.vt.us

[phone] 802-828-2593
[fax] 802-828-2795
[ttd] 800-253-0191

Agency of Transportation

PROJECT: _____

PROPERTY OWNER'S RELEASE
KNOW ALL TO WHOM THESE PRESENTS COME:

THAT the undersigned, _____, of _____, in the County of _____ and State of _____, owner(s) of certain lands and premises adjacent to a certain public highway in the Town of _____; and known as _____ _____; in consideration of the improvements on said land and premises in connection with construction on said highway, to wit:

do hereby waive, release and discharge the Agency of Transportation of the State of Vermont, and all of their officers, agents, and employees of and from any damage or claim of damages of any kind or nature which I (we) may have claim to have now, or in the future, in connection with the above-mentioned work done or to be done on said land and premises.

It is not intended to hereby exempt any party or contractor who may be hereafter designated to perform the work hereinabove provided from liability for damage to the property due to negligent acts or omissions.

Dated at _____, in the County of _____and State of __ _____, this _____ day of _____, A.D., .

_____ _____
Property Owner's Signature Property Owner's Name (Printed)

c Project File/Regional Construction Engineer
Project Manager
Property Owner
Resident Engineer
Right-of-Way Section via Construction & Materials Bureau Director (Original Copy)

State of Vermont
Agency Of Transportation
Construction Section
Contractor's Responsibility For Work
Guidance and Process

General

This document provides guidance on how to deal with damage that occurs to a project, whether the Contractor or the Agency should be reimbursed for such damage, and the process to do so. This document will clarify the information found in *Subsection 107.18(a) Contractor's Responsibility for Work* of the Standard Specifications for Construction. No two damage events are the same, so a variety of situations are explored.

This document has four sections:

1. General
2. Contractor Responsibilities
3. Guidance Examples
4. Damage Mitigation Process

Contractor Responsibilities

Subsection 107.18(a) Contractor's Responsibility for Work of the Standard Specifications for Construction states the following:

> *Until acceptance of the project by the Engineer the Contractor shall be responsible therefore and shall take every precaution against injury or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore and make good all injuries or damages to any portion of the work before acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God, of a public enemy, or governmental authorities. For purposes of this paragraph the term work shall exclude Contractor owned, rented, or leased materials, equipment and incidentals.*

Therefore, if the damage that occurs is not the fault of the Contractor, the Agency will reimburse the Contractor the cost to rebuild, repair, or restore the work. Note the phrase *"…unforeseeable causes beyond the control of and without the fault or negligence of the Contractor."* Whether this condition is met can only be determined on a case-by-case basis.

In addition, the Agency will not reimburse the Contractor for *"Contractor owned, rented, or leased materials, equipment and incidentals."* Contractors are required to carry their own insurance on these items. Under no circumstances will the Agency reimburse a Contractor for rebuilding, repairing, or replacing such items.

Guidance Examples

A determination must be made in each instance if the damage is *"…beyond the control of and without the fault or negligence of the Contractor."* Use the following examples as guidance. All examples are situations occurring during the construction of a project, before the work is accepted.

Example 1:

A citizen driving a vehicle with diesel fuel containers turns onto new pavement from a side road, and the fuel containers tip over and proceed to spill fuel onto the new roadway, causing pavement damage. All necessary and proper traffic control features according to the contract were in place, and the transition from the side road to the project was a properly prepared fillet providing a smooth transition. The damage requires that the pavement be removed and replaced.

Result: The Agency would cover the cost to repair the pavement.

On the other hand, if the situation shows that the Contractor is at fault for not deploying the necessary and proper traffic control, resulting in the citizen becoming confused and driving in a location not intended for traffic, or if the transition from the side road to the project was not smooth, then the Agency would determine that the Contractor was responsible for causing the fuel spill.

Result: The Agency would not cover the cost to repair the pavement.

Example 2:

Delineators are installed along the roadway per the project plans. Some of the delineators are knocked over during mowing operations by the Agency or a third party, but the damage was not done by an approved Subcontractor.

Result: The Agency would cover the cost to replace the delineators.

However, the Contractor is at fault if their mowing Subcontractor was responsible for damaging the delineators.

Result: The Agency would not cover the cost to replace the delineators.

Example 3:

Guardrail and end sections are installed along the roadway per the project plans. The project spans two seasons, and during the intervening winter, when the project is inactive, terminal sections are destroyed and panels are damaged due to motor vehicle crashes and/or plow damage that was caused by third parties, but not by the Contractor.

Result: The Agency would cover the cost to replace the guardrail and end sections.

Example 4:

A section of road is being reclaimed. After normal work hours, a severe rainstorm causes flooding damage to the roadway, creating potholes and washouts. The Contractor returns to the project the morning of the next business day and finds that a vehicle crash occurred earlier, damaging a signal pole. While the storm is considered to be an "Act of God," the Contractor failed to return to the project during or immediately after the storm to inspect the conditions and implement any necessary actions to ensure that traffic could continue in safe manner through the project site. The Contractor is responsible for the damage to the signal pole.

Result: The Agency would not cover the cost to replace the signal pole.

Example 5:

On a day when severe storms are predicted, the contractor proceeds to commence installation of a large culvert. A severe storm does indeed occur and the Contractor suspends operations. Heavy rain floods the project site and the stream diversion is overpowered, the excavation work is undermined, and the newly installed culvert is washed downstream and damaged. While the storm is considered to be an "Act of God," the Contractor chose to proceed despite the weather forecast. The Contractor is responsible for the damage to the excavated area and the culvert.

Result: The Agency would not cover the cost to repair the excavated area and replace the culvert.

Example 6:

The location of a utility conduit for communication lines is altered slightly to avoid interference with other utilities, but this information about the rerouted conduit is not provided to other project personnel. The guardrail Subcontractor subsequently drives guard rail posts through the conduit during their installation operations, severing the conduit and communication lines. The Contractor is responsible for knowing that the conduit's location had been altered and for providing specific information about that to their personnel and their Subcontractors. The guardrail Subcontractor did not know about the new conduit location and the fault for that lies with the Contractor.

> Result: The Agency would not cover the cost to replace the conduit and communication lines.

Example 7:

During paving operations, a paver's hydraulic hose ruptures, resulting in a hydraulic fluid leak. The Contractor and/or their Subcontractors are responsible for the maintenance and repair of their equipment.

> Result: The Agency would not cover the cost to repair the paver's hydraulic hose.

Damage Investigation and Reporting Process

Once any damage is discovered at the project site, the following process should be followed:

1. The Contractor will inspect the damaged area and determine the responsible party or parties. The Contractor will gather all possible information concerning the damage, including police reports, eyewitness accounts, inquiries made to the Agency's staff, and from any other relevant personnel.

2. Until the Agency can determine whether is the damage was *"beyond the control of and without the fault or negligence of the Contractor,"* the Contractor needs to protect their interests. The Resident Engineer will notify the Contractor that no decision will be made regarding responsibility for the damage until determination has been made regarding who did the damage and the circumstances that resulted in the damage.

3. The Resident Engineer will also notify the Contractor that that its failure to adequately investigate and report information about the damage may result in a finding of fault or negligence on its part.

4. The Resident Engineer shall contact Operations staff (Maintenance District or Area) to determine what, if anything, the Operations staff knows concerning the damage event. The Resident Engineer shall also contact any State or local law enforcement and emergency personnel involved. These efforts by the Resident Engineer may also serve as a check on the thoroughness of the Contractor's efforts to obtain the relevant information.

5. The Resident Engineer will review the situation and issues with the Regional Construction Engineer to determine whether or not the Agency is responsible for paying the cost for the repair, replacement, and restoration of the damaged work.

6. If the Agency determines the damage was *"beyond the control of and without the fault or negligence of the Contractor,"* in addition to paying the cost to for the repair, replacement, and restoration of the damaged work, the Resident Engineer will provide all information concerning the event to VTrans' Risk Management Section.

7. If the Agency determines the damage was not *"beyond the control of and without the fault or negligence of the Contractor,"* the Resident Engineer will notify the Contractor in writing of the Agency's decision that the Contractor should be responsible for paying the cost for the repair, replacement, and restoration of the damaged work. As always, the Contractor retains their right to file a claim if they want to dispute the Agency's decision.

8. VTrans' Finance Administration or Risk Management Sections may pursue vehicle operators responsible for crashing into guardrails or light posts, for example and causing damage to State property. If the Agency holds a Contractor responsible for the damage and is later reimbursed by those who actually causing the damage, the Contractor will be reimbursed by the State to the same extent that the State is reimbursed.

State of Vermont
Agency Of Transportation
Construction Section

Buy America Provisions

Guidance

General

This document provides the Resident Engineer and Regional Staff guidance on enforcing the Buy America Provisions when procuring construction materials for VTrans projects.

Contents

This document has four sections:

1. A citation from *Title 23 U.S. Code § 313 Buy America*
2. A link to FHWA's *Buy America Q & A for Federal-aid Program*
3. Citations from *Subsection 107.22 Buy America Provisions* and *Subsection 700.02(a) Materials Certifications* of the Standard Specifications for Construction
4. Responsibilities

1. Title 23 USC § 313 Buy America

(a) *Notwithstanding any other provision of law, the Secretary of Transportation shall not obligate any funds authorized to be appropriated to carry out the Surface Transportation Assistance Act of 1982 (96 Stat. 2097) or this title and administered by the Department of Transportation, unless steel, iron, and manufactured products used in such project are produced in the United States.*

(b) The provisions of subsection (a) of this section shall not apply where the Secretary finds-

(1) that their application would be inconsistent with the public interest;

(2) that such materials and products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) that inclusion of domestic material will increase the cost of the overall project contract by more than 25 percent.

(c) For purposes of this section, in calculating components' costs, labor costs involved in final assembly shall not be included in the calculation.

(d) The Secretary of Transportation shall not impose any limitation or condition on assistance provided under the Surface Transportation Assistance Act of 1982 (96 Stat. 2097) or this title that restricts any State from imposing more stringent requirements than this section on the use of articles, materials, and supplies mined, produced, or manufactured in foreign countries in projects carried out with such assistance or restricts any recipient of such assistance from complying with such State imposed requirements.

(e) Intentional Violations.-If it has been determined by a court or Federal agency that any person intentionally-

> *(1) affixed a label bearing a "Made in America" inscription, or any inscription with the same meaning, to any product used in projects to which this section applies, sold in or shipped to the United States that was not made in the United States; or*
>
> *(2) represented that any product used in projects to which this section applies, sold in or shipped to the United States that was not produced in the United States, was produced in the United States; that person shall be ineligible to receive any contract or subcontract made with funds authorized under the Intermodal Surface Transportation Efficiency Act of 1991 pursuant to the debarment, suspension, and ineligibility procedures in subpart 9.4 of chapter 1 of title 48, Code of Federal Regulations.*

(f) Limitation on Applicability of Waivers to Products Produced in Certain Foreign Countries.-If the Secretary, in consultation with the United States Trade Representative, determines that-

> *(1) a foreign country is a party to an agreement with the United States and pursuant to that agreement the head of an agency of the United States has waived the requirements of this section, and*
>
> *(2) the foreign country has violated the terms of the agreement by discriminating against products covered by this section that are produced in the United States and are covered by the agreement, the provisions of subsection (b) shall not apply to products produced in that foreign country.*

(g) Application to Highway Programs.-The requirements under this section shall apply to all contracts eligible for assistance under this chapter for a project carried out within the scope of the applicable finding, determination, or decision under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.), regardless of the funding source of such contracts, if at least 1 contract for the project is funded with amounts made available to carry out this title.

2. FHWA's Buy America Q and A for Federal-aid Program

The *FHWA's Buy America Q and A for Federal-aid Program* may be found at the following URL:

http://www.fhwa.dot.gov/construction/contracts/buyam_qa.cfm

3. Standard Specifications for Construction

Subsection 107.22 Buy America Provisions

(a) General. All steel 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 (i.e., smelting and any subsequent process which alters the steel material's physical form or shape or changes its chemical composition) must occur within the United States to be considered of domestic origin. This includes processes such as rolling, extending, machining, bending, grinding, and drilling.

(b) Use of Foreign Materials. 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. The Contractor shall notify the Engineer if it intends to use any foreign materials on the project.

(c) Coatings on Steel/Iron. In accordance with 23 CFR 635.410, iron has been added to the materials now subject to the Buy America requirements, and the action of applying a coating to a covered material (i.e., steel and iron) is now 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 a material subject to requirements of Buy America. Buy America requirements of 23 CFR 635.410 are applicable to all Federal-Aid highway construction projects (NHS and non-NHS).

Subsection 700.02(a) Materials Certifications

(a) General. When these Specifications require a certification, the certification will be approved prior to the use of the material, unless otherwise directed by the Engineer. In all cases, certifications must be approved prior to payment.

All material used on the basis of a materials certification may be sampled and tested at any time. The fact that a material is used on the basis of a certification shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements of the Contract and any such material not conforming to such requirements will be subject to rejection whether in place or not.

New materials, previously certified and purchased by the Contractor for use on an Agency contracted project, may be used on another Agency project provided that the Contractor submits a sworn statement identifying the past project which the materials were originally certified for, attests that the material certifications were previously furnished and accepted by the Agency for the past project, and certifies that the new materials were part of the original quantity purchased.

When Agency approval is given for Working Drawings under the requirements of Section 105 and the referenced drawings or project Special Provisions have identified a component of an item by a specific product name and/or number, the Engineer may waive all or part of any certification or testing requirements for that particular product.

The Agency reserves the right to refuse the use of materials where acceptance is based only on certification.

Within each Subsection, materials designated to conform to another Subsection shall require the certification type of the referenced Subsection.

For steel and iron materials, the following requirements shall apply:

> *(1) To comply with Buy America provisions, a manufacturer must certify that all manufacturing processes have occurred in the United States.*
>
> *(2) To identify a chain of custody documentation trail that the product meets the Buy America provisions, each supplier or fabricator involved in the manufacturing processes of a product will be required to include in its certification a statement that each process performed by them which alters the physical form or shape or changes its chemical composition was entirely performed in the United States.*
>
> *(3) All certifications shall be forwarded to the Vermont Agency of Transportation Materials Section.*

4. <u>Responsibilities</u>

It is the responsibility of the contractor to report "*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.*" It is the responsibity of the Resident Engineer to review and document this usage through a *Written Order* acknowledging and accepting the Contractor's request.

When exceptions to the Buy America provisions occur, other than "*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,*" they must be reported to FHWA for determination of actions to be taken.

VTrans
Construction Section
1 National Drive
Montpelier, VT 05633-5001
Phone: (802) 828-2593 Fax: (802) 828-2795

Equipment Assignment Record

Record # *392*
AOT Tag Number
Equipment Type
Make
Model
Serial Number
AdditionalEquipment:

Employee Name
Employee Number
Region Assigned to
ProjectName:
Signature

Recieved Date

Transferred From ***Employee Number:*** ***Date:***

Signature

SAMPLE - See Field Forms CD

VTrans
Construction Section
1 National Drive
Montpelier, VT 05633-5001
Phone: (802) 828-2593 Fax: (802) 828-2795

Equipment Assignment Record

Record # 295

AOT Tag Number	18606
Equipment Type	Data Collectors
Make	TriPod Data Systems (TDS)
Model	Ranger ST1-MY5CMDB
Serial Number	SS26A18221

AdditionalEquipment:

Transferred From

Region Assigned to	Northwest
Employee Name	John Doe
Signature	John Doe
Date	3/2/2012

Transferred To

Region Assigned to	Southwest
Employee Name	Lance Kool
Signature	Lance F. Kool
Recieved Date	3/22/2012

State of Vermont
Agency Of Transportation
Construction Section

Material Exceptions and Explanations

Guidance

Materials incorporated into VTrans projects require appropriate documentation. When materials are not properly documented a "material exception" must be developed that justifies material quality. The materials quality may be defined by test results, specific forms of inspection or certifications. While it is recognized that exceptions will occur, it is the responsibility of VTrans to maintain project oversight including the decision making process associated with all material usage.

The explanations for justifying a material exception should include five fundamental elements:

1. Proper identification of the material, e.g., name and Pay Item.
2. A description of the quantity of material affected and its location and placement conditions.
3. An accurate description of the failure mechanism, e.g., sampling overlooked, quantitative statement of the noncompliance (excessive slump measured), Contractor-placed material before sampling was achieved or other clear description of the nonconformance with VTrans plans and specifications.
4. The projected consequence and further elaboration on the magnitude of the consequence, e.g., excessive slump suggests excess water or admixture that can result in segregation of the concrete during or after placement. The slump exceedance by 3 inches or 50% raises significant concern for mix segregation, coring was conducted to confirm concrete quality.
5. Corrective action is required for all exceptions. The corrective action can be a further examination of the material (nondestructive evaluation), an action to prevent recurrence, retrospective testing (destructive evaluation) up to and including removal and replacement of the defective material.

These steps are very clearly listed in the Construction Manual.

There are several specific parameters that should be addressed when the material exception explanations are written. Contract changes, timing of activities, and any mitigating circumstances (such as unforeseen bad weather and "Acts of God") should be included in the explanation.

For nonconforming tests, the basis of the decision should be recorded when it is made, so that any issues or clarifications needed from the Materials Section is incorporated into your decision. The word "minor" is not an acceptable explanation unless the quantity is so small that testing will cost more than the product itself and there is no direct safety implication if the material is permanently incorporated into the project.

The following are not acceptable material exception explanations: Inadequate lead time for materials sampling and testing; incomplete or errant communications on quantity or quality from the Contractor; or, a statement "Verified by the Engineer."

State of Vermont
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
PROJECT MATERIALS ACCEPTANCE REPORT

Project Name: Bristol **Project Number:** STP F021-1(15)

The following material(s) was previously certified for use on the above project. The Resident Engineer has verified that the contractor continues to use the same material described on the original certification; amended only by the quantity. No other change to material, manufacturer, product, lot, or heat has occurred.

Project Line No.	Item No. & Name:	Product Name:	Manufacturer/Supplier:
506.60	Structural Steel		Casco Bay Steel

Original Certified Quantity: 45,000 Lb
Increase Quantity by: 1,528 Lb
Total Quantity to be Certified: 46,528 Lb

Note: Do not exceed 20% of the original certified quantity. If the increase in quantity exceeds 20% of the original quantity, an additional certification must be submitted.

Date: March, 9th 2014

Submitted by:

J. Smith
Resident Engineer

cc: C & I.A. Unit Supervisor
RE project file
Regional project file

TA 555 (Advance Certification List)

State of Vermont
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
PROJECT MATERIALS ACCEPTANCE REPORT

Project Name: ANYTOWN **Project Number:** AAA000(00)

The following materials, covered by the Agency's "Advance Certification List", were inspected and authorized for use on the above project.

Project Line No.	**Item No. & Name:**	**Product Name:**	**Quantity:**	**Manufacturer/Supplier:**
0250	651.15, Seed	Catamount Seed	50 Lb	L.D. Oliver Seed Company P.O. Box 156, Sunset Ave. Milton, VT 05468-0156
0255	651.18 Fertilizer	Green Mountain Fertilizer	1.5 Tons	Same as above
0260	651.20 Agg. Limestone	GMF Pel Lime	0.75 Tons	Same as above

Additional Information:

The quantities listed above are the contract quantity. These items may run over contract quantity and if they do another TA555 will be submitted

Date: October 2, 2014 **Submitted by:**

_____
Jane Smith, Resident Engineer

cc: C & I.A. Unit Supervisor
RE project file
Regional project file

State of Vermont
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
PROJECT MATERIALS ACCEPTANCE REPORT

Project Name: Any town **Project Number:** STP 9999(8)

The following materials, covered by the Agency's "Approved Products List", were inspected and authorized for use on the above project.

Project Line No.	**Item No. & Name:**	**Product Name:**	**Quantity:**	**Manufacturer/Supplier:**
0430	646.400 Durable Pavement marking	Stud-Gard SG7 Thermoplastic	145,000 Lf	Ennis Paints, Inc.

Additional Information:

Date: 4/10/14 **Submitted by:**

Alfred E. Newman, Resident Engineer

cc: C & I.A. Unit Supervisor (Original document)
RE project file
Regional project file

TA 555 (Waive Small Qty)

State of Vermont
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH DIVISION
PROJECT MATERIALS ACCEPTANCE REPORT

Project Name: Anytown **Project Number:** STP 9999(8)

Certification requirements for the following materials are hereby waived, as per the State of Vermont Agency of Transportation Standard Specifications for Construction - Section 700, Subsection 700.01 General Statement, paragraph 3, which states that "In the case of small quantities of materials having a cost of less than $5,000.00 and that are not directly involved with the safety of the structure or the roadway, the Agency may waive the requirement for certification."

Project Line No.	**Item No. & Name:**	**Product Name:**	**Manufacturer/Supplier:**
0355	649.51 Geotextile for Silt Fence	GT 180	Propex .

Quantity Waived: 25 SY

Date: _____

Submitted by:

_____
,Resident Engineer

cc: C & I.A. Unit Supervisor
RE project file
Regional project file

TA 557 (Minor Quantity)

Distribution:
C&IA Supervisor
RE Project File
Regional Project File

STATE OF VERMONT
AGENCY OF TRANSPORTATION
MATERIALS & RESEARCH SECTION

PROJECT MATERIALS ACCEPTANCE REPORT
DECLARATION OF MINOR QUANTITY

Project Name: _____ Number: _____

This is to certify that the listed materials used on the above project meet the requirement of a minor quantity as defined in the Material Sampling Manual and were accepted for their intended use on the basis of satisfactory performance and visual

A minor quantity is defined as any total quantity, for the whole project, of one material, which is equal or less than 300 CY for aggregates and 20% of the minimum sampling frequency for structural concrete or bituminous concrete.

Quantity	Unit	Pay Item and Name	Material Name	Supplier/ Source

Additional Information:

_____ Date: _____
Resident Engineer.

Vermont Agency of Transportation **Materials and Research Section**

Notification of Out of Compliance Material

Notification Date: 12/29/2014

Distribution list: Chad Greenwood, Resident Engineer
Ann Gammell, Regional Const. Engineer
Acting Materials Engineer or Designee
Donal Morris, C & IA Supervisor

Test results for the following material sample do not meet values established by the project specifications:

Project Name:	JAMAICA		Project Number:	BRF 015-1(23)	
Sample Number:	jstaab136E140121		Line Item:	0045	
Pay Item No.	301.25		Pay Item Name:	subbase of crushed gravel, coarse graded	
Material Code:	704.05		Material Name:	crushed gravel for subbase	
Date Sampled:	06/03/2013		Date Tested:	06/14/2013	
Quantity Represented:	3,000cy	Sampled By:	Jack Williams	Tested By:	J. Staab

TEST METHOD	TEST RESULT	SPECIFICATION VALUE		AMOUNT OUTSIDE
		MINIMUM	MAXIMUM	
AASHTO T-96	40.2		40	0.2

POTENTIAL IMPACT OF FAILURE ON MATERIAL PERFORMANCE:

TO BE COMPLETED BY THE RESIDENT ENGINEER:

Please use the drop-down box below to select the intended disposition of the material represented by this sample.

The material will be: Removed from the project. ⇦ **Select Here**

If the material is not removed and will be incorporated into the project, please provide a brief narrative of explanation.

⇨ The material was never used on project.

TO BE COMPLETED BY THE REGIONAL CONSTRUCTION ENGINEER:

Please use the drop-down box below to indicate concurrence/nonconcurrence with the intended disposition of the material represented by this sample.

The Regional Construction Engineer has reviewed and concurs with the above recommendation.

⇧ **Select Here**

Return completed form to the Materials Engineer with a copy to the C & IA Supervisor.

Vtrans - Construction Section
2010 Mat Density Core Location Selection Sheet

Project Name:		Date Paved:	
Project Number:		Date Cored:	
Contract ID / CES #:		Source:	
Course (Base, Binder, Top):		Plant:	
Item # / Mix Type:		Resident Engineer:	

MM Locations	Begin	End	Position
	1.15	3.17	ML Travel

Buffers (ft)

Tranverse Joints:	50.0
Center Joint:	0.50
Edge Joint:	0.50

Lane Width (ft): 12.0

Effective Paved Width: 11.0

Lot / Core Number	Sublot Length (ft)	Sublot Start (MM)	Sublot End (MM)	Random Number	Longitudinal Core Location (MM)	Non-Core Location? (Y / N)	Adjusted Longitudinal Location	Effective Paved Width (ft)	Random Number	Tranverse Core Location (ft)
1	1760.9	1.159	1.493	0.884	1.454			11.0	0.171	2.38
2	1760.9	1.493	1.826	0.366	1.615			11.0	0.833	9.66
3	1760.9	1.826	2.160	0.066	1.848			11.0	0.040	0.94
4	1760.9	2.160	2.494	0.371	2.284			11.0	0.196	2.65
5	1760.9	2.494	2.827	0.042	2.507			11.0	0.273	3.50
6	1760.9	2.827	3.161	0.968	3.150			11.0	0.820	9.52

Run Date and Time: 4/1/2015 8:52

Notes:
1. Yellow shaded cells are required inputs - Press F9 to select new random numbers.
2. To generate random numbers and core locations, press the F9 key. Print results and investigate if "non core" areas were generated.
3. If a longitudinal core location falls on a non core area (eg. Bridge) add the length of the bridge to the original location to arrive at an adjusted core location upstation. If the adjusted location results in the core falling within the following lot, repeat the same by subtracting the length of bridge to arrive at the adjusted core location backstation.
4. The calculations above may be overridden by the requirements of the transverse buffer no-core location. Should this be the case, the adjusted core location will be a point 75' (25m) upstation or backstation in that order as appropriate in accordance with note #3.

VTrans - Construction Section
2015 Mat Density Core Location Selection Sheet

Project Name:		Date Paved:	
Project Number:		Date Cored:	
Contract ID / CES #:		Source:	
Course (Base, Binder, Top):		Plant:	
Item # / Mix Type:		Resident Engineer:	

Station Locations	Begin	End	Position
	000+53	023+39	ML Passing

Buffers (ft)

Tranverse Joints:	50.0
Center Joint:	0.50
Edge Joint:	0.50

Lane Width (ft): 12

Effective Paved Width: 11.0

Lot / Core Number	Sublot Length (ft)	Sublot Start	Sublot End	Random Number	Longitudinal Core Location	Non-Core Location? (Y / N)	Adjusted Longitudinal Location	Effective Paved Width (ft)	Random Number	Tranverse Core Location (ft)
1	364.3	001+03.0	004+67	0.946	004+48			11.0	0.315	3.97
2	364.3	004+67.3	008+32	0.271	005+66			11.0	0.395	4.85
3	364.3	008+31.7	011+96	0.921	011+67			11.0	0.651	7.66
4	364.3	011+96.0	015+60	0.301	013+06			11.0	0.964	11.11
5	364.3	015+60.3	019+25	0.109	016+00			11.0	0.266	3.42
6	364.3	019+24.7	022+89	0.512	021+11			11.0	0.533	6.36

Run Date and Time: 4/1/2015 8:52

Notes:
1. Yellow shaded cells are required inputs - Press F9 to select new random numbers.
2. To generate random numbers and core locations, press the F9 key. Print results and investigate if "non core" areas were generated.
3. If a longitudinal core location falls on a non core area (eg. Bridge) add the length of the bridge to the original location to arrive at an adjusted core location upstation. If the adjusted location results in the core falling within the following lot, repeat the same by subtracting the length of bridge to arrive at the adjusted core location backstation.
4. The calculations above may be overridden by the requirements of the transverse buffer no-core location. Should this be the case, the adjusted core location will be a point 75' (25m) upstation or backstation in that order as appropriate in accordance with note #3.

VERMONT AGENCY OF TRANSPORTATION
CONSTRUCTION SECTION

BITUMINOUS CONCRETE PAVEMENT CORE DATA SHEET

PROJECT NAME & No.: _____

PPMS # (i.e. 02B125): _____

LINE ITEM #: _____ REPRESENTED QUANTITY:_____

HOT MIX PLANT LOCATION: _____

PAVEMENT TYPE (CIRCLE ONE): TYPE I TYPE II TYPE III TYPE IV

MATERIAL CODE (CIRCLE ONE): 406.25(75blow) 406.27(50 blow) 490.30

SUPERPAVE NO GYRATIONS: _____

AVERAGE DAILY MAX. SPECIFIC GRAVITY: _____

DATE PAVED: _____

DATE CORED: _____

DESIGN DEPTH: _____

DENSITY SPEC:_____

Core Number	**Position**	
	Station or MM	**Offset**

CORES PICKED UP AND DELIVERED BY: _____ DATE: _____

RESIDENT ENGINEER PHONE: _____ FAX: _____

PAVING CONTRACTORS NAME: _____

Deck Pre-Placement Meeting Agenda

(Not for use on bare-deck bridges)

Date: _____

Project: _____

Contractor: _____

Producer: _____

Attendees:

1. Has a mix design been submitted and approved (either designed by producer or state)?

2. Anticipated day and time for pour?

3. What time will plant be open for inspector to run gradations?

4. How many yards and expected duration of pour?

5. Spacing between trucks and load size?

6. How is concrete being placed on deck?

7. Keep the leading edge of concrete no more then 4 feet in front of the screed. Adjust truck spacing or pumping rate to accomplish this.

8. Name of representative from the concrete producer that will be on site to administer / supervise the addition of mix water / chemical admixture? (The Engineer shall be notified prior to any change in water or admixture to be added on project).

9. Water meters will be used to determine how much water is added to each load of concrete. (Check all truck water meter lines prior to placement to be sure the lines are clear of rust and meters work properly).

10. What is the anticipated weather (Ambient air temps 40F-90F, 85F max for class AA concrete)? What is the procedure for cancellation of placement due to weather?

11. Are there procedures in place for maintaining concrete temperatures between 50F-85F (80F max. for class AA) for longer transport distances?

12. What is the target slump requested by the Contractor?

13. What is the proposed set retarder schedule for preventing concrete from taking initial set prior to the deck being fully placed? Is the schedule dependent on weather?

14. What is the estimated size of work force for deck pour? Supply a diagram or explain the number and function of positions needed.

15. Which details in the plans call for the use of epoxy bonding compound (i.e. expansion dams and adjacent concrete pours)? At what point in the pour will this be applied?

16. What type of screed machine will be used?

    a. Automatic Roller screeds:
        i. What type of drags such as pans, burlap, none, etc.

        ii. Does machine have a skew kit?

        iii. How is machine aligned?

        iv. How are rails supported?

        v. If rail support saddles need to be removed from a finished area of concrete, extra concrete shall be used to fill the holes and be screened.

        vi. When will dry run be done?

    b. Vibratory Screeds:
        i. How will the screed be propelled?

        ii. How will concrete level be maintained ahead of screed?

        iii. How is machine aligned?

        iv. How is machine supported?

        v. If rail support saddles need to be removed from a finished area of concrete, extra concrete shall be used to fill the holes and be screened.

vi. When will dry run be done?

vii. When starting to move with the vibratory screed after stopping, it will sometimes ride up on the fresh concrete, watch for those ridges.

17. Is any hand finishing anticipated after the screed machine? (Work the surface as little as possible, close it up best that you can).

18. Proper vibrator technique is to insert in a straight down motion for 1-2 seconds and then withdraw it completely within 2-3 seconds.

19. How will work bridge(s) be supported, moved and what will they be used for?

20. What is your proposed initial wet cure method?

    a. Will it be pre-wetted?

    b. Will 10 minute lag time from finishing to application be met?

    c. Is there any special surface texturing that needs to be done?

    d. How will it be kept wet for duration of deck placement?

    e. Two layers of burlap are required per section 501.17(b)(2) and 541.17(b)(2) if burlap is the chosen method for curing.

    f. How will the wet cure be maintained for 10 days?

    g. Who will be responsible for maintaining the curing during non-working hours and weekends?

    h. Be sure you have enough burlap precut prior to starting the pour.

    i. If finishers fall behind in curbs areas how will that affect cure application?

    j. Please wipe concrete off rebar that is to be poured over at a later date, for example the curb steel.

21. What are your proposed fogging methods?

a. Demonstrate equipment prior to day of placement.

b. Set equipment up prior to start of pour.

c. Dedicated person to operate it?

22. What are the provisions for a delay of 20 minutes or greater between trucks?

    a. How will evaporation and drying of the surface be prevented in unfinished concrete?

    b. Will you have material ready for building an emergency bulkhead?

    c. How much unfinished concrete will be exposed during delay?

    d. Have enough plastic readily available to cover concrete if it rains.

23. If you think you may need more concrete after pour is over as back up, place it on plywood, plastic or some other non-absorptive material and keep covered with damp burlap.

24. How many people will be available to help collect and transport samples to the test area? (The concrete shall be sampled at the point of placement, at discharge of pump or chute if a bucket is used).

25. A plywood or plank walkway should be provided on top of the rebar mat if sample buckets will be carried by hand across the rebar mat without adequate walkways along the sides of the bridge.

26. Where is the proposed testing area? It will need a level stable testing platform and its own pressurized water source for cleaning equipment. (If you propose a mixer as the source than that mixer shall remain available for the inspector to use).

27. Where will the curing box be placed? Make sure it is level.

28. (For resident and contractor) What is the number of process control cylinders that are required, such as early break field cure cylinders? Do air test on first load at point of discharge.

29. If this deck has epoxy coated rebar:
    a. Do the vibrators have rubber coated head?

    b. What are the repair procedures for epoxy steel?

c. Banging shovels and come-a longs on the steel is not permitted. If you are going to have things like generator or wheelbarrows on the rebar, make sure plywood or similar protection is used.

30. Is there to be an application of silane to the concrete?

    a. What is the products name you will be using?

31. Concrete must be above freezing, or above the manufactures lowest allowable temperature, if the concrete is below this how do you propose warming the concrete?

32. Cold Weather Concrete Decks (For concrete that contains slag when temperature is expected to be below 50 F during the cure period or 40 F for all other concrete)

    a. Approved heating/ insulating material on project prior to pour.

    b. What is the lowest anticipated ambient air temperature for placement?

    c. If concrete temperature drops below 50 F cure period will be extended.

    d. Where will temperature recorders be located?

    e. Have temperature recorders been calibrated within a 12 month period per 50107(b)(7)?

    f. What is the process for cool down at the conclusion of the cure period? The transition shall take at least 48 hours and at no time exceed a concrete temperature change of more than 1 degree Fahrenheit per hour. (501.07(b)(4)).

    g. Concrete shall not placed on a surface or in forms that are frozen…or that contain frozen materials. The frozen surface or forms shall be completely thawed the day previous to the placing of concrete and shall be kept continuously thawed until the concrete is poured.

Additional Notes:

Bare Deck Pre-Placement Meeting Agenda

Date: _____

Project: _____

Contractor: _____

Producer: _____

Attendees:

1. Has a mix design been submitted and approved (either designed by producer or state)?

2. Anticipated day and time for pour?

3. What time will plant be open for inspector to run gradations?

4. How many yards and expected duration of pour?

5. Spacing between trucks and load size?

6. How is concrete being placed on deck?

7. Keep the leading edge of concrete no more then 4 feet in front of the screed. Adjust truck spacing or pumping rate to accomplish this.

8. Name of representative from the concrete producer that will be on site to administer / supervise the addition of mix water / chemical admixture? (The Engineer shall be notified prior to any change in water or admixture to be added on project).

9. Water meters will be used to determine how much water is added to each load of concrete. (Check all truck water meter lines prior to placement to be sure the lines are clear of rust and meters work properly).

10. What is the anticipated weather (Ambient air temps 40F-90F, 85F max for class AA concrete)? What is the procedure for cancellation of placement due to weather?

11. Are there procedures in place for maintaining concrete temperatures between 50F-85F (80F max. for class AA) for longer transport distances?

12. What is the target slump required by the Contractor?

13. What is the proposed set retarder schedule for preventing concrete from taking initial set prior to the deck being fully placed? Is the schedule dependent on weather?

14. What is the estimated size of work force for deck pour? Supply a diagram or explain the number and function of positions needed.

15. Which details in the plans call for the use of epoxy bonding compound (i.e. expansion dams and adjacent concrete pours)? At what point in the pour will this be applied?

16. What type of screed machine will be used?

    a. Automatic Roller screeds:
        i. What type of drags such as pans, burlap, none, etc.
        ii. Does machine have a skew kit?
        iii. How is machine aligned?
        iv. How are rails supported?
        v. What is the support spacing?
        vi. If rail support saddles need to be removed from a finished area of concrete, extra concrete shall be used to fill the holes and be screeded.
        vii. When will dry run be done?

    b. Vibratory Screeds:
        i. How will the screed be propelled?
        ii. How will concrete level be maintained ahead of screed?
        iii. How is machine aligned?
        iv. How is machine supported?

v. What is the support spacing?

vi. If rail support saddles need to be removed from a finished area of concrete, extra concrete shall be used to fill the holes and be screened.

vii. When will dry run be done?

viii. When starting to move with the vibratory screed after stopping, it will sometimes ride up on the fresh concrete, watch for those ridges.

17. Is any hand finishing anticipated after the screed machine? (Work the surface as little as possible, close it up best that you can).

18. Is the 10 foot straight edge on site? If not when will it be?

19. Do you have an approved Turf Drag material?

20. What is your method of applying the Turf Drag going to be?

21. Is the Turf Drag apparatus available to be inspected?

22. If not when?

23. Do you have a dedicated person for this task?

24. Do they have any experience with this?

25. Do they know what type of finish is acceptable?

26. Proper vibrator technique is to insert in a straight down motion for 1-2 seconds and then withdraw it completely within 2-3 seconds.

27. How will work bridge(s) be supported, moved and what will they be used for?

28. What are your proposed fogging methods?

    a. Demonstrate equipment prior to day of placement.

b. Set equipment up prior to start of pour.

c. Dedicated person to operate it?

29. What is your proposed initial wet cure method?

a. If burlap will it be pre-wetted?

b. Will 10 minute lag time from finishing to application be met?

c. Is there any special surface texturing that needs to be done?

d. How will it be kept wet for duration of deck placement?

e. How will the wet cure be maintained for 10 days?

f. Be sure you have enough burlap precut prior to starting the pour.

g. If finishers fall behind in curbs areas how will that affect cure application?

h. Please wipe concrete off rebar that is to be poured over at a later date, for example the curb steel.

30. What are the provisions for a delay of 20 minutes or greater between trucks?

a. How will evaporation and drying of the surface be prevented in unfinished concrete?

b. Will you have material ready for building an emergency bulkhead?

c. How much unfinished concrete will be exposed during delay?

d. Have enough plastic readily available to cover concrete if it rains.

31. If you think you may need more concrete after pour is over as back up, place it on plywood, plastic or some other non-absorptive material and keep covered with damp burlap.

32. How many people will be available to help collect and transport samples to the test area? (The concrete shall be sampled at the point of placement, at discharge of pump or chute if a bucket is used).

33. A plywood or plank walkway should be provided on top of the rebar mat if sample buckets will be carried by hand across the rebar mat without adequate walkways along the sides of the bridge.

34. Where is the proposed testing area? It will need a level stable testing platform and its own pressurized water source for cleaning equipment. (If you propose a mixer as the source than that mixer shall remain available for the inspector to use).

35. Where will the curing box be placed? Make sure it is level.

36. (For resident and contractor) What is the number of process control cylinders that are required, such as early break field cure cylinders? Do air test on first load at point of discharge.

37. If this deck has epoxy coated rebar:
    a. Do the vibrators have rubber coated head?

    b. What are the repair procedures for epoxy steel?

    c. Banging shovels and come-alongs on the steel is not permitted. If you are going to have things like generator or wheelbarrows on the rebar, make sure plywood or similar protection is used.

38. Who is going to be doing the longitudinal grooving?

39. When are they scheduled to do the work?

40. Depth gauges are to be supplied to the Resident for use in checking the groove depths.

41. Cold Weather Concrete Decks (For concrete that contains slag when temperature is expected to be below 50 F during the cure period or 40 F for all other concrete)

    a. Approved heating/ insulating material on project prior to pour.

    b. What is the lowest anticipated ambient air temperature for placement?

    c. If concrete temperature drops below 50 F cure period will be extended.

    d. Where will temperature recorders be located?

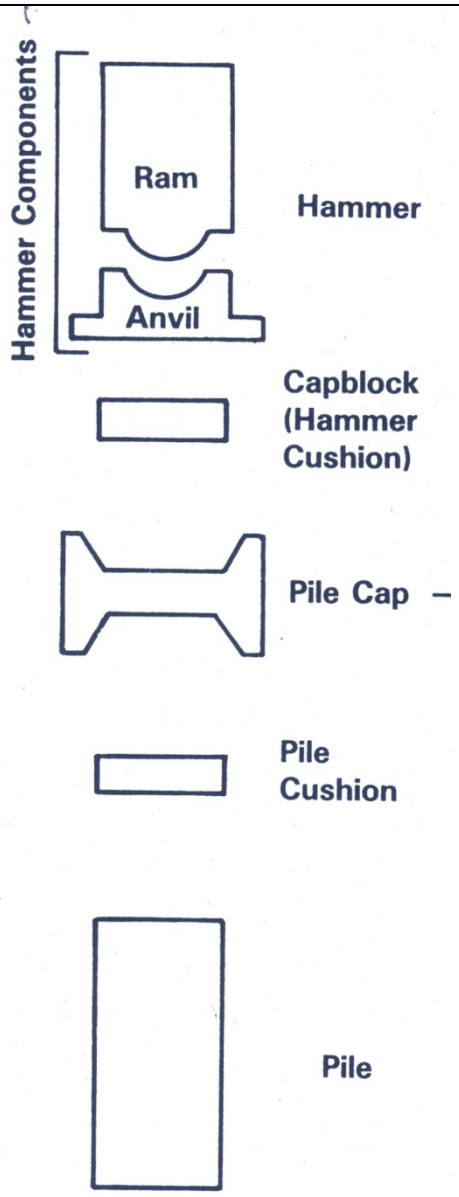
e. Have temperature recorders been calibrated within a 12 month period per 50107(b)(7)?

f. What is the process for cool down at the conclusion of the cure period? The transition shall take at least 48 hours and at no time exceed a concrete temperature change of more than 1 degree fahrenheit per hour. (501.07(b)(4))

g. Concrete shall not placed on a surface or in forms that are frozen…or that contain frozen materials. The frozen surface or forms shall be completely thawed the day previous to the placing of concrete and shall be kept continuously thawed until the concrete is poured.

Additional Notes:

Pile and Driving Equipment Data Form

Project Name: **Project No.:** **Route No.:**	**Structure Name:** **Structure No:** **Pile Driving Contractor:** **Foreperson:**
	**Manufacturer:** **Type:** Diesel - Open End **Rated Energy:** kip-ft **Length of Stroke:** ft **Model:** **Serial No:**
	Modifications:
	Material:
	Thickness: in **Area:** in^2
	Modulus of Elasticity – E: ksi
	Coefficient of Restitution-e:
	Also named: **Helmet** **Bonnet** **Anvil Block** **Drivehead** **Weight:** lbs
	Cushion material: **Thickness:** in **Area:** mm^2 **Modulus of Elasticity – E:** ksi **Coefficient of restitution – e:**
	Pile Type & Size: **Length (in Leads):** ft **Weight:** lb/ft **Wall thickness:** in. **Taper:** **Cross Sectional Area:** in^2 **Ultimate Axial Pile Capacity:** kips **Steel Yield Strength:** ksi **Description of Splice:** **Tip Treatment Description:**
Distribution- One copy each to: ☐ **State Structures Engineer** ☐ **State Soils & Foundations Engineer** ☐ **Resident Engineer:**	**NOTE: If mandrel is used to drive the pile, please attach separate manufacturer's detail sheet(s), including weight and dimensions.**
	Submitted by: **Title:** — **Date:**

Z:\Highways\ConstructionMaterials\Construction\Forms\2015 Construction Field Forms\2015 Pile and Driving Equipment Data Form.docx

SAXIMETER BLOW COUNT/STROKE PILE DRIVING RECORD

Pile # _____ Time: Start/stop _____ Date: _____
Project _____ Location _____
Pile Type/size _____ Length _____ Batter _____
Elevation: Ground: _____ Pile Tip _____ Cutoff:
Hammer Type/Size _____ Fuel Setting:_____
Cap/Helmet/Cushion
Contractor _____

Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM	Depth ft	Blow/ft ft	H BPM
0-1			25-26			50-51			75-76		
1-2			26-27			51-52			76-77		
2-3			27-28			52-53			77-78		
3-4			28-29			53-54			78-79		
4-5			29-30			54-55			79-80		
5-6			30-31			55-56			80-81		
6-7			31-32			56-57			81-82		
7-8			32-33			57-58			82-83		
8-9			33-34			58-59			83-84		
9-10			34-35			59-60			84-85		
10-11			35-36			60-61			85-86		
11-12			36-37			61-62			86-87		
12-13			37-38			62-63			87-88		
13-14			38-39			63-64			88-89		
14-15			39-40			64-65			89-90		
15-16			40-41			65-66			90-91		
16-17			41-42			66-67			91-92		
17-18			42-43			67-68			92-93		
18-19			43-44			68-69			93-94		
19-20			44-45			69-70			94-95		
20-21			45-46			70-71			95-96		
21-22			46-47			71-72			96-97		
22-23			47-48			72-73			97-98		
23-24			48-49			73-74			98-99		
24-25			49-50			74-75			99-100		

Remarks	Depth	Min	Interruption Reason

blow/inch

State of Vermont
Agency of Transportation
Pile Record

VERMONT

Project
Item Number
Show Number and Location of Piles, Direction of Station and Stream Flow

Type of Hammer:

Design Bearing
Required Blows/inch at stroke/ft

Pile #	Length in Leads	Actual Cut-off	In Place Length	No. Splices	Final Blow Count	Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						

Engineer: _____ Checked By: _____

VERMONT

Agency of Transportation
Initial Estimate

Contract Id: 07092101 FAIR HAVEN RWIS 1
Location: US ROUTE 4, EXIT 1 TO THE WELCOME CENTER

Contractor: PIKE INDUSTRIES, INC.
249 GRANGER ROAD-BERLIN

BARRE VT 05641
Phone: 802-223-3002

Contract Spec Year: 2006

Current Contract Amount: $72,945.00
Original Contract $72,405.00
Percent Complete: 0.00

Projects: 07E050 FAIR HAVEN RWIS 1
07E054 MENDON RWIS 1

Time Allowed: 43 DAY
Time Charged: 0 S DAY
Percent Time: 0.00 S

Date Let: 09/21/2007
Date Awarded: 09/25/2007
Date Executed: 09/27/2007
Notice to Proceed: 10/19/2007
Work Began:
Completion Date: 11/30/2007
Time Stopped:
Date Accepted:

Counties: MENDON
FAIR HAVEN

SAMPLE

Project No: 07E050 FAIR HAVEN RWIS 1

Project Description: CONSTRUCTION OF AN INFRASTRUCTURE FOR AN RWIS STATION AT THE WELCOME CENTER ON US 4 FAIR HAVEN

Project Amt: $37,470.00

Type of Road: NHS - NON INTERSTATE (US 4)

Category	Line Number	Item Number / Item Description	Quantity	Units	Price	Extensio
1011	0005	204.22 TRENCH EXCAVATION OF EARTH, EXPLORATORY (N.A.B.I.)	1	CY	$75.00	$75.00
1011	0010	204.25 STRUCTURE EXCAVATION	30	CY	$30.00	$900.00
1011	0015	204.30 GRANULAR BACKFILL FOR STRUCTURES	23	CY	$32.00	$736.00
1011	0020	301.35 SUBBASE OF DENSE GRADED CRUSHED STONE	4	CY	$38.00	$152.00
1011	0025	406.25 BITUMINOUS CONCRETE PAVEMENT (PG 58-28)	2	TON	$200.00	$400.00
1011	0030	507.15 REINFORCING STEEL	365	LB	$2.00	$730.00
1011	0035	541.25 CONCRETE, CLASS B	7	CY	$300.00	$2,100.00
1011	0040	630.10 UNIFORMED TRAFFIC OFFICERS	24	HR	$45.00	$1,080.00
1011	0045	630.15 FLAGGERS	24	HR	$25.00	$600.00
1011	0050	635.11 MOBILIZATION/DEMOBILIZATION	1	LS	$14,250.00	$14,250.00
1011	0055	641.10 TRAFFIC CONTROL	1	LS	$1,250.00	$1,250.00
1011	0060	641.15 PORTABLE CHANGEABLE MESSAGE SIGN	2	EACH	$750.00	$1,500.00

SAMPLE

Project No: 07E050 FAIR HAVEN RWIS 1

Project Description: CONSTRUCTION OF AN INFRASTRUCTURE FOR AN RWIS STATION AT THE WELCOME CENTER ON US 4 FAIR HAVEN

Project Amt: $37,470.00

Type of Road: NHS - NON INTERSTATE (US 4)

Category	Line Number	Item Number / Item Description	Quantity	Units	Price	Extensio
1011	0065	649.51 GEOTEXTILE FOR SILT FENCE	29	SY	$7.50	$217.50
1011	0070	651.15 SEED	3	LB	$10.00	$30.00
1011	0075	651.17 SEED, WINTER RYE	5	LB	$10.00	$50.00
1011	0080	651.18 FERTILIZER	31	LB	$2.00	$62.00
1011	0085	651.20 AGRICULTURAL LIMESTONE	0.1	TON	$250.00	$25.00
1011	0090	651.25 HAY MULCH	0.2	TON	$400.00	$80.00
1011	0095	651.35 TOPSOIL	21	CY	$55.00	$1,155.00
1011	0100	652.10 EPSC PLAN	1	LS	$750.00	$750.00
1011	0105	652.20 MONITORING EPSC PLAN	10	HR	$25.00	$250.00
1011	0110	652.30 MAINTENANCE OF EPSC PLAN (N.A.B.I.)	0.5	LU	$2,000.00	$1,000.00
1011	0115	653.55 PROJECT DEMARCATION FENCE	900	LF	$0.20	$180.00
1011	0120	678.21 ELECTRICAL CONDUIT (2")(PVC)	250	LF	$7.75	$1,937.50
1011	0125	678.23 WIRED CONDUIT (2")(PVC)	530	LF	$12.00	$6,360.00
1011	0130	678.26 JUNCTION BOX	2	EACH	$800.00	$1,600.00

SAMPLE

Project No: 07E050 FAIR HAVEN RWIS 1

Project Description: CONSTRUCTION OF AN INFRASTRUCTURE FOR AN RWIS STATION AT THE WELCOME CENTER ON US 4 FAIR HAVEN

Project Amt: $37,470.00

Type of Road: NHS - NON INTERSTATE (US 4)

Category	Line Number	Item Number / Item Description	Quantity	Units	Price	Extensio
1011	9000	678.30 ELECTRICAL CONDUIT SLEEVE (4")(PVC)	0	LF	$6.75	$0.00
		TOTAL CATEGORY 1011 ROADWAY (50% FEDERAL/50% STATE PARTICIPATION)				$37,470.00

SAMPLE

Project No: 07E054 MENDON RWIS 1

Project Description: CONSTRUCTION OF AN INFRASTRUCTURE FOR AN RWIS STATION AT THE VTRANS GARAGE ON US 4 IN MENDON.

Project Amt: $34,935.00

Type of Road: NHS - NON INTERSTATE (US 4)

Category	Line Number	Item Number / Item Description	Quantity	Units	Price	Extensio
1011	0005	201.15 REMOVING MEDIUM TREES	1	EACH	$250.00	$250.00
1011	0010	203.15 COMMON EXCAVATION	13	CY	$50.00	$650.00
1011	0015	204.22 TRENCH EXCAVATION OF EARTH, EXPLORATORY (N.A.B.I.)	1	CY	$75.00	$75.00
1011	0020	204.25 STRUCTURE EXCAVATION	30	CY	$30.00	$900.00
1011	0025	204.30 GRANULAR BACKFILL FOR STRUCTURES	23	CY	$32.00	$736.00
1011	0030	301.25 SUBBASE OF CRUSHED GRAVEL, COARSE GRADED	13	CY	$30.00	$390.00
1011	0035	301.35 SUBBASE OF DENSE GRADED CRUSHED STONE	4	CY	$38.00	$152.00
1011	0040	507.15 REINFORCING STEEL	365	LB	$2.00	$730.00
1011	0045	541.25 CONCRETE, CLASS B	7	CY	$300.00	$2,100.00
1011	0050	630.10 UNIFORMED TRAFFIC OFFICERS	24	HR	$45.00	$1,080.00
1011	0055	630.15 FLAGGERS	24	HR	$25.00	$600.00
1011	0060	635.11 MOBILIZATION/DEMOBILIZATION	1	LS	$14,250.00	$14,250.00
1011	0065	641.10 TRAFFIC CONTROL	1	LS	$1,250.00	$1,250.00

SAMPLE

Project No: 07E054 MENDON RWIS 1

Project Description: CONSTRUCTION OF AN INFRASTRUCTURE FOR AN RWIS STATION AT THE VTRANS GARAGE ON US 4 IN MENDON.

Project Amt: $34,935.00

Type of Road: NHS - NON INTERSTATE (US 4)

Category	Line Number	Item Number / Item Description	Quantity	Units	Price	Extensio
1011	0070	641.15 PORTABLE CHANGEABLE MESSAGE SIGN	2	EACH	$750.00	$1,500.00
1011	0075	649.11 GEOTEXTILE FOR ROADBED SEPARATOR	37	SY	$2.50	$92.50
1011	0080	649.51 GEOTEXTILE FOR SILT FENCE	34	SY	$7.50	$255.00
1011	0085	651.15 SEED	2	LB	$10.00	$20.00
1011	0090	651.17 SEED, WINTER RYE	4	LB	$10.00	$40.00
1011	0095	651.18 FERTILIZER	26	LB	$2.00	$52.00
1011	0100	651.20 AGRICULTURAL LIMESTONE	0.1	TON	$250.00	$25.00
1011	0105	651.25 HAY MULCH	0.2	TON	$400.00	$80.00
1011	0110	651.35 TOPSOIL	18	CY	$55.00	$990.00
1011	0115	652.10 EPSC PLAN	1	LS	$750.00	$750.00
1011	0120	652.20 MONITORING EPSC PLAN	10	HR	$25.00	$250.00
1011	0125	652.30 MAINTENANCE OF EPSC PLAN (N.A.B.I.)	0.5	LU	$2,000.00	$1,000.00
1011	0130	653.55 PROJECT DEMARCATION FENCE	275	LF	$0.20	$55.00
1011	0135	675.50 REMOVING SIGNS	1	EACH	$25.00	$25.00

SAMPLE

Project No: 07E054 MENDON RWIS 1

Project Description: CONSTRUCTION OF AN INFRASTRUCTURE FOR AN RWIS STATION AT THE VTRANS GARAGE ON US 4 IN MENDON.

Project Amt: $34,935.00

Type of Road: NHS - NON INTERSTATE (US 4)

Category	Line Number	Item Number / Item Description	Quantity	Units	Price	Extensio
1011	0140	675.60 ERECTING SALVAGED SIGNS	1	EACH	$30.00	$30.00
1011	0145	678.21 ELECTRICAL CONDUIT (2")(PVC)	130	LF	$7.75	$1,007.50
1011	0150	678.23 WIRED CONDUIT (2")(PVC)	400	LF	$12.00	$4,800.00
1011	0155	678.26 JUNCTION BOX	1	EACH	$800.00	$800.00
		TOTAL CATEGORY 1011	***ROADWAY (50% FEDERAL/50% STATE PARTICIPATION)***			$34,935.00

SAMPLE

Contract Item Placement Report

Contract: **08031401**

BARRE TOWN HES 026-1(38)

Project Number: ***04B198*** ***BARRE TOWN HES 026-1(38)***

Category Number: ***1051*** ***EROSION CONTROL*** *Contractor:* ***J. HUTCHINS,INC.***

Item Code: **0530** **653.20** **TEMPORARY EROSION MATTING**

DWR Date	Report Qty	Location Installed	Auth	Statio		to	Statio	
20080827 0	36	24" Pipe Out (18'x18')/9 sf/sy - FM DAH	Y	14	+	4	RT	+
20080904 0	80	P/R lot drainage swale - FM DAH	Y		+	0		+
		6 ft x 120 lf / 9 sf/sy = 80 SY						
20081106 0	20	Winter ESCP measure - 24" outlet - DAH	Y	14	+	4	RT	+
		Placed temp matting for winter on 24" CPEPES outlet slope (6' x 30') / 9 sf/sy = 20 SY FM DAH						
20081106 0	51.3	Winter ECSP measure - ECHR/302 - DAH	Y	54	+	30	LT	+
		Placed temp matting on slope adjacent to Cobble Hill Rd/US302. (77' x 6') / 9 sf/sy = 51.3 SY FM DAH						
Total Installed to	187.3 SY							

SAMPLE

Vermont Agency of Transportation - Construction Section

2015 Bituminous Pay Adjustments Calculation Sheet

13-Mar-13 13-Mar-13

Project Name:		**Estimate Number:**			
Project Number:		**Estimate Period:**		**Adjustments Included in Contract? (Yes / No):**	
Project ID:				**Air Voids?**	**Select One**
Item #:		**Material Source / Plant:**		**Density?**	
Mix Type:		**Prime Contractor:**		**Ride Spec?**	
Design AC:				**Joint?**	
Bid Price:		**Resident Engineer:**			

Date Paved	Location	Daily Tonnage	Accumulated Daily Tonnage	Average Percent Compaction	Mat Density		Air Voids		Surface Tolerance			Joint Compaction	
					Pay Factor	Pay Adjustment	Pay Factor	Pay Adjustment	IRI	Pay Factor	Pay Adjustment	Pay Factor	Pay Adjustment
	Totals	0.00				$0.00		$0.00			$0.00		$0.00

RE Comments:

1.
2.
3.
4.

Fuel Price Adjustment - 690.50 (METRIC VERSION)

Project Name and No. :

Month of Year:

From Project Special Provisions:

Index Price, Diesel (IPD) =

Index Price, Gasoline (IPG) =

Input the Yellow Areas, and get your results in the Blue

From Monthly Contr Admin Posting:

Click Here for Web Page

Posted Price, Diesel (PPD) =

Posted Price, Gasoline (PPG) =

Work Category	Pay Item #	Item Description	Usage Factor Units	Fuel Usage Factor, Diesel (FUFD)	Fuel Usage Factor, Gasoline (FUFG)	Quantity Threshold
Excavation	203.15	Common Excavation	GAL/CM	0.38	0.20	2,500
	203.16	Solid Rock Excavation	GAL/CM	0.51	0.24	2,000
	204.25	Structure Excavation	GAL/CM	0.46	0.21	2,000
	208.30	Cofferdam Excavation, Earth	GAL/CM	0.46	0.21	1,500
	208.35	Cofferdam Excavation, Rock	GAL/CM	0.51	0.24	1,500
Borrows / Fill / Base	203.30	Earth Borrow	GAL/CM	0.38	0.20	2,500
	203.31	Sand Borrow	GAL/CM	0.38	0.20	2,500
	203.32	Granular Borrow	GAL/CM	0.38	0.20	2,500
	204.30	Granular Backfill for Structures	GAL/CM	1.31	0.21	1,200
	301.25	Subb of Crushed Gravel, Coarse Graded	GAL/CM	1.11	0.73	750
	301.35	Subb of Dense Graded Crushed Stone	GAL/CM	1.11	0.73	750
Cold Plane / Reclaim / Paving	210.10	Cold Planing, Bituminous Pavement	GAL/SM	0.16	0.00	11,000
	310.20	Reclaimed Stabilized Base	GAL/SM	0.05	0.00	30,000
	406.25	Bituminous Concrete Pavement	GAL/T	3.37	0.95	450
	406.27	Medium Duty Bit Concrete Pavement	GAL/T	3.37	0.95	450
	490.30	Superpave Bit Concrete Pavement	GAL/T	3.37	0.95	450
Concrete	501.32	Concrete, High Performance Class AA	GAL/CM	0.98	0.33	750
	501.33	Concrete, High Performance Class A	GAL/CM	0.98	0.33	750
	501.34	Concrete, High Performance Class B	GAL/CM	0.98	0.33	750
Stone Fill	613.10	Stone Fill, Type I	GAL/CM	0.51	0.24	1,500
	613.11	Stone Fill, Type II	GAL/CM	0.51	0.24	1,500
	613.12	Stone Fill, Type III	GAL/CM	0.51	0.24	1,500
	613.13	Stone Fill, Type IV	GAL/CM	0.51	0.24	1,500
Guardrail	621.20	Steel Beam Guardrail, Galvanized	GAL/M	0.59	0.16	1,500
	621.205	Steel Beam GR, Galv w/2.4 m Posts	GAL/M	0.59	0.16	1,500
	621.21	HD Steel Beam Guardrail, Galvanized	GAL/M	0.59	0.16	1,500
	621.215	HD Steel Bm GR, Galv w/2.4 m Posts	GAL/M	0.59	0.16	1,500

5% Criteria met =	FALSE	Diesel
5% Criteria met =	FALSE	Gasoline

Work Category	Pay Item #	Item Description	Quantity		Price Adjustment - Diesel Fuel	Price Adjustment - Gasoline	Total Price Adjustment
			Orig Contract	Monthly Total			
Excavation	203.15	Common Excavation			$0.00	$0.00	$0.00
	203.16	Solid Rock Excavation			$0.00	$0.00	$0.00
	204.25	Structure Excavation			$0.00	$0.00	$0.00
	208.30	Cofferdam Excavation, Earth			$0.00	$0.00	$0.00
	208.35	Cofferdam Excavation, Rock			$0.00	$0.00	$0.00
Borrows / Fill / Base	203.30	Earth Borrow			$0.00	$0.00	$0.00
	203.31	Sand Borrow			$0.00	$0.00	$0.00
	203.32	Granular Borrow			$0.00	$0.00	$0.00
	204.30	Granular Backfill for Structures			$0.00	$0.00	$0.00
	301.25	Subb of Crushed Gravel, Coarse Graded			$0.00	$0.00	$0.00
	301.35	Subb of Dense Graded Crushed Stone			$0.00	$0.00	$0.00
Paving / Reclaim / Cold Plane	210.10	Cold Planing, Bituminous Pavement			$0.00	$0.00	$0.00
	310.20	Reclaimed Stabilized Base			$0.00	$0.00	$0.00
	406.25	Bituminous Concrete Pavement			$0.00	$0.00	$0.00
	406.27	Medium Duty Bit Concrete Pavement			$0.00	$0.00	$0.00
	490.30	Superpave Bit Concrete Pavement			$0.00	$0.00	$0.00
Concrete	501.32	Concrete, High Performance Class AA			$0.00	$0.00	$0.00
	501.33	Concrete, High Performance Class A			$0.00	$0.00	$0.00
	501.34	Concrete, High Performance Class B			$0.00	$0.00	$0.00
Stone Fill	613.10	Stone Fill, Type I			$0.00	$0.00	$0.00
	613.11	Stone Fill, Type II			$0.00	$0.00	$0.00
	613.12	Stone Fill, Type III			$0.00	$0.00	$0.00
	613.13	Stone Fill, Type IV			$0.00	$0.00	$0.00
Guardrail	621.20	Steel Beam Guardrail			$0.00	$0.00	$0.00
	621.205	Stl Beam Guardrail w/2.4m Posts			$0.00	$0.00	$0.00
	621.21	HD Steel Beam Guardrail			$0.00	$0.00	$0.00
	621.215	HD Stl Bm Guardrail w/2.4m Posts			$0.00	$0.00	$0.00
						Grand Total:	$0.00

Fuel Price Adjustment - 690.50 (ENGLISH VERSION)

Project Name and No. :
Month of Year:

From Project Special Provisions:
Index Price, Diesel (IPD) = $1.00
Index Price, Gasoline (IPG) = $1.00

Input the Yellow Areas, and get your results in the Blue

From Monthly Contr Admin Posting:
Click Here for Web Page
Posted Price, Diesel (PPD) = $1.00
Posted Price, Gasoline (PPG) = $1.00

Work Category	Pay Item #	Item Description	Usage Factor Units	Fuel Usage Factor, Diesel (FUFD)	Fuel Usage Factor, Gasoline (FUFG)	Quantity Threshold
Excavation	203.15	Common Excavation	GAL/CY	0.29	0.15	3,000
	203.16	Solid Rock Excavation	GAL/CY	0.39	0.18	2,500
	204.25	Structure Excavation	GAL/CY	0.35	0.16	2,500
	208.30	Cofferdam Excavation, Earth	GAL/CY	0.35	0.16	2,000
	208.35	Cofferdam Excavation, Rock	GAL/CY	0.39	0.18	2,000
Borrows / Fill / Base	203.30	Earth Borrow	GAL/CY	0.29	0.15	3,000
	203.31	Sand Borrow	GAL/CY	0.29	0.15	3,000
	203.32	Granular Borrow	GAL/CY	0.29	0.15	3,000
	204.30	Granular Backfill for Structures	GAL/CY	1.00	0.16	1,500
	301.25	Subb of Crushed Gravel, Coarse Graded	GAL/CY	0.85	0.56	1,000
	301.35	Subb of Dense Graded Crushed Stone	GAL/CY	0.85	0.56	1,000
Cold Plane / Reclaim / Paving	210.10	Cold Planing, Bituminous Pavement	GAL/SY	0.12	0.00	15,000
	310.20	Reclaimed Stabilized Base	GAL/SY	0.04	0.00	35,000
	406.25	Bituminous Concrete Pavement	GAL/TON	3.06	0.86	500
	406.27	Medium Duty Bit Concrete Pavement	GAL/TON	3.06	0.86	500
	490.30	Superpave Bit Concrete Pavement	GAL/TON	3.06	0.86	500
	900.680	Material Transfer Vehicle	GAL/TON	0.10	0.00	1
	900.675	Cold Mixed Recycled Bituminous Pavement	GAL/TON	0.96	0.75	1
Concrete	501.32	Concrete, High Performance Class AA	GAL/CY	0.75	0.25	1,000
	501.33	Concrete, High Performance Class A	GAL/CY	0.75	0.25	1,000
	501.34	Concrete, High Performance Class B	GAL/CY	0.75	0.25	1,000
Stone Fill	613.10	Stone Fill, Type I	GAL/CY	0.39	0.18	2,000
	613.11	Stone Fill, Type II	GAL/CY	0.39	0.18	2,000
	613.12	Stone Fill, Type III	GAL/CY	0.39	0.18	2,000
	613.13	Stone Fill, Type IV	GAL/CY	0.39	0.18	2,000
Guardrail	621.20	Steel Beam Guardrail, Galvanized	GAL/FT	0.18	0.05	5,000
	621.205	Steel Beam GR, Galv w/8 ft Posts	GAL/FT	0.18	0.05	5,000
	621.21	HD Steel Beam Guardrail, Galvanized	GAL/FT	0.18	0.05	5,000
	621.215	HD Steel Bm GR, Galv w/8 ft Posts	GAL/FT	0.18	0.05	5,000

5% Criteria met =	FALSE	Diesel
5% Criteria met =	FALSE	Gasoline

Work Category	Pay Item #	Item Description	Quantity		Price Adjustment - Diesel Fuel	Price Adjustment - Gasoline	Total Price Adjustment
			Orig Contract	Monthly Total			
Excavation	203.15	Common Excavation		0.00	$0.00	$0.00	$0.00
	203.16	Solid Rock Excavation		0.00	$0.00	$0.00	$0.00
	204.25	Structure Excavation		0.00	$0.00	$0.00	$0.00
	208.30	Cofferdam Excavation, Earth		0.00	$0.00	$0.00	$0.00
	208.35	Cofferdam Excavation, Rock		0.00	$0.00	$0.00	$0.00
Borrows / Fill / Base	203.30	Earth Borrow		0.00	$0.00	$0.00	$0.00
	203.31	Sand Borrow		0.00	$0.00	$0.00	$0.00
	203.32	Granular Borrow		0.00	$0.00	$0.00	$0.00
	204.30	Granular Backfill for Structures		0.00	$0.00	$0.00	$0.00
	301.25	Subb of Crushed Gravel, Coarse Graded		0.00	$0.00	$0.00	$0.00
	301.35	Subb of Dense Graded Crushed Stone		0.00	$0.00	$0.00	$0.00
Paving / Reclaim / Cold Plane	210.10	Cold Planing, Bituminous Pavement		0.00	$0.00	$0.00	$0.00
	310.20	Reclaimed Stabilized Base		0.00	$0.00	$0.00	$0.00
	406.25	Bituminous Concrete Pavement		0.00	$0.00	$0.00	$0.00
	406.27	Medium Duty Bit Concrete Pavement		0.00	$0.00	$0.00	$0.00
	490.30	Superpave Bit Concrete Pavement		0.00	$0.00	$0.00	$0.00
	900.680	Material Transfer Vehicle		0.00	$0.00	$0.00	$0.00
	900.675	Cold Mixed Recycled Bituminous Pavement		0.00	$0.00	$0.00	$0.00
Concrete	501.32	Concrete, High Performance Class AA		0.00	$0.00	$0.00	$0.00
	501.33	Concrete, High Performance Class A		0.00	$0.00	$0.00	$0.00
	501.34	Concrete, High Performance Class B		0.00	$0.00	$0.00	$0.00
Stone Fill	613.10	Stone Fill, Type I		0.00	$0.00	$0.00	$0.00
	613.11	Stone Fill, Type II		0.00	$0.00	$0.00	$0.00
	613.12	Stone Fill, Type III		0.00	$0.00	$0.00	$0.00
	613.13	Stone Fill, Type IV		0.00	$0.00	$0.00	$0.00
Guardrail	621.20	Steel Beam Guardrail		0.00	$0.00	$0.00	$0.00
	621.205	Steel Beam Guardrail w/8 ft Posts		0.00	$0.00	$0.00	$0.00
	621.21	HD Steel Beam Guardrail		0.00	$0.00	$0.00	$0.00
	621.215	HD Steel Bm Guardrail w/8 ft Posts		0.00	$0.00	$0.00	$0.00
						Grand Total:	$0.00

This spreadsheet has been developed based on the project special provisions as approved by the VAOT specification committee on November of 2008. Prior to utilizing the spreadsheet for payments, the user shall crosscheck the fuel usage factors and quantity thresholds as contained in the spreadsheet to those within the project Contract and for additional project Special Provisions that may alter the method of fuel price adjustment calculations. (eg. A Special Provision may be present that combines four different stone fill type quantities which are all below the quantity threshold into one group quantity which exceeds the quantity and allows for the calculation)

Any user is further encouraged to fully review all of Section 690 - Fuel Price Adjustment to check for other applicable provisions as to the use of the adjustment or for revisions since last use. For example, attention is directed to Subsections 690.01 (d), (e), and (f).

Though largely self explanatory, the following is a brief description of executing the fuel adjustment spreadsheet.

1. Locate the file in G:/Drive on the Field Forms Disc handed out at the Annual Spring Meeting

2. Open and select the appropriate metric or english version per your Contract by way of the red or blue tabs at the bottom of the sheet. Select to read or print these notes from the green instructions tab at the bottom of the sheet.

3. Enter your project name / number and the applicable month / year for which the calculation is to be executed in the yellow space as indicated.

4. From Subsection 690.02 (a), paragraph 2 of your project special provisions, enter the index prices of gasoline and diesel fuel in the respective yellow spaces indicated. These values will not change for the life of the Contract.

5. In processing the first estimate of each month, retreive the respective gasoline and diesel fuel posted prices of the previous month by going to the Contract Admin web site via the link provided on the spreadsheet and enter in the respective yellow spaces as indicated. These values will change on a monthly basis.

6. Upon entering the above, a calculation is performed to test for satisfying the provision of Subsection 690.02 (c.) (5% criteria) "TRUE" or "FALSE" is indicated and subsequently the spreadsheet will allow, or not allow, for any price adjustment calculation to be performed.

7. Enter the ORIGINAL AWARDED CONTRACT BID QUANTITIES (not quantities as revised by COD's) in the applicable column in the second table in the spreadsheet. This column performs a second calculation to satisfy, or not satisfy, the minimum threshold requirements of Subsection 690.01 (e) and subsequently allows, or does not allow, for any fuel adjustment calculation to be performed. The values as entered in this column will not change for the life of the Contract. A quantity of "0" may be entered for those items not inherent in any Contract or the entry may be left blank.

8. Enter the applicable previous month's pay items quantities used in their respective yellow spaces provided. Individual item fuel adjustments are calculated given this information and the results revealed.

9. Enter as applicable payment or credit under item 690.50, the dollar amount summed into the green space at the bottom of the spreadsheet entitled "Grand Total".

Project Name: _____
Project Number: _____
FPA Month / Year: _____
Resident Engineer: _____

Work Category	Pay Item #	Item Description	Daily Quantity of Construction Item															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Excavation	203.15	Common Excavation																
	203.16	Solid Rock Excavation																
	204.25	Structure Excavation																
	208.30	Cofferdam Excavation, Earth																
	208.35	Cofferdam Excavation, Rock																
Borrows / Fill / Base	203.30	Earth Borrow																
	203.31	Sand Borrow																
	203.32	Granular Borrow																
	204.30	Granular Backfill for Structures																
	301.25	Subb of Crushed Gravel, Coarse Graded																
	301.35	Subb of Dense Graded Crushed Stone																
Cold Plane / Reclaim / Paving	210.10	Cold Planing, Bituminous Pavement																
	310.20	Reclaimed Stabilized Base																
	406.25	Bituminous Concrete Pavement																
	406.27	Medium Duty Bit Concrete Pavement																
	490.30	Superpave Bit Concrete Pavement																
	900.680	Material Transfer Vehicle																
	900.675	Cold Mixed Recycled Bituminous Pavement																
Concrete	501.32	Concrete, High Performance Class AA																
	501.33	Concrete, High Performance Class A																
	501.34	Concrete, High Performance Class B																
Stone Fill	613.10	Stone Fill, Type I																
	613.11	Stone Fill, Type II																
	613.12	Stone Fill, Type III																
	613.13	Stone Fill, Type IV																
Guardrail	621.20	Steel Beam Guardrail, Galvanized																
	621.205	Steel Beam GR, Galv w/8 ft Posts																
	621.21	HD Steel Beam Guardrail, Galvanized																
	621.215	HD Steel Bm GR, Galv w/8 ft Posts																

ıs Subject to FPA Provisions 17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Totals	Work Category	Pay Item #	Item Description
															0	Excavation	203.15	Common Excavation
															0		203.16	Solid Rock Excavation
															0		204.25	Structure Excavation
															0		208.30	Cofferdam Excavation, Earth
															0		208.35	Cofferdam Excavation, Rock
															0	Borrows / Fill / Base	203.30	Earth Borrow
															0		203.31	Sand Borrow
															0		203.32	Granular Borrow
															0		204.30	Granular Backfill for Structures
															0		301.25	Subb of Crushed Gravel, Coarse Graded
															0		301.35	Subb of Dense Graded Crushed Stone
															0	Cold Plane / Reclaim / Paving	210.10	Cold Planing, Bituminous Pavement
															0		310.20	Reclaimed Stabilized Base
															0		406.25	Bituminous Concrete Pavement
															0		406.27	Medium Duty Bit Concrete Pavement
															0		490.30	Superpave Bit Concrete Pavement
															0		900.680	Material Transfer Vehicle
															0		900.675	Cold Mixed Recycled Bituminous Pavement
															0	Concrete	501.32	Concrete, High Performance Class AA
															0		501.33	Concrete, High Performance Class A
															0		501.34	Concrete, High Performance Class B
															0	Stone Fill	613.10	Stone Fill, Type I
															0		613.11	Stone Fill, Type II
															0		613.12	Stone Fill, Type III
															0		613.13	Stone Fill, Type IV
															0	Guardrail	621.20	Steel Beam Guardrail, Galvanized
															0		621.205	Steel Beam GR, Galv w/8 ft Posts
															0		621.21	HD Steel Beam Guardrail, Galvanized
															0		621.215	HD Steel Bm GR, Galv w/8 ft Posts

TO: , **Project Manager**

FROM: , **Resident Engineer**

DATE:

SUBJECT: Construction Closeout Comments for _____

The following comments are intended to provide constructive feed back to the Project Manager in regards to the design and the Contract Documents following the completion of this project. The Construction Section has created this outline as a template for all projects, so please note that not all topics may apply to this project.

I have made an effort to make these comments project specific along with an explanation of how any issues were handled for this project. I have also tried to explain how the plans and specifications could have been created differently so that the project would have been more constructible.

A) **Environmental Issues**:

a. Plan Content:

b. Specifications/Special Provisions:

c. Overall Constructability of the Project:

B) **Traffic Control/Sign Package**:

a. Plan Content:

b. Specifications/Special Provisions:

c. Overall Constructability of the Project:

C) **Materials Issues**:

a. Plan Content:

b. Specifications/Special Provisions:

c. Overall Constructability of the Project:

D) **Roadway/Approach/Pavement Issues**:

a. Plan Content:

b. Specifications/Special Provisions:

c. Overall Constructability of the Project:

E) **Bridges/Retaining Walls/Structural Issues**:

a. Plan Content:

b. Specifications/Special Provisions:

c. Overall Constructability of the Project:

F) **Other ( )**

a. Plan Content:

b. Specifications/Special Provisions:

c. Overall Constructability of the Project:

G) **Standards**

a. Errors or Omission on Standard Sheets:

b. Standard Sheets not in agreement with plans:

Please contact me after you have read these comments so that we may discuss any questions or concerns that you have. I can be reached at this phone number, xxx-xxxx, or via email.

Cc: Regional Construction Engineer
Regional Administrative Technician
Quality Assurance Engineer, Mike Pologruto
Contract and Specifications Engineer, Michael Lozier, P.E.
Environmental Specialists, Chris Slesar
Project File

Construction Specialists:
Construction Environmental Engineer, Bill Farley, P.E.
Construction Paving Engineer, Mark Woolaver
Construction Structures Engineer, Jeremy Reed, P.E.

2015 Project Box Checklist

Contract Name & Number_____

Appointment Date: _____ **CES number:** _____

Resident Engineer: _____ **Finals Representative:** _____

Pre Final Requirements	By	Date
1. Completion & Acceptance Memo written - Right of Way Encroachment Certification written		
2. Ratings Forms completed by RE, and distributed by Regional Office - Contractor, Subcontractor and Consultant		
3. Project Manager Closeout Comments Memo complete/distributed/Z:Drive		
4. All Summary Book quantities complete and checked by RE/RT a. All Book quantities verified to match Site Manager		
5. Final Field Estimate run by Regional Tech a. Stockpiles and Other Adjustments = $0 b. All Dates entered into SM by RT (C&A, Substantial, etc.)		
6. Explanations for Overruns/Underruns(Completed **after** #4 & #5 are done) - Distributed and Placed in Z:/Drive (RE/Clerk)		
7. IPSM Explanations for Materials & Certs failures & omissions to Lab (RE)		

Project Box Contents	Included in Box ?		
	Yes	No	N/A
1. Project Summary (Orange Field) Books (Check Engineering Force)	☐	☐	☐
2. Computations Binder – Must be bound	☐	☐	☐
3. Contract	☐	☐	☐
4. Written Orders (specifically check for Substantial and Interim Comp)	☐	☐	☐
5. Change Orders - including all backup documentation	☐	☐	☐
6. Paving Slips – Labeled in envelopes, by day and location and checked	☐	☐	☐
7. Concrete Batch Slips and Test Results	☐	☐	☐
8. Materials, Samples & Certifications Booklets - completed	☐	☐	☐
9. Inspectors Daily Reports, especially handwritten reports	☐	☐	☐
10. Contractor Daily Reports, including available Flagger & UTO reports	☐	☐	☐
11. Record Plans	☐	☐	☐
12. Environmental, including contractor plans and reports	☐	☐	☐
14. Correspondence: Utilities, Prop Owner, PR, Municipal, Contractor.	☐	☐	☐
15. Shop Drawings	☐	☐	☐
16. Project Photos and Video Logs	☐	☐	☐
17. Contractor's Progress Schedules.	☐	☐	☐
18. Regional File added to Project Box, with duplicate documents "weeded"	☐	☐	☐
19. Extension of Time information (additional info beyond written order)	☐	☐	☐
20. Was there an interim completion date? If yes, note dates below. - Were any weather days credited. (Should NOT be)	☐	☐	☐
21. Is there an overpayment? If yes, explain why in Notes below. - Contractor to be notified by Regional Staff. Who was notified?	☐	☐	☐
Notes:			

FINALS CHECK

Sending Final Quantities
PROJECT NAME & NUMBER: _____

Checked By: _____ Date _____

Verified By (Finals Engineer): _____ Date _____

☐ Project Box Checklist done? (Interview between Finals Technician [Nick] and RE.)
- Check any notes on the checklist, and on the "Additional Items to Check" checklist if included

☐ Is there a fully checked Comparative Quantities in the box?
- If not, print out a hardcopy Comparative Quantities in Site Manager Reports, and make sure that all book entries match Comparative Quantities.
- If electronic books were used, is there a signed Contract Finals Checked Report?

☐ Check to see if an EOT is needed (CTS).

☐ Check Contract Completion date vs. Substantial ☐ Y ☐ N

☐ Check for Interim completion date: contract special provisions (usually #3) ☐ Y ☐ N

Check estimate status:

☐ There should be a Draft Estimate in the box?

☐ Is everything zeroed out? (other adjustments/stockpiles)

☐ Is Liquidated Damages the correct amount, as compared to EOT analysis? ☐ N/A ☐ Y

☐ Check estimate in Site Manager. Is last estimate fully approved and paid? Run zero estimate if necessary (check with Eric).

☐ After the Zero Estimate is run, check that the Final Amount (TOTAL CONTRACT) shown in the Comparative Quantities matches the Zero Estimate Contractor Net Earnings amount. (Could be off a couple pennies due to rounding.)

☐ Have the Explanations for overrun/underruns been completed, and placed in Z:/Drive.
- If you don't find it electronically in Finals folder E-mail Regional Clerk and CC Dan Dudensing.

☐ Check CTS Ratings Tab to see if the Contractor Rating information has been sent.
- If not, E-Mail the Regional Staff and let them know that the Rating information is not entered, and CC Dan Dudensing. (That is between them, just a notification.)

☐ Go to Z:/Highways/Construction Materials/Construction Services/Finals/Finals Forms & Letters/Final Quantities and choose the correct Final Quantities letter. Save the letter to the appropriate Project Correspondence File in the Finals subdirectory. (**The bottom of the letter shows the appropriate attachments**)

☐ Check CTS and fill out a Routing Slip with the CES number, Project Name and Number, whether an EOT is needed, Materials Certification Memo issued and the Program Manager Name and Section.

☐ Check C+A memo.
- Check "EOT Needed" phrase.
- Check other dates.

VERMONT

State of Vermont
Construction & Materials Bureau Central Laboratory
2178 Airport Rd., Unit B
Berlin, VT 05641-8628
www.aot.state.vt.us

[phone] 802-828-2561
[fax] 802-828-2792
[ttd] 800-253-0191

Agency of Transportation

DATE: September 1, 2015

PROJECT: PROJECT

SUBJECT: MATERIALS MEMORANDUM

This is to certify that:

The results of the tests used in the acceptance program indicate that the materials incorporated in the construction work, and the construction operations controlled by sampling and testing, were in conformity with the approved plans and specifications.

☒ Exceptions to the plans and specifications are explained on the attached sheet.
☐ There are no exceptions to the plans and specifications.

X_____ **X**_____

Mladen Gagulic
Materials Bureau Central Laboratory Manager

Date

DJH: DGM

CC Carmen Neveau, Financial Operations
Meredith Asselin, Accounts Receivable
Eric Fontana, Finals Engineer
REGIONAL, Regional Construction Engineer
RESIDENT, Resident Engineer
Project File

VTrans Working to Get You There
Vermont Agency of Transportation

DATE: September 1, 2015

Attachment page 1 of 1

Project: PROJECT

Exceptions to plans and specifications as stated by the Resident Engineer except where noted.

Description of Exception	Determination of Investigation
SAMPLE EXCEPTIONS: 203.31 Sand Borrow; line item 0030; installed quantity 3743.100 CY exceeds represented quantity of 3335.000 CY 204.30 Granular Backfill for Structures; line item 0055; no tests to represent 1004.330 CY placed 401.10 Aggregate Surface Course; line item 0070; no tests to represent 80.000 CY placed 404.65 Emulsified Asphalt; line item 0075; no tests to represent 18.500 CWT installed. 490.30 Superpave Bituminous Concrete Pavement; line item 0085; installed quantity of 3237.810 Tons exceeds represented quantity of 2535.35 tons 507.15 Reinforcing Steel; line item 0105; no tests to represent quantity of 1506.000 LB installed 507.17 Epoxy Coated Reinforcing Steel; line item 0110; quantity installed 7020.000 LB exceeds quantity certified of 971.000 LB 601.2615 18” CPEP(SL); line item 0130; quantity installed 469.300 LF exceeds quantity certified of 387.000 LF 601.2625 30” CPEP(SL); line item 0150; quantity installed 152.300 LF exceeds quantity certified of 70.000 LF 646.76 Line Striping Targets; line item 0355; no indication that product used was from Approved Product List (APL)	THIS SIDE MUST INCLUDE RE’S RESPONSE TO BE A MATERIALS MEMO.

VERMONT AGENCY OF TRANSPORTATION
COMPARATIVE QUANTITIES REPORT

Contract: 07030901
Project Code: 06K182
Project STATEWIDE STP CRAK(25)
Contractor: ANNSEAL, INC.
Category: 1011 ROADWAY

Item	Item Description	Unit	Contract Quantity	Unit Price	Contract Amount	Final Quantit	Final Amoun	Diff In Quantit	Diff In Amoun	Pct. Diff
417.10	BITUMINOUS CRACK SEALING Crack Filler	LB	236000	0.40	94400.00	91620.58	36648.23	-144379.42	-57751.77	-61.18
630.10	UNIFORMED TRAFFIC OFFICERS	HR	1200	47.75	57300.00	517	24686.75	-683	-32613.25	-56.92
630.15	FLAGGERS	HR	2150	14.00	30100.00	412	5768.00	-1738	-24332.00	-80.84
635.11	MOBILIZATION/DEMOBILIZATION	LS	1	57466.65	57466.65	1	57466.65	0	0.00	0.00
641.10	TRAFFIC CONTROL	LS	1	147180.78	147180.78	1	147180.78	0	0.00	0.00
641.15	PORTABLE CHANGEABLE MESSAGE SIGN	EACH	2	3000.00	6000.00	2	6000.00	0	0.00	0.00
	TOTAL CATEGORY:	ROADWAY			392447.43		277750.41		-114697.02	-29.23
	TOTAL PROJECT:	06K182			392447.43		277750.41		-114697.02	-29.23
	TOTAL CONTRACT:	07030901			392447.43		277750.41		-114697.02	-29.23
	ORIGINAL CONTRACT AMOUNT:	07030901			392447.43					

SAMPLE

STATE OF _____
)
)
_____County, ss.)

CONTRACTOR'S CERTIFICATE REGARDING PAYMENT OR
SETTLEMENT OF BILLS AND CLAIMS, CONSTRUCTION PROJECTS

_____**Project Name and Number**_____

The undersigned Contractor hereby certifies that, pursuant to Subsection 109.03, Division 100 of the 2001/2006 Standard Specifications for Highway and Bridge Construction, Agency of Transportation, State of Vermont, with reference to the above-captioned project, all payments due from said Contractor to others, Subcontractors included, for materials and equipment used in and upon such project and for work and labor done in connection therewith have been made, except as noted below; and further certifies that all damage claims and liabilities incurred in connection with such project have been settled and paid, except as noted below.

FIRM NAME:_____

BY:_____
Signature

_____
Printed Name & Title

(Note exceptions here and reason why payment has not been made, including to Subcontractors.)

Sworn and subscribed to before me this_____day of

_____, A.D. 20___.

_____
Notary Public

My Commission Expires

_____

SAMPLE

Final Estimate Routing Summary Report

Contract ID: 08031401

Region: NE

To: Distribution List, see cover routing sheet and guidance below.

From: Eric Fontana, Finals Engineer

Date: Wednesday, March 25, 2015

Contract: BARRE TOWN HES 026-1(38)

Construction has been completed on this contract, Final Quantities have been agreed upon, and we are sending this Final Estimate Routing packet for your use. There will be no more payments made to the contractor, nor Construction Engineering charges. The project(s) have been completed in substantial conformance with the approved program and authorization. There are no right-of-way encroachments and no significant unexplained overruns or underruns.

The Contractor: J. HUTCHINS,INC.

✔ *Has signed the Final Estimate and Contractor Claim Certificate.*

__ *Has NOT signed the Final Estimate and Contractor Claim Certificate. Per subsection 109.08 Partial and Final Payments (d) Final Payments, we are closing the contract due to non-signature within 20 days of receipt of the Final Estimate. There is no claim against the Contractor on file which would prevent closing of the contract.*

The Resident Engineer was: Hosking, David

Schedule Summary		Expenditure Summary	
Construction Began Date:	07/16/2008	Contract Bid Amount:	$1,254,923.65
Contract Completion Date:	10/16/2009	Final Amount Paid:	$1,305,519.82
Substantial Completion Date:	07/17/2009	Percent Of Contract Bid Amount:	104.03 %
Actual Complete Date:	08/04/2010	Total CO's:	004
Final Inspection Date:	07/23/2009	Total CO Amount:	$134,103.60
Acceptance Date:	12/17/2010	Liquidated Damages Withheld:	$0.00

Project Name(s):	PIN #:	Project Description:	Project Manager:
BARRE TOWN HES 026-1(38)	04B198	IMPROVEMENTS TO THE US302/VT110/TH30 INTERSECTION IN BARRE TOWN, INCLUDING CONSTRUCTION OF A ROUNDABOUT.	SCHULTZ,JOSH

Distribution List - Please initial and date the Cover Routing Sheet and take the following actions:

Construction Engineer: Sign the enclosed Final Estimate. By signature, the Construction Engineer recommends approval of the estimate to the Director of Program Development.

Chief of Utilities and Permits: Take your copies from the "copies" section of this packet, close out any agreements and forward this packet to the appropriate Program Manager.

Program Manager: Take your copies from the "copies" section of this packet and deliver them to the appropriate Project Manager. Sign the enclosed Final Estimate and forward this packet to the Director. Note the explanations for overruns and underruns, which are intended to provide feedback to help you on future estimates. You should close the project(s) and submit to Financial Operations for Final Voucher.

Director of Program Development: Sign the enclosed Final Estimate if you concur. Forward this packet to the Business Office.

Business Office: Process the Final Estimate and distribute as necessary. Return the package to the Finals Engineer.

CES Number: _____

AGENCY OF TRANSPORTATION
FINAL ESTIMATE ROUTING SHEET

PROJECT NAME AND NUMBER: _____

ORDER OF ROUTING	DATE	INITIALS
1. Final Quantities sent to the Contractor. **A. Final Quantities and Estimates Checked by Finals Tech/Regional Tech/Finals Engineer.** **B. Is an EOT required? _____. (Y or N)**		
2. Final Estimate Sent to the Contractor. **A. Finals Engineer- Check on Status of Claims Filed Against Contractor.** **B. EOT (if applicable) approved: _____(date or N/A)**		
3. Final Estimate Approved and Signed by the Contractor.		
4. Final Estimate Approved and Signed by: **A. Finals Engineer** **Materials Certification Memo Issued: _____** **B. Construction & Materials Bureau Director**		
5 Final Estimate Packet to Chief of ROW: _____		
6. Final Estimate Approved and Signed by the appropriate Program Manager: _____ Section:_____		
7. Final Estimate Approved and Signed by the Project Delivery Bureau Director: _____.		
8. Final Estimate Packet to Program Development Business Office: **A. Entered in Estimate Log** **B. Signatures Typed on Unsigned Copies** **C. A-23 Standard State Invoice Prepared** **D. A-23 and All Documents to Program Development Business Manager for Signature**		
9. Business Office Distributes Copies: **A. Original & Copy #2 – Financial Services** **B. Copy #3 – Contractor (estimate only)** **C. Copy #4 – Construction (complete package)** **D. Copy #5 – District (estimate only)** **E. One copy – Materials & Research (estimate only)** **F. Two copies – FHWA (w/comparative quantities)**		
10. Routing Sheet and Estimate Packet Returned to Finals Engineer.		

Agency of Transportation
Highway Division
Construction Section

TO: Richard M. Tetreault, Chief Engineer

FROM: David J. Hoyne, Construction and Materials Bureau Director

DATE: _____

SUBJECT: Extension of Time: _____

Contractor: _____
Bids Opened: _____
Notice to Proceed: _____
Began Construction: _____
Contract Completion Date _____
Adjusted Completion Date _____
Substantial Completion Date: _____
Actual Completion Date: _____

There were __ working days between the Adjusted Completion Date of _____, and the substantial completion date of _____. These were:

_____

Total: __ days charged

Part (b)(4) of Section 108.11 - Determination of Extension of Contract Time for Completion states "if major items of work are suspended by order of the Engineer, the time for completion will be extended an amount equal to the elapsed time between effective dates of order to suspend and order to resume". The contractor was not allowed to work on the following days due to _____:

_____

Total: __ days credited

Part (b)(11) of Section 108.11 (as modified by Special Provisions) – Determination of Extension of Contract Time for Completion states that an extension of the contract completion date will be determined for "the days from April 15 through December 1, inclusive, on which the weather or condition of the ground caused suspension of the work". The Contractor could not work because of inclement weather on the following days:

_____

Total: ___ days credited

2. Part (b)(12) of Section 108.11 - Determination of Extension of Contract Time for Completion states: "If satisfactory completion of the Contract with any authorized extension and increases requires the performance of the work in greater quantities than those set forth in the proposal, the Contract time allowed for performance of the work will be increased in the same ratio that the total cost of the work actually performed bears to the total cost in the proposal. However, when additional time is added to the Contract by change order/supplemental agreement, the number of days will be deducted from the number of days calculated in the method above. Also, if more days are added by change order/supplemental agreement than would have been by the previously mentioned method, the Contractor will not have the excess days deducted…Any change in the final Contract time shall be computed to the nearest full day."

The actual cost of the Contract is $_____(amount paid to date). Price Adjustment and Pay Adjustment items are adjustments based on market conditions and work quality as well as being considered "Not A Bid Item" items. These are independent of actual "performance of work", and therefore must be removed from the analysis. The following adjustments were paid on this project:

Item Number	Item Name	Final Quantity (and Amount)
406.50	Price Adjustment, Asphalt Cement (NABI)	
490.31	Air Voids Pay Adjustment (NABI)	
490.32	Mat Density Pay Adjustment (NABI)	
490.33	Surface Tolerance Pay Adjustment (NABI)	
490.34	Longitudinal Joint Compaction Pay Adjustment (NABI)	
690.50	Price Adjustment, Fuel (NABI)	
	Total Market Condition and Work Quality adjustments	

Actual amount paid to date _____
- Market Conditions and Work Quality Adjustment _____
Total Cost of work actually performed _____
-Original Contract Amount (bid price) _____
Adjusted Contract Overrun _____

($_____/$_____) x 100 = _____%

The project Notice to Proceed was issued on _____, Work began on the project on _____. Since the Construction Season begins on April 15 and the Anticipated Completion date was _____, the Contract originally anticipated _____ work days to complete the project.

_____ days x _____= ____ days, Change of Design Order Number __ added __ working days to the Contract.

___ days is greater than the ___ days added by Change of Design Order No.__; therefore, _ day(s) will be credited from the ratio of the Actual Contract cost to Contract Bid cost.

Total: __ day(s) credited

Since there were ___ days of overrun, but _____ credit days applied, this justifies granting an Extension of Time to _____ leaving ___ days of liquidated damages at a rate of _____ per day for a total of _____ in liquidated damages.

DJH:___/egf

c Project Files-Montpelier

Explanations Form For Contract Overruns And Underruns

Contract Name: MAIDSTONE-BLOOMFIELD STP 2609(1)S
Contract ID #: 07110201
Total Bid Amount: $4,323,001.00
Report Generated: Thursday, February 19, 2009
Number Of Items Requiring An Explanation: 4

PIN Number	Project Name and Number
06C042	MAIDSTONE-BLOMFIE STP 2609(1)S

Category	Category Description	Item #	Unit	Project Quantity Including CO's	Unit Price	Final Quantity	Percent Difference	Cost Difference	Quantity Difference
1011	ROADWAY	203.15	CY	65.00	$25.00	0.00	-100.00	($1,625.00)	-65.00

Description of Item Requiring Explanation: COMMON EXCAVATION

Explanation:

1011	ROADWAY	203.30	CY	4,550.00	$21.50	2,739.10	-39.80	($38,934.35)	-1,810.90

Description of Item Requiring Explanation: EARTH BORROW

Explanation:

1011	ROADWAY	204.21	CY	50.00	$25.00	0.00	-100.00	($1,250.00)	-50.00

Description of Item Requiring Explanation: TRENCH EXCAVATION OF ROCK

Explanation:

1011	ROADWAY	210.10	SY	9,100.00	$5.00	5,283.00	-41.95	($19,085.00)	-3,817.00

Description of Item Requiring Explanation: COLD PLANING, BITUMINOUS PAVEMENT

Explanation:

Subcontractor/Supplier Claims against Contractors on Vermont Agency of Transportation Construction Projects

DATE_____

The following sets forth my statement of claim against _____(Contractor)

of_____(Contractor Address)

on Project_____(Project Name)

in the Town of_____, Vermont.

Statement of Claim: Include all items and quantities of each item, with all extensions and totals made correctly. If claim is for labor performed, all rates should be included Attach all supporting documentation, e.g. invoices, copies of checks, copies of subcontracts, or any agreements. If additional space is needed, either use the reverse of this form or separate sheets and attach to this form.

The amount of the claim is $_____.

Bills covering this claim were presented to the Contractor Yes_____ No _____ (check one).

I hereby swear that the foregoing is a correct statement of my claim.

_____
Authorized Signature

_____
Printed Name & Title

_____
Company Name of Claimant

_____

_____
Company Address of Claimant

STATE OF _____)

) ss

COUNTY OF_____)

The above subscribed and sworn to before me

at _____ in said

County, this _____day of

_____20___.

_____
Notary Public

My Commission Expires_____

ADDRESS AND MAIL ALL CLAIMS TO: AGENCY OF TRANSPORTATION, ATTN: FINALS ENGINEER, CONSTRUCTION SECTION, 1 NATIONAL LIFE DRIVE, MONTPELIER, VERMONT 05633-5001.

Title 19 Vermont Statues Annotated (V.S.A.) § 10 (9) provides for filing of claims against contractors on highway and bridge construction projects for the benefit of labor, material men and others for the payment, settlement, liquidation and discharge of claims of creditors for material, merchandise, labor, rent, professional services, premiums and other services used or employed in carrying out the terms of the contract between the contractor and the State of Vermont. To obtain the protection of the statutes, **CLAIMS MUST BE FILED WITHIN 90 DAYS AFTER ACCEPTANCE OF THE PROJECT AND MUST BE NOTARIZED.** If claimant complies with all of the provisions of 19 V.S.A. §10 (9), claimant may be protected by the surety bond required of all contractors.

Damage Claims against Contractors on Vermont Agency of Transportation Construction Projects

DATE_____

The following sets forth my statement of claim against _____(Contractor)

of_____(Contractor Address)

on Project_____(Project Name)

in the Town of_____, Vermont.

Statement of Claim: If claim is for personal injury or property damage, please state as specifically as possible the facts surrounding the claim. Attach all supporting documentation, e.g. copies of checks, invoices, estimates, medical bills. If additional space is needed, either use the reverse of this form or separate sheets and attach to this form.

The amount of the claim is $_____.

Bills covering this claim were presented to the Contractor Yes_____ No _____ (check one).

_____
Signature of Claimant

_____
Printed Name of Claimant

_____

_____
Address of Claimant

ADDRESS AND MAIL ALL CLAIMS TO: AGENCY OF TRANSPORTATION, ATTN: FINALS ENGINEER, CONSTRUCTION SECTION, 1 NATIONAL LIFE DRIVE, MONTPELIER, VERMONT 05633-5001.

IN CERTAIN, LIMITED CIRCUMSTANCES, A PERSON SUFFERING PERSONAL INJURY OR PROPERTY DAMAGE AS A RESULT OF ACTION OR INACTION BY A CONTRACTOR OF THE AGENCY **MAY** ALSO BE PROTECTED BY SUBMISSION OF A CLAIM IN THE EVENT THE CONTRACTOR CANNOT OR WILL NOT PAY ANY JUDGMENT OR SETTLEMENT OF A CLAIM OR COURT CASE.

As further explanation, the Agency's contracts with construction contractors provides that the contractor is responsible for all damage claims connected with work on Agency projects. Further, Title 19 Vermont Statutes Annotated (V.S.A.) § 10(8) requires the contractor to provide a bond or other surety to assure compliance by the contractor with the provisions of the contract, including the provisions making the contractor responsible for damage claims. Again, in the event a contractor cannot or will not pay any court judgment or settlement of a damage claim, payment may be obtained from the bonding company under the Performance Bond required by 19 V.S.A. § 10(8).

Project Weeding (& Scanning) Procedures Checklist

Items to keep should be sorted, and packaged in manila envelopes, labeled with the project name, project number, and what's inside, by category. An inventory of what is kept in the project box should also be produced and kept inside the box.

Items to throw:

Anything that is stored electronically. (Make sure the signed copies are stored.)
Bi-Weekly Estimates (all reproducible by SiteManager)
Copies of the Contract (Make sure we have an original in Montpelier) (See also below)
Lab Reports (Copy kept by Materials Lab)
Miscellaneous Junk (Use Discretion)
Notice to Proceed

Things to send to others:

Prime Contractor and Subcontractor ratings are to be sent to the construction Administrative Services Technician.
Payrolls: Send to Civil Rights
R.O.W. Agreements or changes: copy to R.O.W. and copy to the District Office
Water Pipe Sleeve Diagrams: DTA, Town Clerk ?
Permanent Bench Mark Information Sheets: Chief of Survey ?

Items to Scan into OnBase

Change Orders and Supplementary Agreements (fully signed)
Claims information
Concrete Batch Slips
Contract - Original
Correspondence (Keep Nothing that we have saved somewhere already, G:drive, or Onbase)
Daily Reports, Inspector Dailies
Design Folder, Correspondence, and Quantities (review and weed anything that is stored already)
Detail Reports
Drainage Reports
Field Books
Final Estimate Routing Package
Materials (Certification reports and Lab reports should be entered into Materials booklet then discard the reports)
Project Quantities (Calculations Folder)
Subcontractor Requests /Authorizations
Survey Notes, Original and Final Sections
Water Well info
Written Orders

Items to store at warehouse per <u>three year</u> rule.

Anything utilized to derive a quantity for payment
Aggregate Shoulder slips
Asphalt Paving Slips
Emulsified Asphalt Slips
Erosion Control Reports
Flagger Slips
Foreman Reports
Miscellaneous Weights, Receipts, Slips
Payroll Checklist (Only keep the sheet that compiles the weeks that the Resident Engineer checked the payrolls)
Reinforcing steel slips and calculations
Sign Summary Sheets (should get put on Record Plans then can discard!)
Subbase Gravel Slips
Uniform Traffic Officer
Telephone Bill

State of Vermont
VTrans - Construction Section
Consultant Evaluation Form

Name of Consultant Inspector:				
VTrans Position:				
Name of Consultant Firm:				
Project Name and Number:				
Evaluation Period:	From:		To:	
Name of VTrans employee who prepared this evaluation:				

Key to Ratings:
- 1 - Unsatisfactory *(Comment Required)*
- 2 - Marginal
- 3 - Satisfactory
- 4 - Commendable
- 5 - Outstanding

Factor	Comments	Rating 1	2	3	4	5	Factor	Comments	Rating 1	2	3	4	5
1) Knowledge, Skill, Ability- Is the consultant competent to fulfill the requirements of the job and have the knowledge, skill, and ability necessary to perform the work, including appropriate certifications required.		☐	☐	☐	☐	☐	**6) Judgment-** Does the consultant have the ability to think clearly and impartially utilizing available information and experience to make mature, logical and timely decisions		☐	☐	☐	☐	☐
2) Quality of Work- Does the consultant provide quality work which is neat, accurate, thorough, and free of errors		☐	☐	☐	☐	☐	**7) Personal Relationships-** Does the consultant work well as a member of a group or team, maintain a hostile free work environment and act in a professional manner when interacting with others		☐	☐	☐	☐	☐
3) Work Habits- Is the consultant punctual, diligent, dependable, resourceful, not disruptive		☐	☐	☐	☐	☐	**8) Quantity of Work-** Consider workload to be accomplished, time lost in non-productive activity, consistency of output, amount of satisfactory work completed within a given time period.		☐	☐	☐	☐	☐
4) Attitude, Cooperation- Does the consultant sustain a positive attitude, willing to work when needed (days, nights, weekends), has the spirit of cooperation, maintains high morale		☐	☐	☐	☐	☐	**9) Work Under Stress-** Does the consultant have the ability to produce satisfactory work under the pressure of heavy volume and/or tight deadlines, maintain self-control, cope with the unexpected and maintain balance and poise		☐	☐	☐	☐	☐
5) Learning Ability- Does the consultant have the ability to grasp, understand and master new or changing duties or assignments		☐	☐	☐	☐	☐	**10) Overall Rating-** (Please enter in an overall rating) Would you consider utilizing this consultant again in the future? ☐ Yes ☐ Possibly ☐ Not Likely		☐	☐	☐	☐	☐

Consultant Name: _____ **Consultant Firm:** _____

Resident Engineer Comments:

Prepared by: Date:

Regional Construction Engineer Comments:

Reviewed and Approved by: Date:

Attached please find a Performance Evaluation for *{Consultant's name}* prepared by *{RE's name}*, Resident Engineer on the *{Project name and number}* Contract for this past construction season.

Please forward this evaluation to *{Consultant employee's name}* for {his/her} review. If *{Consultant's first name again}* *or you* have any questions or wish to discuss the evaluation, please contact {Regional's name}, *Regional Construction Engineer* *(include e-mail address/phone number)* *directly.*

SAMPLE

Any comments must be made in the gray section following "Comments" to avoid being in a protected cell.

Vermont Agency Of Transportation

Construction Division

Contractor Project Performance Evaluation

Contractor Name:		Contractor Vendor ID:	
Project Name:		Project Number:	
Route:		Construction Region:	
Town/City:		County:	
Prepared By:		Date Prepared:	
Prequalification Project Type:		Total Performance Score	0.0%
Prepared By:		Reviewed and Approved by:	
Resident Engineer's Name:		Regional Construction Engineer's Name:	
Date:		Date:	

Section	Number of Questions in Section	Number of "No" Responses
Contract Administration	13	0
Personnel	4	0
Submitttals/Certifications	8	0
Environmental	10	0
Structures	13	0
Covered Bridges	3	0
Paving	9	0
Earthworks	9	0
Traffic Control	6	0
Incindental Construction	12	0
Safety	8	0

Instructions: Written comments must be provided for any question with a "NO" response.

Responses to questions must be either YES, NO, or NA

CONTRACT ADMINISTRATION		
1	Did the Contractor provide a list of personnel to contact for non-working hour emergencies prior to the first day of work?	
2	Were the non-working hour emergency personnel available when called?	
3	Did the Contractor utilize “Dig Safe” prior to beginning any excavation on the project?	
4	Was a proper bulletin board with the required notices posted installed in an accessible place prior to the beginning of work and maintained throughout the duration of the project?	
5	Did the Contractor submit subcontractor requests prior to the subcontracted work being performed?	
6	Did the DBE subcontractors perform the work as identified in the bid proposal?	
7	Did the Contractor submit accurate certified payrolls within seven days of payment to the employee?	
8	Did the Contractor fulfill the employee traineeship requirement of the contract, including the required trainee reports?	
9	Did the Contractor provide information for processing Change Orders, Force Account or Extra Work in a timely manner?	
10	Did the Contractor attempt to resolve substantiated complaints in a positive, prompt, and professional manner. *(This should reflect the Contractor’s overall conduct, not a singular occurrence.)*	
11	Did the Contractor coordinate with third parties as set out in the contract in a timely and courteous manner? *(This should reflect the Contractor’s overall conduct, not a singular occurrence.)*	
12	Did the Contractor act quickly to resolve the issues from the Final Inspection and complete the project?	
13	Did the Contractor complete the project on time, taking into consideration weather days and days added to the contract?	
Comments Below:	Percentage of No answers:	0.00%

PERSONNEL		
1	Did the Contractor have an individual that was clearly the Superintendent as defined in 105.06, and did this individual have the ability to make decisions for the company?	
2	Did the Contractor have enough people available to maintain their operations in an acceptable fashion? (i.e. deck pours, paving, etc)	
3	Did the Contractor’s personnel maintain and protect the original control points and other important layout features as required by the contract?	
4	Did the Contractor’s personnel respond to requests and direction, such as written orders, of Agency personnel in a timely manner? *(This should reflect the Contractor’s overall conduct, not a singular occurrence).*	
Comments Below:	Percentage of No answers:	0.00%

SUBMITTALS/CERTIFICATIONS

1	Was the CPM schedule submitted at or before the pre-construction conference?	
2	Were there updates made to the CPM as delays were encountered, or did the Contractor at a minimum discuss how these delays might affect the progress of the project with the Resident Engineer?	
3	Were shop drawings submitted in a timely manner, and were they complete?	
4	Did the Contractor provide the appropriate certifications for materials prior to incorporating them into the project?	
5	Did the Contractor notify the Resident Engineer when materials would be available for testing in a timely manner?	
6	Did the Contractor respond quickly and positively to failing materials tests?	
7	Did the submitted erosion control plan conform to the contract requirements and the actual project situation?	
8	Were the temporary structures (temporary bridge, cofferdams, sheeting, shoring, etc.) designs submitted by the Contractor constructed as per the submittal and were they adequate to complete the work?	

Comments Below: Percentage of No answers: 0.00%

ENVIRONMENTAL

1	Did the Contractor make necessary changes to the Contract EPSC Plan to fit his proposal methods and means before beginning work on the project?	
2	Did the Contractor submit the EPSC Plan (including waste, borrow, and staging areas) for review at the pre-construction conference or before?	
3	Were temporary erosion control items installed in a timely manner and in accordance with the EPSC Plan?	
4	Were temporary erosion control properly maintained until replaced by permanent items?	
5	Did the Contractor's On-site Coordinator monitor the erosion control plan for effectiveness and complete the required monitoring forms in a timely manner?	
6	Did the Contractor's On-site Coordinator record modifications to the EPSC Plans as they occurred in the field?	
7	Were waste and borrow areas opened, maintained and closed in conformance with the specifications, project plans and local, state and federal requirements?	
8	Did the Contractor comply with archaeological/historical conditions specified in the contract and other pertinent clearances?	
9	Was the Contractor responsive and timely in correcting project environmental issues?	
10	Did the Contractor coordinate with appropriate regulatory agencies prior to making changes in the field?	

Comments Below: Percentage of NO answers: 0.00%

STRUCTURES

1	Were the Contractor's personnel highly skilled and knowledgeable about their work?	
2	Was the equipment provided of adequate size, acceptable condition and well maintained?	
3	Did the Contractor's personnel accurately layout all the structural components associated with this project, such as piles, abutments, wingwalls, retaining walls, and bridge seats?	
4	Did the Contractor's concrete removal procedures minimize the damage to reinforcing steel or structural steel that was designated to remain in place and be reused?	
5	Did the Contractor follow the deck placement plan as outlined in the pre-placement meeting and demonstrate an adequate level of quality control during the placement of the deck?	
6	Was all of the concrete properly cured in accordance with the specifications?	
7	Was the formwork and reinforcing steel properly installed to provide proper clearances and member dimensions in accordance with the contract documents?	
8	Was reinforcing steel and epoxy coated reinforcing steel properly stored and protected on the project prior to being incorporated into the work?	
9	Did the Contractor provide welding procedures for all field welding and have certified welders perform all field welding?	
10	Were mechanical bridge deck and curb expansion devices properly installed?	
11	Did the Contractor provide adequate equipment and personnel to skillfully install the bridge membrane waterproofing in conformance with contract specifications?	
12	If the structure was jacked and shored, did the Contractor submit and follow an acceptable plan prior to beginning the work?	
13	Did the Contractor's painting operations meet all specifications?	

Comments Below: Percentage of NO answers: 0.00%

COVERED BRIDGES

1	Did the Contractor install lumber and timber items in a high quality manner and within specifications?	
2	Were timber, lumber and glued laminated materials stored on site according to specifications?	
3	If only portions of the existing timber structure were specified to be removed, did the Contractor carefully remove those portions without damaging the elements that are to be retained?	

Comments Below: Percentage of NO answers: 0.00%

PAVING

1	Were the Contractor's personnel sufficiently skilled and knowledgeable about their work?	
2	Was the equipment provided of adequate size, number, in acceptable condition, and well maintained throughout the project?	

3	Did the Contractor place bituminous concrete pavements properly; i.e., clean truck beds hauling only the bituminous material, truck beds properly lubricated, materials maintained within the correct temperature range, proper widths, proper placement and rolling best practices, etc.?	
4	Was the bituminous concrete pavement delivered to the project a consistent quality product meeting the specifications and did the production facility exhibit good control over production?	
5	After the cores were marked were they taken within the specification time limits and immediately stored in suitable transport containers?	
6	Did the contractor make a conscientious effort to place all of the material within the contract tolerances for thickness?	
7	Did the contractor work cooperatively and in a proactive manner to address all failing material samples and compaction results in a timely manner?	
8	Did all material meet specification requirements to the point that they did not fall under the provisions provided for under either Subsection 406/490.03(e)(5) or 406/490.14(e), REJECTED MATERIAL?	
9	Did all material placed as part of the project remain in place through to final acceptance?	
Comments Below:	Percentage of No answers:	0.00%

EARTHWORKS

1	Were the Contractor's personnel highly skilled and knowledgeable about their work?	
2	Was the equipment provided of adequate size, acceptable condition and well maintained?	
3	Did the Contractor's excavation and fill operations provide the required subgrade/embankment densities?	
4	Did the Contractor use the proper lift thicknesses and benching procedures in the construction of embankments?	
5	Did the Contractor perform blasting operations in such a manner as to avoid damage to public and/or private property?	
6	Was the rock excavation kept within the neat line on the plans by more than one foot (300 mm)?	
7	Was the earth excavation kept within the neat line on the plans by more than one foot (300 mm)?	
8	Did the contractor supply materials meeting the gradation requirements of the contract, or work cooperatively and timely to address materials falling outside of the specification?	
9	Did the Contractor place the subbase material(s) properly; i.e. proper lift thicknesses, proper compaction effort, placement so as to minimize contamination, etc. and did they protect the subbase material from contamination and segregation until it was paved over, if applicable?	
Comments Below:	Percentage of No answers:	0.00%

TRAFFIC CONTROL

1	Were temporary traffic signs and traffic control devices maintained in a clean and legible manner?	
2	Did the Contractor provide well trained, well equipped, properly attired, and trained Flaggers/UTOs when required by work on the project?	

3	Were temporary traffic control devices installed and maintained in accordance with the plans, specifications and the MUTCD?	
4	Were project signs covered, set aside, turned, removed, or relocated as necessary?	
5	Were temporary markings placed within the time frame specified in the contract?	
6	Were permanent markings placed within the time frame specified in the contract after the placement of the final wearing course of bituminous pavement?	

Comments Below: Percentage of No answers: 0.00%

INCIDENTAL CONSTRUCTION

1	Were drainage structures properly installed in conformance with the contract specifications and the plans? *(The answer is "no" if there were failures to provide proper camber, grade, compaction, sealing of joints, or properly certified material.)*	
2	Were shoulders brought up to grade within contract specification after paving was complete?	
3	Was the guardrail/bridge railing installed in accordance with the plans and specifications?	
4	Did the Contractor provide proper handling, containment and removal of hazardous materials encountered on the project?	
5	Did the Contractor remain within the limits of the Right-of-Way and/or easement areas?	
6	If the Contractor disturbed areas outside the project limits, were the areas repaired quickly to the property owner's satisfaction and without action by the Resident Engineer?	
7	Were materials, designated to be salvaged in the contract, removed and salvaged without damage?	
8	Did the Contractor remove, maintain, and relocate signs, mailboxes, and all other items identified in the contract or encountered on the project in a satisfactory manner?	
9	Did the Contractor maintain access to all drives and side roads as required by the contract?	
10	Was the Field Office(s) installed and maintained in accordance with contract documents?	
11	Were the sanitary facility(s) installed and maintained in accordance with the contract documents?	
12	Did the Contractor's personnel have the ability to do layout on their own, or at a minimum did they subcontract the layout work out?	

Comments Below: Percentage of No answers: 0.00%

SAFETY

1	Did the Prime Contractor have a Competent Person ("***Competent Person means:*** *one who is capable of identifying existing and predictable hazards in the surrounding or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them*".) on sight at all times?	
2	Were all Contractor and Sub Contractor personnel appropriately outfitted with Personal Protective Equipment and did they wear it?	

3	Did Fall Protection meet the requirements of 29 CFR 1926.500?	
4	Was a trench box or some other means of protection used for trenches deeper than 5 feet?	
5	Did the Contractor adhere to all safety regulations and requirements?	
6	Was the Contractor responsive and proactive in promoting a safe worksite?	
7	Did the Contractor correct safety issues without the issuance of a written order(s)?	
8	Was the project void of citations by VOSHA? Comment on any violations discovered by VOSHA.	
Comments Below:	Percentage of No answers:	0.00%

Attached please find a copy of the Resident Engineer's Evaluation for the {Contract name(s) and number(s) Contract. The Resident Engineer has answered a series of "Yes", "No", or "N/A" questions that have been developed to assess your firm's ability to complete an Agency contract within the specifications of the contract. Each question carries a specific weight for which an overall score is developed. The Resident Engineer does not know the weighted value of the questions; their only requirement is to answer "Yes", "No" or "N/A" to each question. Any question that has an "N/A" does not affect your final evaluation score.

The Evaluation form has been developed to eliminate subjectivity from the scoring process as much as possible; we believe it will allow for more reliable scorings. In addition to providing you constructive feedback, the evaluation form is included in the Prequalification Committee's information packet used to determine a Contractor's ability to bid on Vermont Agency of Transportation contracts.

If you have any questions, concerns, or comments, please contact Regional Construction Engineer _____. He/She can be reached at (802) *RCE #*. **If you would like to appeal the Evaluation, please do so in writing within 30 calendar days of this e-mail to the address below.** Please include a specific list of items in contention and include supporting documentation.

{Regional's Name} , *Regional Construction Engineer*
Vermont Agency of Transportation
{Region} Regional Construction Office
Street Address
Town, *VT Zip Code*

{IF ATTACHING SUBCONTRACTOR EVALUATIONS, INCLUDE THIS ADDITIONAL PARAGRAPH}
Also attached for your information are Evaluations prepared by {Resident's Name}, Resident Engineer on the Subcontractors who performed work for you under this Contract. Again, if you have any concerns that you would like to discuss with the Regional Construction Engineer, please feel free to contact *him/her at the address noted*.

SAMPLE - See Field Forms CD

Attached please find a copy of the Resident Engineer's evaluation for the above mentioned contract. The Resident Engineer has answered a series of "Yes", "No", or "N/A" questions that have been developed to assess a Contractor's ability to complete an Agency contract within the specifications of the contract. Each question carries a specific weight for which an overall score is developed. The Resident Engineer does not know the weighted value of the questions; their only requirement is to answer "Yes", "No" or "N/A" to each question. Any question that has an "N/A" does not affect the final scoring. All Contractors receive a scoring through use of this form.

The overall performance score on this contract has raised concerns. This evaluation has been forwarded to the Agency's Prequalification Committee for their information. This evaluation could affect your future ability as a Contractor to become prequalified to bid on Vermont Agency of Transportation contracts.

If you have any questions, concerns, or comments, please contact {Regional's name}, Regional Construction Engineer at *{e-mail address/phone number}*. **If you would like to appeal or refute the overall evaluation's score, or any section thereof, please do so in writing within 30 calendar days of this letter to the address noted below.** Please include a specific list of the items in contention with supporting documentation.

{Regional's Name} , Regional Construction Engineer
Vermont Agency of Transportation
{Region} Regional Construction Office
{Street Address}
{Town}, VT {Zip Code}

{IF ATTACHING SUBCONTRACTOR EVALUATIONS, INCLUDE THIS ADDITIONAL PARAGRAPH}
Also attached for your information are Evaluations prepared by {Resident's Name}, Resident Engineer on the Subcontractors who performed work for you under this Contract. Again, if you have any concerns that you would like to discuss with the Regional Construction Engineer, please feel free to contact *him/her at the address noted*.

SAMPLE - See Field Forms CD

State of Vermont
Agency of Transportation
Construction Section

Subcontractor Performance Rating

Subcontractor
Address:
Project(s) name(s) and Number(s)

Type of subcontracted work (check all that apply):

Paving		Signing		Earthworks		Line Striping	
Drainage		GuardRail		Signals		Traffic Control	
Bridges		Other					

Start Date: End Date: Subcontract Amount:

Check the rating that best fits the following subjects:

Subject				Excellent	Satisfactory	Marginal	Unsatisfactory
Supervision	Quality						
	Quantity						
Equipment	Condition						
	Quantity						
Planning, organization and efficiency							
Quality of work							
Cooperation							
Public Relations	Property Owners						
	Traveling Public						
	Town/City Officials						
Timely submissions of schedule, reports and shop drawings							
Completion of Project in a timely manner							
Adhere to all safety regulations and requirements							
Overall Rating							

Remarks:

Resident Engineer **Date** **Regional Construction Engineer** **Date**

2015 First Report of Injury Form

To report an injury first notify your Supervisor, the Construction Safety Technician and the Construction Executive Services Coordinator and then complete the online form below. If you are unable to complete the form due to the injury your Supervisor can complete it for you.

Worker's Comp website

http://aoa.vermont.gov/wcp

https://sov.esolutionsclient.com/ivos/Client_Custom/sov/vtWcIncidentForm.jsp?user=WCUSER

VTrans — Vermont Agency of Transportation

TAILGATE TALK

SUBJECT: ***WARNING: EXTREME HEAT IS HERE!***

Heat Stress Disorders are serious. Workers who have ignored the symptoms have lost their lives. We have a system for regulating body temperature-a personal, "natural" air conditioner. We sweat, it evaporates through our skin, & we're cooled off. But this personal air conditioner can fail, & often does if we overexert when the temperatures are high.

BE COOL. KNOW WHAT TO DO TO BEAT THE HEAT!

CODE: TGT05HSD
DATE: 28 JUNE 2005
ALSO REFER TO: "Sun Protection-Tailgate Talk."
SUPERSEDES:

INSTRUCTIONS:
Safety Coordinators & Supervisors should use the Safety "Tailgate Talk" as a guide for discussion during their safety/garage meetings.

The meetings should include the items mentioned, but are not limited to these subjects. The primary purpose of safety meetings is to give crews the opportunity to discuss any safety-related concerns they may have.

Once the meeting is concluded the Safety Coordinator &/or Garage Supervisor should have each employee sign this form in the spaces below (if more space is required continue on the back) and **insert into your "TAILGATE TALK" binder.**

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SUPERVISOR or SAFETY COORDINATOR SIGNATURE

COMENTS:

Wow! What a scorcher! You knew it was going to be a hot day but with the humidity it has to be 105° outside. You reach for a tool to finish your job & start to feel lightheaded. It's probably because you haven't eaten much this morning. You can make it until lunch!

Time passes & your condition hasn't gotten any better-in fact it's worse! Your breathing has increased, your sweating a lot, and your mouth is dry. Something's wrong! You start to climb off a piece of equipment, but you're almost too weak to move. You feel like you're going to be sick. With no control of your movements, you fall to the ground. The crew is trying to get your attention but you can't understand them. You yell "Help me up guys!" But they don't respond. Can't they hear? All you can see is black…what's happening…?

Heat Exhaustion! That's what's happening. Heat exhaustion can occur when you are subjected to hot environments & fail to take in enough fluids, salt, or both. And even worse, this can lead to a life threatening condition known as heat stroke. Sun stroke or heat stroke happens when the body's internal mechanism fails to regulate its core temperature. At this point, the body stops cooling itself through perspiration & can't get rid of the perspiration & heat. Unfortunately, the end result can be death if the body temperature is not lowered immediately! So, especially if you work in hot environments, it's critical to recognize when you are suffering from a Heat Stress Disorder.

SYMPTOMS OF HEAT STRESS DISORDERS:

- **Heat Cramps – Symptoms are painful spasms of the muscles. Heat cramps are caused when workers consume large quantities of water but fail to take enough salt to replace the salt their body lost through sweating. Tired muscles are most susceptible to cramping.**
- **Heat Exhaustion – Symptoms for this disorder are moist, clammy, pale skin: profuse sweating; extreme weakness or fatigue; dry mouth; dizziness; fast pulse; rapid breathing; muscle cramps & nausea.**
- **Heat/Sun Stroke – Symptoms are a very high body temperature (104° or higher); lack of sweat; mental confusion, delirium, or hallucinations; deep breathing & rapid pulse; hot, dry, red or blotchy skin; & dilated pupils. Seek medical help immediately for this condition.**

TIPS FOR PREVENTION:

- **Acclimatization – Adjust yourself to the heat through short exposure periods followed by longer exposure until your body is accustomed to the heat. It may take 5-7 days of hot weather exposure before the body undergoes changes that make heat more bearable.**
- **Drink lots of Water/Fluids – Replenish the fluids your body is losing through sweating. Not only water, but critical electrolyte drinks to combat heat related disorders. Alcohol the night before could cause dehydration the next day.**
- **Education – Know the signs & symptoms of heat stress disorders & act quickly.**
- **Use Your Head – Do not ignore possible symptoms of heat stress disorders & act quickly. If you feel very hot, dizzy, nauseous or if your muscles cramp, stop & cool off.**

If you have any questions or comments regarding this Tailgate Talk, or any safety-related concerns please contact VTRANS Safety Officer Camille Erwin at 802-595-1636

TAILGATE TALK

SUBJECT:	CODE: TGT05IDT
Advice On How to Avoid Identity Theft	DATE: 29 July 29, 2005 ALSO REFER TO: N/A SUPERSEDES: N/A

INSTRUCTIONS:

Safety Coordinators & Supervisors should use this "Safety Tailgate Talk" as a guide for discussion during their safety meetings. The primary purpose of the safety meetings is to give crews the opportunity to discuss any safety related concerns they may have.

Once the meeting has concluded, the Safety Coordinator &/or Supervisor should have each employee sign this form in the spaces below (if more spaces are needed, continue on the back) & insert into your "TAILGATE TALK" binder.

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A corporate attorney sent the following out to the employees in his company:

1. The next time you order checks have only your initials (instead of first name) and last name put on them. If someone takes your checkbook, they will not know if you sign your checks with just your initials or your first name, but your bank will know how you sign your checks.

2. Do not sign the back of your credit cards. Instead, put "PHOTO ID REQUIRED".

3. When you are writing checks to pay on your credit card accounts, DO NOT put the complete account number on the "For" line. Instead, just put the last four numbers. The credit card company knows the rest of the number, and anyone who might be handling your check as it passes through all the check processing channels won't have access to it.

4. Put your work phone # on your checks instead of your home phone. If you have a PO Box use that instead of your home address. If you do not have a PO Box, use your work address. Never have your SS# printed on your checks. You can add it if it is necessary. But if you have it printed, anyone can get it.

5. Place the contents of your wallet on a photocopy machine. Do both sides of each license, credit card, etc. You will know what you had in your wallet and all of the account numbers and phone numbers to call and cancel. Keep the photocopy in a safe place. I also carry a photocopy of my passport when I travel either here or abroad. We've all heard horror stories about fraud that's committed on us in stealing a name, address, Social Security number, credit cards.

Unfortunately I, an attorney, have firsthand knowledge because my wallet was stolen last month. Within a week, the thieve(s) ordered an expensive monthly cell phone package, applied for a VISA credit card, had a credit line approved to buy a Gateway computer, received a PIN number from DMV to change my driving record information online, and more. But here's some critical information to limit the damage in case this happens to you or someone you know:

1. We have been told we should cancel our credit cards immediately. But the key is having the toll free numbers and your card numbers handy so you know whom to call. Keep those where you can find them.

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SUPERVISOR or SAFETY COORDINATOR SIGNATURE	

2. File a police report immediately in the jurisdiction where your credit cards, etc., were stolen. This proves to credit providers you were diligent, and this is a first step toward an investigation (if there ever is one).

3. But here's what is perhaps most important of all: (I never even thought to do this.)

4. Call the 3 national credit reporting organizations immediately to place a fraud alert on your name and Social Security number. I had never heard of doing that until advised by a bank that called to tell me an application for credit was made over the Internet in my name. The alert means any company that checks your credit knows your information was stolen, and they have to contact you by phone to authorize new credit.

By the time I was advised to do this, almost two weeks after the theft, all the damage had been done. There are records of all the credit checks initiated by the thieves' purchases, none of which I knew about before placing the alert. Since then, no additional damage has been done, and the thieves threw my wallet away this weekend (someone turned it in). It seems to have stopped them dead in their tracks.

Now, here are the numbers you always need to contact about your wallet, etc., has been stolen:

1.) Social Security Administration (fraud line): 1-800-269-0271
2.) Equifax: 1-800-525-6285
3.) Experian (formerly TRW): 1-888-397-3742
4.) Trans Union: 1-800-680-7289

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Safety Officer, Camille Erwin at 802-595-1636

Vermont Agency of Transportation

TAILGATE TALK

SUBJECT: **BLOOD BORNE PATHOGENS (BBP)**	**CODE: TGT05BBP** **DATE: 27 September 2005** **ALSO REFER TO: VTrans Safety Manual 11.0** **SUPERSEDES: N/A**

INSTRUCTIONS:

Safety Coordinators & Supervisors should use this "Safety Tailgate Talk" as a guide for discussion during their safety meetings. The primary purpose of the safety meetings is to give crews the opportunity to discuss any safety related concerns they may have.

Once the meeting has concluded, the safety Coordinator &/or Supervisor should have each employee sign this form in the spaces below (if more spaces are needed, continue on the back) & insert into your "TAILGATE TALK" binder.

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SUPERVISOR or SAFETY COORDINATOR SIGNATURE

Individuals who are infected with Hepatitis B Virus (HBV) or Human Immunodeficiency Virus (HIV) may not show symptoms and may not know they are infectious. For this reason, all human blood and body fluids should be considered *as if infectious*, and all precautions should be taken to avoid contact. This simple rule is known as "universal precautions."

In the workplace, blood borne pathogens (BBP) may be transmitted when blood or other infectious body fluids come in contact with mucous membranes (your eyes, nose, mouth); non-intact skin (due to cuts, abrasions, burns, rashes, paper cuts); or by handling or touching contaminated materials or surfaces. Blood borne pathogens are also transmitted by "injection" under the skin via a contaminated sharp object puncturing or cutting the skin causing a wound.

Hepatitis B Virus versus Human Immunodeficiency Virus:

- Hepatitis B Virus is more persistent than HIV and is able to survive for at least one week in dried blood on environmental surfaces. However, HIV will not survive for more than a few minutes when exposed to room temperature air, and will usually die within seconds.
- A teaspoon of infected blood may contain over one billion HBV particles, while a teaspoon of infected HIV blood contains about 15 HIV particles.
- Hepatitis B Virus usually has mild symptoms which makes diagnosis difficult. HIV infections usually are not diagnosed for years and symptoms may not appear for many months or years.
- Hepatitis B can be prevented with a vaccine (even after exposure). At the present time there is no preventive vaccine for HIV.
- No cure is presently available for HBV or HIV.

If you administer first aid to an injured person in the workplace and there is a potential for contacting any body fluids, you should adhere to the following "universal precaution" guidelines:

- Wear impervious gloves when there is a chance of exposure to blood or body fluids.
- Wear a face shield to protect your entire face, and safety goggles to provide the most complete eye protection.
- Use resuscitation devices when performing cardiopulmonary resuscitation (CPR).
- Report all BBP exposures or potential exposures to your supervisor immediately.
- Immediately wash your hands and affected areas with soap and warm water.
- Flush your eyes, nose or other mucous membrane areas with water, if exposed.

Wash down areas which body fluids may have been contacted with the use of a mild solution of household water and bleach (10:1).

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Safety Officer, Camille Erwin at 802-595-1636

VTrans Safety

Vermont Agency of Transportation

TAILGATE TALK

Dog Bites, a *ruff* situation!

We have had some of our people bitten lately.

CODE: TGT05DGBTS
DATE: 12 October 2005
ALSO REFER TO: VTrans Safety Manual, sections 2.0 & 11.0
http://aotapps/opshdq/safteymanual.htm
SUPERSEDES: N/A

INSTRUCTIONS:

Safety Coordinators & Supervisors should use this "Safety Tailgate Talk" as a guide for discussion during their safety meetings. The primary purpose of the safety meetings is to give crews the opportunity to discuss any safety related concerns they may have.

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SUPERVISOR or SAFETY COORDINATOR SIGNATURE

The Humane Society & the US Postal Service offer these tips on preventing dog bites.

How can I avoid being bitten by a dog?

- Never approach a strange dog, especially one who is tied up or confined behind a fence or in a car.
- Do not pet a dog, even your own, without letting him or her see & sniff you first.
- Never turn your back to a dog and run away. A dog's natural instinct is to chase and catch fleeing prey.
- Don't disturb a dog while he or she is sleeping, eating, chewing on a toy, or caring for puppies.
- Be cautious around strange dogs. Always assume that a dog who does not know you may see you as an intruder or as a threat.

What should I do if I think a dog may attack?

- Never scream and run. Remain motionless, hands at your sides, and avoid eye contact with the dog.
- Remain motionless with your hands at your sides until the dog loses interest in you, then slowly back away until he or she is out of site.
- If the dog does attack, "feed" him or her your jacket, purse, or anything that you can put between yourself and the dog.
- If you fall or are knocked to the ground, curl into a ball with your hands over your ears and remain motionless. Try not to scream or roll around.

VERMONT COMMUNICABLE DISEASE REGULATIONS (VT Dept of H)
CHAPTER IV - RABIES CONTROL

Management of Animals that Bite Humans:
The local health officer shall cause an apparently healthy dog, cat or ferret that bites a person to be confined and observed for 10 days. Other biting animals which may have exposed a person to rabies must be reported immediately to the local health officer. Prior vaccinations of an animal may not preclude the necessity for euthanasia and testing if the period of virus shedding is unknown for that species. Management of animals other than dogs, cats or ferrets depends on the species, the circumstances of the bite, and the epidemiology of rabies in the area, and the biting animal's history, current health status, and potential for exposure to rabies

If you have been bitten, you must call your physician (who is supposed to call the local health officer) & you need to fill out a First Report of Injury (if this occurred while at work).

Please share the "Dog Bite Activity Worksheet" with your family.

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Safety Officer, Camille Erwin at 802-595-1636

Vermont Agency of Transportation

TAILGATE TALK

Effective communicating and listening both begin with language. **By** **DR. Steven Covey**	**CODE: TGT05EFFECTCOMM** **DATE: 27 September 2005** **ALSO REFER TO: "Common Sense & Accident Prevention" Tailgate Talk** **SUPERSEDES: N/A**

INSTRUCTIONS:

Safety Coordinators & Supervisors should use this "Safety Tailgate Talk" as a guide for discussion during their safety meetings. The primary purpose of the safety meetings is to give crews the opportunity to discuss any safety related concerns they may have.

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SUPERVISOR or SAFETY COORDINATOR SIGNATURE

Effective communicating and listening both begin with language.

Are you proactive or reactive in your language? Between stimulus and response, you have the freedom to choose. This is your greatest power. One of the most important things you choose is what you say.

Your language is a good indicator of how you see yourself. A proactive person uses proactive language—I can, I will, I prefer, etc. A reactive person uses reactive language—I can't, I must, if only.

Reactive people believe they are not responsible for what they say—they have no choice. Think of a situation in your life during the last week when you responded in a reactive way. Write down and describe what you said.

Now think of a proactive response you might have used in the same situation. Write it down, just for practice.

Make it a point to really listen to your language during the next week. Is your language more proactive or reactive? Is your language different between work and home life?

VTrans Safety

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Safety Officer, Camille Erwin at 828-2585

TAILGATE TALK

How to recognize a stroke	CODE: TGT05STROKE DATE: 17 October 2005 ALSO REFER TO: TGT05(1)EMPHS2 (Emergency Ph # Tailgate Talk) SUPERSEDES: N/A

INSTRUCTIONS:

Safety Coordinators & Supervisors should use this "Safety Tailgate Talk" as a guide for discussion during their safety meetings. The primary purpose of the safety meetings is to give crews the opportunity to discuss any safety related concerns they may have.

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SUPERVISOR or SAFETY COORDINATOR SIGNATURE

A neurologist says that if he can get to a stroke victim within 3 hours he can totally reverse the effects of a stroke...totally. He said the trick was getting a stroke recognized, diagnosed and getting to the patient within 3 hours which is tough.

RECOGNIZING A STROKE - A true story

Susie is recouping at an incredible pace for someone with a massive stroke all because Sherry saw Susie stumble - - that is the key that isn't mentioned below -and then she asked Susie the 3 questions.

So simple - - this literally saved Susie's life - - Suzie failed all three so then 9-1-1 was called. Even though she had normal blood pressure readings and did not appear to be a stroke as she could converse to some extent with the Paramedics they took her to the hospital right away. Thank God for the sense to remember the "3" steps. Read and Learn!

Sometimes symptoms of a stroke are difficult to identify. Unfortunately, the lack of awareness spells disaster. The stroke victim may suffer brain damage when people nearby fail to recognize the symptoms of a stroke. Now doctors say a bystander can recognize a stroke by asking three simple questions:

1. *Ask the individual to SMILE.
2. *Ask him or her to RAISE BOTH ARMS.
3. *Ask the person to SPEAK A SIMPLE SENTENCE (Coherently) (i.e. . . It is sunny out today) If he or she has trouble with any of these tasks, call 9-1-1 immediately and describe the symptoms to the dispatcher.

After discovering that a group of non-medical volunteers could identify facial weakness, arm weakness and speech problems, researchers urged the general public to learn the three questions. They presented their conclusions at the American Stroke Association's annual meeting last February. Widespread use of this test could result in prompt diagnosis and treatment of the stroke and prevent brain damage.

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Safety Officer, Camille Erwin at 802-595-1636

VTrans Safety

Vermont Agency of Transportation

TAILGATE TALK

Signs & Symptoms of Clinical Depression	CODE: TGT05DEPRESSION DATE: 18 October 2005 ALSO REFER TO: N/A SUPERSEDES: N/A

INSTRUCTIONS:

Safety Coordinators & Supervisors should use this "Safety Tailgate Talk" as a guide for discussion during their safety meetings. The primary purpose of the safety meetings is to give crews the opportunity to discuss any safety related concerns they may have.

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SUPERVISOR or SAFETY COORDINATOR SIGNATURE

Signs & Symptoms of Clinical Depression:

- Persistent sad, anxious or "empty" mood
- Changes in sleep patterns
- Reduce appetite and weight loss, or increased appetite and weight gain
- Loss of pleasure and interest in once-enjoyable activities.
- Restlessness, irritability
- Persistent physical symptoms that do not respond to treatment, such as chronic pain or digestive disorders
- Difficulty concentrating at work or at school, or difficulty remembering things or making decisions
- Fatigue or loss of energy
- Feeling guilty, hopeless or worthless
- Thoughts of suicide or death

If you experience five or more of these symptoms for two weeks or longer, you could have clinical depression. See a doctor or qualified mental health professional for help, right away. If you are supervising an employee who exhibits any of these symptoms and has frequent, unexcused absences, discuss the situation with the individual, but do not try to diagnose the problem. Suggest that the employee seek help from his or her doctor or, if you have one, the Employee Assistance Program (EAP). Make sure the employee knows that seeking help is the healthy thing to do.

Invest EAP can be contacted by calling 888-834-2830

VTrans Safety

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Safety Officer, Camille Erwin at 802-595-1636

Vermont Agency of Transportation

TAILGATE TALK

SUBJECT: "HARD HATS"

CODE: TGT-2005-1
DATE: March 2005
REFER TO: *VTrans Safety Manual* & *White Hard Hats Memorandum,* November 8, 2002
SUPERSEDES:

INSTRUCTIONS:
Safety Coordinators & Supervisors should use the Safety "Tailgate Talk" as a guide for discussion during their safety/garage meetings.

The meetings should include the items mentioned, but are not limited to these subjects. The primary purpose of safety meetings is to give crews the opportunity to discuss any safety-related concerns they may have.

When the meeting has concluded, the Safety Coordinator &/or Garage Supervisor should have each employee sign this form in the spaces below (if more space is required continue on the back) and **insert into your "TAILGATE TALK" binder.**

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SUPERVISOR'S NAME (PRINT)

DATE: _____

SITE: _____

Other:_____

_____
SUPERVISOR'S SIGNATURE

INTRODUCTION:
The average safety hard hat weighs about 14 ounces. The average man's head (I only have information on the man's head, sorry ladies) weighs 14 pounds. So there's an ounce of safety for every pound of head – provided the head protection is worn & maintained.

The brain is the control center of the body. The slightest damage to any part of the brain will cause malfunction of some area of the body. The skull under normal circumstances protects the brain. But when a possibility of injury from falling or flying objects exists, additional protection is required.

Hard hats not only reduce the chances of serious injury resulting from falling objects, but protect you when you bump your head on things – like machinery & beams. Non-conductive hard hats protect you from electrical shock & burns.

HOW TO CARE FOR YOUR HARD HATS:
The better care you take of your hard hat, the better care it will take of you. Here are some suggestions:

1. Properly adjust suspension systems to maintain clearance between your head & the shell of the hat.
2. Don't cut holes for ventilation. Don't heat & bend.
3. Don't substitute with a "bump cap." They are not strong enough.
4. Don't paint your hard hat.
5. Don't put anything under it, except for your head; this includes cigarettes or notebooks.
6. Don't wear it backwards.

SOME COMMON COMPLAINTS & REAL TRUTH:
We sometimes hear the following complaints about the hard hats. But is there any real basis for them?

- "It's too heavy." Hard hats are only a few ounces heavier than a cloth cap, but the protection you get is well worth then extra weight.
- "It's too hot." Measurements taken in hot weather show that the temperature under a hard hat is often cooler than it is outside.
- "It gives me a headache." A thump on the head from something which has fallen a few feet will give you a worse one. There is however, no medical reason why a properly adjusted hard hat should cause a headache. Don't alter the suspension system or the hard hat, because you will not get the designed protection.
- "It won't stay on." You're right; it won't in a high wind. A chin strap will solve this problem. Otherwise, you will find that a hard hat stays put no matter how much stooping or bending you have to do – if it's fitted properly.
- "It's noisy." That's your imagination. In fact tests show that properly worn hard hats will shield your ears from noise to some extent.

NO HELP UNLESS YOU WEAR IT:
The hard hat is a useful piece of safety equipment. But like any other protective device, it must be properly adjusted & worn & kept in good condition to give you maximum protection.

Don't be a hard head – get in the hard hat habit.

If you have any questions or comments regarding this Tailgate Talk, or any safety-related concerns please contact VTRANS Safety Officer Camille Erwin at 802-595-1636

Vermont Agency of Transportation

TAILGATE TALK

West Nile Virus: What You Need To Know

West Nile virus has been detected in dead birds, mosquitoes, and horses. The first documented case of human illness caused by West Nile virus in Vermont was in 2002. People can not get West Nile virus from handling dead birds. However, it is always wise to wear gloves when handling a dead animal and to wash your hands thoroughly with soap and water afterwards.

CODE: TGT05WNV
PAGES: 3
DATE: 30 June 2005
ALSO REFER TO: Section 11.2 of the VTrans Safety Manual
SUPERSEDES: *West Nile – Like Virus-* Memo, dated October 12, 1999

INSTRUCTIONS:

Safety Coordinators & Supervisors should use this "Safety Tailgate Talk" as a guide for discussion during their safety meetings. The primary purpose of the safety meetings is to give crews the opportunity to discuss any safety related concerns they may have.

Once the meeting has concluded, the safety Coordinator &/or Supervisor should have each employee sign this form in the spaces below (if more spaces are needed, continue on the back) & insert into your "TAILGATE TALK" binder.

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SUPERVISOR or SAFETY COORDINATOR SIGNATURE

What Is West Nile Virus?

West Nile virus encephalitis is an infection of the brain caused by the West Nile virus. West Nile virus first appeared in the United States in 1999, when at least 62 people in the New York City area got sick and seven people died.

What Are the Symptoms of WNV?

WNV affects the central nervous system. Symptoms vary.

- **No Symptoms in Most People.** Approximately 80 percent of people who are infected with WNV will not show any symptoms at all.
- **Mild Symptoms in Some People.** Up to 20 percent of the people who become infected will display mild symptoms, including fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms typically last a few days.
- **Serious Symptoms in a Few People.** About one in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may be permanent.

How Does It Spread?

- **Infected Mosquitoes.** Generally, WNV is spread by the bite of an infected mosquito. Mosquitoes are WNV carriers that become infected when they feed on infected birds. Infected mosquitoes can then spread WNV to humans and other animals when they bite.
- **Transfusions, Transplants, and Mother-to-Child.** In a very small number of cases, WNV also has spread through blood transfusions, organ transplants, breastfeeding and even during pregnancy from mother to baby.
- **Not through touching.** WNV is not spread through casual contact such as touching or kissing a person with the virus.

How Soon Do Infected People Get Sick?

People typically develop symptoms between 3 and 14 days after they are bitten by the infected mosquito.

How Is WNV Infection Treated?

There is no specific treatment for WNV infection. In cases with mild symptoms, people experience symptoms such as fever and aches that pass on their own. In more severe cases, people usually need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

What Should I Do if I Think I Have WNV?

Mild WNV illness improves on its own, and people do not necessarily need to seek medical attention for this infection. If you develop symptoms of severe WNV illness, such as unusually severe headaches or confusion, seek medical attention immediately. Severe WNV illness usually requires hospitalization; Pregnant women and nursing mothers are encouraged to talk to their doctor if they develop symptoms that could be WNV.

VTrans Safety

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Safety Officer, Camille Erwin at 802-595-1636

What Is the Risk of Catching WNV?

- **For most, risk is low.** Less than 1 percent of people who are bitten by mosquitoes develop any symptoms of the disease and relatively few mosquitoes actually carry WNV.
- **Greater risk for those outdoors a lot.** People who spend a lot of time outdoors are more likely to be bitten by an infected mosquito. They should take special care to avoid mosquito bites.
- **People over 50 can get sicker.** People over the age of 50 are more likely to develop serious symptoms of WNV if they do get sick and should take special care to avoid mosquito bites.
- **Risk through medical procedures is low.** The risk of getting WNV through blood transfusions and organ transplants is very small, and should not prevent people who need surgery from having it. If you have concerns, talk to your doctor before surgery; Pregnancy and nursing do not increase risk of becoming infected with WNV.

What Can I Do to Prevent WNV?

The easiest and best way to avoid WNV is to prevent mosquito bites.

- When you are outdoors, use insect repellents containing DEET (N, N-diethyl-meta-toluamide). Follow the directions on the package.
- Use insect repellent and wear long sleeves and pants. Light-colored clothing can help you see mosquitoes that land on you.
- Make sure you have good screens on your windows and doors to keep mosquitoes out.
- Get rid of mosquito breeding sites by emptying standing water from flower pots, buckets and barrels.
- Change the water in pet dishes and replace the water in bird baths weekly. Drill drainage holes in tire swings so water drains out; Keep children's wading pools empty and on their sides when they aren't being used.

VTrans Safety

West Nile Virus

Don't Let It Bug You

Most people who get West Nile virus don't feel sick, but it can cause serious illness. Here are some simple steps to help reduce your risks.

Protect yourself and your family!

Avoid mosquito bites.

- **Use insect repellent that contains DEET** on clothing and exposed skin according to the manufacturer's recommendations.
  - Use repellents containing no more than 30 percent DEET on adults
  - Use repellents containing less than 10 percent DEET on children age 3 and older
- **Wear protective clothing** like long-sleeved shirts and long pants while outside.
- **Limit outdoor activity at dawn and dusk** when mosquitoes are most active.

Tell mosquitoes to buzz off!

Don't let mosquitoes breed around your home

- **Eliminate standing water** from flower pots, barrels, used tires, swimming pool covers, clogged roof gutters or other waterholding containers.
- **Change water** twice a week in bird baths, wading pools and outside animal water dishes.
- **Install or repair screens** on windows and doors to keep mosquitoes out.

HEALTHY VERMONTERS 2010

Support disease tracking activities.

In Vermont, call 1-800-913-1139 to report dead birds.

Vermont Department of Health
Division of Health Surveillance • Epidemiology & Disease Prevention
P.O. Box 70 • Burlington, VT 05402

TAILGATE TALK

SUBJECT: Concrete Barrier & Friction Clamps	DATE: January 10, 2008 ALSO REFER TO: Standard G-18 SUPERSEDES: N/A

1) **Proper use of a barrier clamp** When lifting any barrier, it is important to lift from the center of the barrier. If you lift a barrier with a J-style connection off center or don't lift it exactly vertically, the barrier will not easily come apart. Lifting while not being positioned directly over the top - center of the barrier will cause the barrier to swing - possibly into, or in front of, on-coming traffic. Any unanticipated intrusion into a traveled lane may cause traffic to react with potentially dangerous results.

2) **Friction Clamps** Barrier slippage is a concern any time friction clamps are used and needs to be approached with extreme caution. Regardless of the season frost, dirt, moisture or other elements can compromise the friction surfaces and cause the clamp to not grasp as well as it normally would. It is extremely important to stay clear of barriers in motion. Tag lines should be used to assist with alignment and placement of barriers. This will leave the person in control of the barrier out of harm's way but still in control of the barrier. As it is necessary for employees to maneuver barriers into place when connecting them, extreme caution must be employed to prevent workers from being caught or struck by the barrier. During inclement weather or extreme cold, barriers may need to be dried or thawed with a hand held propane heater or other methods. In all instances it is recommended a trial lift be performed at the beginning of each operation to ensure proper procedures are followed.

3) **Traffic Control** When working immediately adjacent to a designated travel lane, the use of a traffic spotter is a good way to let the equipment operator know when it is safe to lift and or set barriers. This allows the operator to concentrate on the job at hand without having to focus on the traffic as well.

4) **Competent Person** An operation such as this requires that a competent person be present, where they can be responsible for all aspects of the operation.

VTrans Safety

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Construction Division Safety Officer at 802-828-1585

Vermont Agency of Transportation

TAILGATE TALK

LYME DISEASE

CODE: TGT05LD

PAGES: 2

DATE: 05 July 2005

Where there are deer, you will find ticks. Because we live & work among these animals, it's important to be cautious, not nauseous. The only tick that can transmit this disease by a bite to humans & animals is the deer tick (also known as the black-legged tick). Studies have shown that an infected tick normally cannot begin transmitting this disease until it has been attached to it's host for approximately 24 – 72 hours; your best line of defense is to examine yourself at least once a day & remove any ticks before they become engorged (swollen) with blood.

INSTRUCTIONS:

Safety Coordinators & Supervisors should use this "Safety Tailgate Talk" as a guide for discussion during their safety meetings. The primary purpose of the safety meetings is to give crews the opportunity to discuss any safety related concerns they may have.

Once the meeting has concluded, the Safety Coordinator &/or Supervisor should have each employee sign this form in the spaces below (if more spaces are needed, continue on the back) & insert into your "TAILGATE TALK" binder.

1	**2**
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13	**14**

WHAT IS LYME DISEASE?

Lyme disease is an infection. The infection is transmitted by the bite of black-legged ticks commonly known as deer ticks. Lyme disease, which can affect the skin, heart, nerves, or joints, is an infection that can be cured with antibiotic therapy.

WHAT ARE THE SYMPTOMS OF LYME DISEASE?

There are three stages of Lyme disease: early, early disseminated and late Lyme disease.

SYMPTOMS – 1st STAGE:

The first stage of Lyme disease is called early Lyme disease. Early Lyme disease usually causes one or more of the following symptoms that occur days to weeks after infection:

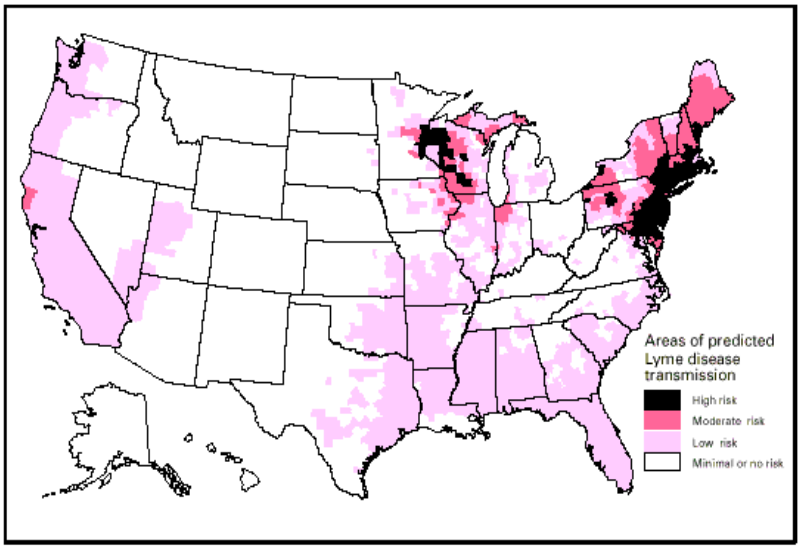
- Fatigue
- Chills and fever
- Muscle and joint pain
- Headache
- Swollen lymph nodes
- Erythema migrans

Erythema migrans is the skin rash associated with Lyme disease. This is an expanding rash which usually appears at or near the site of the tick bite. It may appear anywhere from three days to one month after the infected tick's bite, but it usually appears in about seven to 14 days. The center of the rash may clear as it grows, giving it the appearance of a bull's-eye. The rash may be warm, but it is usually not painful. The erythema migrans type of skin rash is different from a rash that appears as an allergic reaction to a tick or insect bite. Such reactions to a bite usually appear as redness within hours to one day after a bite, do not grow, and disappear within a day or two.

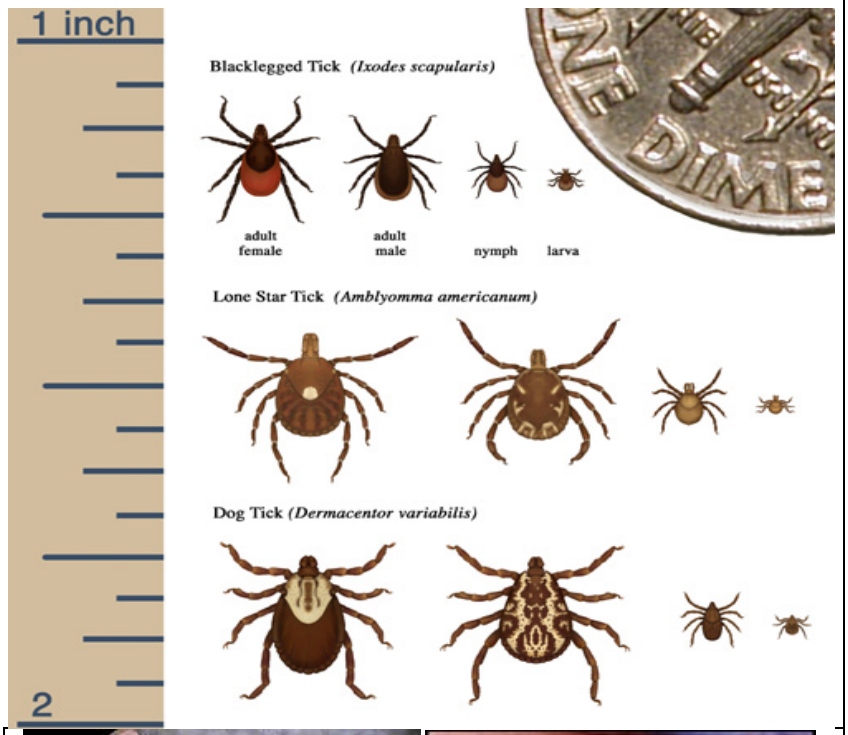
SYMPTOMS – 2nd STAGE:

The second stage of Lyme disease is known as **early disseminated Lyme disease,** which means that the infection is beginning to spread and is affecting certain body

National Lyme disease risk map with four categories of risk



Note: This map demonstrates an approximate distribution of predicted Lyme disease risk in the United States. The true relative risk in any given county compared with other counties might differ from that shown here and might change from year to year. Risk categories are defined in the accompanying text. Information on risk distribution within states and counties is best obtained from state and local public health authorities.



Large, red, slowly spreading rash characteristic of Lyme Disease called erythema migrans (EM) rash

Tick Tip: Use tweezers to remove ticks.

functions. This stage occurs weeks to months after the bite of an infected tick. Problems can include:

- Numbness and pain in arms or legs
- Paralysis of facial muscles (usually on one side of the face)
- Meningitis - fever, stiff neck, and severe headaches
- Abnormal heart beat (rare)

SYMPTOMS - 3rd STAGE:

The third stage of Lyme disease is called late disseminated Lyme disease. This stage can occur weeks, months, or even years after infection in untreated patients. Patients with late Lyme disease may get:

- Chronic Lyme arthritis - brief bouts of pain and swelling usually occurring in one or more of the large joints, especially the knees
- Nervous system problems, including memory loss and difficulty concentrating
- Chronic pain in muscles and/or unrest sleep

HOW DOES LYME DISEASE SPREAD?

The spirochetes enter the body when an infected tick attaches to the skin to take a blood meal. In order to transmit Lyme disease, the infected tick normally must be attached for approximately 24 – 72 hours.

Not all types of ticks carry Lyme disease. In New England, the black-legged tick is mainly responsible for transmitting the disease. However, not all black-legged ticks carry the spirochete that causes Lyme disease. Most cases of Lyme disease occur in a few highly affected areas.

WHO IS AT RISK OF GETTING LYME DISEASE?

Black-legged ticks live in wooded, brushy and grassy places, including lawns and gardens. A person is more likely to get the disease during the spring and summer because a lot of time is spent outside, often with large amounts of skin exposed.

WHAT IS THE TREATMENT FOR LYME DISEASE?

Early treatment of Lyme disease involves antibiotics and almost always results in a full cure. However, the chances of a complete cure decrease if treatment is delayed.

Tick Tip: Upon returning home, clothes can be spun in the dryer for 20 minutes to kill any unseen ticks.

If you found a tick & believe it bit, now you know the odds of getting sick.

IS LYME DISEASE PREVENTABLE? While outdoors, a few simple precautions can reduce your chance of being bitten: • Wear long pants and long-sleeved shirts to minimize skin exposure to ticks. • Tuck your pants into your socks to form a barrier to tick attachment. • Wear light-colored clothing to make ticks on your clothing easier to see. • Check for ticks, looking particularly for what may look like nothing more than a new freckle or speck of dirt. Use tick and insect repellents containing DEET or Permethrin to help protect against Lyme disease. DEET-containing preparations should be used sparingly, not applied to face or hands, and should not exceed 10% concentrations for children over 3 years of age and 30% for adults. DEET should not be used on infants or children under age 3 without first consulting your health care provider. Follow the label instructions carefully. **Tick Tip: Deer ticks cannot jump or fly, & do not drop from above onto a potential host. We get ticks by direct contact.**	If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Safety Officer, Camille Erwin at 802-595-1636.

TAILGATE TALK

SUBJECT:	DATE: January 13, 2009
Cured In Place Pipe Liner (styrene impregnated)	**ALSO REFER TO:** **SUPERSEDES: N/A**

Potential Health Effects:

Acute (short term): Uncured product: Inhalation of vapors from uncured product my cause upper respiratory irritation and possible central nervous system effects including headaches, nausea, vomiting, dizziness, drowsiness, loss of coordination, impaired judgment, and general weakness. Direct contact may cause dryness, cracking, tenderness and irritation of the skin and may result in immediate irritation of the eyes with redness, burning, tearing and blurred vision. It may cause mouth, throat and gastrointestinal irritation, nausea, vomiting and diarrhea if ingested.

Chronic (long term): Uncured product: Styrene is a possible cancer hazard. Prolonged exposure may result in nausea, loss of appetite, general weakness, and changes to blood chemistry, and peripheral and central nervous system activity. Prolonged or repeated skin contact may result in irritation, dermatitis marked by rough, dry cracking skin. Prolonged or repeated eye exposure to vapors may cause irritation to the lining of the eyelids.

Cured product: Exposure to dusts and fibers generated from sawing, drilling or other forms of mechanical alteration of this product may result in itching and irritation of the mouth, nose, throat, skin or eyes.

Personal Protection: Exposure limits establish by OSHA are 100 ppm (5-minute maximum peak in any three hours) therefore air quality monitoring must prove exposure below the above mentioned limits or respiratory protection is required. Use a NIOSH approved air purifying respirator with organic vapor cartridges or canisters or supplied air respirator.

Skin Protection: Wear long sleeved shirt and long pants. Use chemical resistant gloves when handling uncured product.

Eye Protection: Safety glasses, goggles or face shield.

Saw Cutting Cured Product: Use an N85 dust mask or NIOSH approved respirator with particle filter canister or cartridge with safety glasses, goggles or face shield.

Hygienic Practices: Avoid unnecessary exposure and removal of the product from the skin, eyes and clothing. Launder contaminated clothing before reuse and shower at days end.

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Construction Division Safety Officer, 802-828-1585

VTrans Safety

VTrans Vermont Agency of Transportation

TAILGATE TALK

"SEEING IS BELIEVING"- We are receiving quite a few First Report's on eye injuries. Eye injuries are preventable & you can protect your eyes with proper PPE.

CODE: TGT- 09EYES1
DATE: 10 February 2009
REFER TO: TGT-05 10 Commandments of Good Safety Habits & VTrans Safety Manual Section 13.1
SUPERSEDES: N/A

INSTRUCTIONS:
Safety Coordinators & Supervisors should use the Safety "Tailgate Talk" as a guide for discussion during their safety/garage meetings.

The meetings should include the items mentioned, but are not limited to these subjects. The primary purpose of safety meetings is to give crews the opportunity to discuss any safety-related concerns they may have.

Once the meeting is concluded the Safety Coordinator &/or Garage Supervisor should have each employee sign this form in the spaces below (if more space is required continue on the back) and **insert into your "TAILGATE TALK" binder.**

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SUPERVISOR'S NAME (PRINT)

DATE: _____

SITE: _____

Other:

_____
SUPERVISOR'S SIGNATURE

Eye protection devices have been used in the construction industries since 1910. While the original eye protection devices were somewhat limited, today there are eye protection devices for every type of exposure.

While the wearing of eye protection at all times is strongly encouraged, many projects demand that workers wear eye protection. Just a few of these are:

- Chipping, sledging and hammering on metal, stone or concrete
- Use of manual, pneumatic and power impact tools
- Caulking, brushing and grinding
- Drilling, scaling and scraping
- Handling acids, caustics and creosoted materials
- Gas welding, cutting and brazing
- Drilling overhead
- Environments of excessive dust
- Electric arc welding and cutting,
- Other operations that expose the eyes to flying particles, dust, hot liquids, molten substances, gases, fumes and liquids.

Some people just don't like to wear safety glasses and goggles. One of the complaints is that goggles tend to fog up. Fogging happens when sweat vaporizes and coats the inside of the lens. If you have this problem with goggles and glasses, wear a handkerchief or sweatband around your forehead to keep perspiration out.

Another complaint is that eye protection devices are uncomfortable, but usually this is because the eye protection device does not fit properly. Make sure that you have the device properly adjusted for the correct fit or simply get another that fits betters. You can see a lot better out of a properly fitted eye protection device that you can out of a glass eye. Sealed goggles are necessary when you work around liquids & excessive dust. Face shields are necessary when you are exposed to face & eye impact.

Like all safety devices, eye protection is there for you and your eyes. Be smart and use eye protection at all times when on the job. What have you got to loose? Your sight?

If you have any questions or comments regarding this Tailgate Talk, or any safety-related concerns please contact VTRANS Safety Officer Camille Erwin at 802-595-1636.

TAILGATE TALK

SUBJECT: VOSHA Compliance Officer On Your Project	DATE: October 30, 2009 ALSO REFER TO: VOSHA Safety & Health Standards for Construction 29CFR 1926 and 1910 SUPERSEDES: N/A

VOSHA can visit a project under theses circumstances, Act on a Complaint, Dodge Report visit, Local Emphasis Program (LEP) or a Fatality.

Anyone can file a complaint and if someone does VOSHA has to act on it.

The Dodge Report is a listing of all activity in the State with locations and type of activity.

LEP is a program establish by VOSHA and at present is Fall Hazards and Trenching, so if they drive by and see either circumstance they have to stop.

If we encounter a fatality we would be obligated to call VOSHA as well as the State Police.

When a VOSHA Compliance Officer visits your sight they need to identify themselves, some sport an ID and others have a Badge similar to Law Enforcement. Secondly they should tell you why they are there and should be for one of the reasons listed. If they are seeking a violation they have to open an investigation and that too should be conveyed. Once they open an investigation they have total access to the sight and the Compliance Officer will discuss what violations they are in search off with an explanation of the violation, this is an opportunity for us to ask if AOT is named in any of these violations. You may be interviewed during this process and it is in our best interest to provide full cooperation.

VOSHA also has to close an investigation this may or may not happen the same day and again they should let you know. Most cases the close out meeting will be conducted that day but we have seen situations where it was a day or two later and sometimes not closed at all. If VOSHA does not close the investigation they have the right to access the project not needing a reason as listed, at this point the reason is we still have an open investigation.

At the close out meeting they will let you know what violations they are citing; at this point the Resident or Construction Division Safety Officer will call for corrective action to restore compliance to the regulations. You will not receive the citations they will be mailed to AOT at a later date citing their findings and dollar amounts associated to the violation. Once received we have to respond with an abatement letter, the abatement letter is an explanation of what corrective action was taken in regards to the violation. Step two (2) we have an informal conference with VOSHA, this is an opportunity to plea our case which can have an effect on the final outcome.

Should you encounter a VOSHA inspection please contact the Construction Division Safety Officer and your Regional Construction Engineer, at the time of contact we would like to know what violations they are citing and when they plan to close out the investigation. This also gives the Construction Division Safety Officer an opportunity to perform a follow up visit.

If you have any questions or comments regarding this *TAILGATE TALK* or any safety-related concerns, please contact the VTrans Construction Division Safety Officer, at 802-828-1585

VTrans Safety

CERTIFICATE

Employee's Name(s)

Vermont Agency of Transportation

INTERSTATE U-TURN AUTHORIZATION

The Bearer of this Certificate, as an employee of State of Vermont, Agency of Transportation is hereby authorized to utilize the U-Turns on Interstate 89, I 189, I 91 and I 93, [choose effected roadway and delete those not effected] northbound and southbound during the execution of his duties as [Resident Engineer/Project Inspector] in connection with the [Project name(s) and number(s)] construction project [between Mile Marker and Mile Marker or Exit and Exit]. The Anticipated Completion Date of this contract is: [AC Date]. If the project is not completed by said date, this Certificate will remain in effect until the project is completed and accepted by all pertinent parties.

Persons using the U-Turns shall abide by the following and the Guidelines for Using U-Turns noted on the reverse side of this Certificate:

1. Have this authorization in his/her possession.
2. Use the U-Turn with the utmost caution.
3. Use a flashing amber light located on the roof of the vehicle.
4. Yield to all Interstate-through traffic.
5. U-Turns <u>will not</u> be utilized during inclement weather or fog conditions.

Failure to comply with any of the above shall be grounds for revoking this authorization.

_____

David J. Hoyne, P. E. Date
Construction & Materials Bureau Director
Vermont Agency of Transportation
1 National Life Drive
Montpelier, VT 05633-5001

c: Vermont State Police, Sgt. Eric Albright and Lt. Garry Scott
Regional Project Files
Headquarters Project Files
Resident Engineer

Z:\Highways\ConstructionMaterials\Construction\Forms\2015 Construction Field Forms\2015 U-Turn Authorization – Resident Engineer and Project Inspector.docx
Appendix J-16 – U-Turn Authorization – Resident Engineer and Project Inspector

Proper Use of U-Turns on Limited Access Highways
Excerpt from VTrans "Safety Manual - Policy and Procedures"

5.0 VEHICLE AND EQUIPMENT SAFETY

5.9 Procedure For Use by Authorized Vehicles
Law Enforcement Vehicles will follow the procedures set forth by the head of the Agency or Force by which they are employed.

Other Emergency Service Vehicles will follow the procedures set forth by the Head of the Agency or Force by which they are employed.

Repair and Towing Vehicles will activate their installed amber warning lights and when proceeding to repair or recover a damaged or inoperative vehicle will, unless directed otherwise by a law enforcement officer, pull to the right shoulder and stop, allowing any on-coming traffic to clear before entering the U-Turn. When in the U-Turn, repair or towing vehicle will then yield the right of way and enter the other lane only when the way is clear. When proceeding with a vehicle in tow, the amber warning lights shall be operating and the use of the U-Turn shall be made with due care so as not to endanger other users of the highway.

Authorized Construction, Maintenance and Survey Vehicles will comply with the following procedures:

1. The operator shall turn on the vehicle's right turn directional signal well in advance of the crossover, reduce speed, and gradually drive to the extreme right onto the so-called breakdown lane (*shoulder).*

2. The operator shall stop the vehicle opposite the crossover, turn on the vehicle's left turn directional signal, wait until he/she is absolutely positive there is no traffic approaching from the rear that would interfere with a safe crossing; only then shall the operator attempt to drive over into the crossover.

3. The operator shall stop the vehicle on the crossover without any projection of the vehicle or equipment into either lane of the highway.

4. The operator shall wait until he/she is absolutely positive there is no approaching traffic that would interfere with the safe crossing.

5. The operator shall then cross over onto the so-called breakdown lane, turning on the vehicle's right turn directional signal. After completing this operation, the operator shall
turn on the vehicle's left turn directional signal, increase the vehicle's speed, and safely join the flow of traffic.

Exception:

6. Vehicles operating in the passing lane (left) to plow, salt, or sand the passing (left) lane shall turn on left-turn directional signal, allowing adequate notice to motorists that may be following, slow down slowly, and make the turn into the crossover. From that point the procedure shall be the same as a vehicle operating in the right (traveling) lane except that he/she shall proceed from the crossover directly to the left (passing) lane without crossing breakdown (shoulder) lane.

7. NOTE: No authorized vehicle should use a U-Turn when, within 3 miles, an interchange is available except:

> Construction and maintenance equipment during the performance of construction and maintenance activity; and plow trucks "

CERTIFICATE

_____[Consultant Inspector's Name(s) and Company Name]_____
Vermont Agency of Transportation

INTERSTATE U-TURN AUTHORIZATION

The Bearer of this Certificate, as a representative of the State of Vermont, on the [Project name(s) and number(s)] project, is hereby authorized to utilize the U-turns from [Mile Marker to Mile Marker or Exit to Exit] on Interstate 91, 89, 189 or 93 [choose which one pertains and delete the rest], both northbound and southbound [choose which is effected], in the execution of his/her duties on the above-noted construction project. The Anticipated Completion Date of this project is [AC Date]. If the project is not completed by said date, this Certificate will remain in effect until the project is completed and accepted by all pertinent parties as long as Bearer of this Certificate is assigned to said project.

Persons using the U-Turns shall abide by the following and the Guidelines for the Proper use of U-Turns on Limited Access Highways on the reverse side of this Certificate:

1. Have this authorization in his/her possession.
2. Use the U-Turn with the utmost caution.
3. Use a flashing amber light located on the roof of the vehicle.
4. Yield to all Interstate through traffic.
5. U-Turns will not be utilized during inclement weather or fog conditions.

Failure to comply with any of the above shall be grounds for revoking this authorization.

_____

David J. Hoyne, P. E. Date
Construction & Materials Bureau Director
Vermont Agency of Transportation
1 National Life Drive
Montpelier, VT 05633-5001

c: State Police, Sgt. Eric Albright and Lt. Garry Scott
Regional Project Files
Headquarters Project Files
Resident Engineer

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Proper Use of U-Turns on Limited Access Highways

Excerpt from VTrans "Safety Manual - Policy and Procedures"

5.0 VEHICLE AND EQUIPMENT SAFETY

5.9 Procedure For Use by Authorized Vehicles

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Repair and Towing Vehicles will activate their installed amber warning lights and when proceeding to repair or recover a damaged or inoperative vehicle will, unless directed otherwise by a law enforcement officer, pull to the right shoulder and stop, allowing any on-coming traffic to clear before entering the U-Turn. When in the U-Turn, repair or towing vehicle will then yield the right of way and enter the other lane only when the way is clear. When proceeding with a vehicle in tow, the amber warning lights shall be operating and the use of the U-Turn shall be made with due care so as not to endanger other users of the highway.

Authorized Construction, Maintenance and Survey Vehicles will comply with the following procedures:

1. The operator shall turn on the vehicle's right turn directional signal well in advance of the crossover, reduce speed, and gradually drive to the extreme right onto the so-called breakdown lane (*shoulder).*

2. The operator shall stop the vehicle opposite the crossover, turn on the vehicle's left turn directional signal, wait until he/she is absolutely positive there is no traffic approaching from the rear that would interfere with a safe crossing; only then shall the operator attempt to drive over into the crossover.

3. The operator shall stop the vehicle on the crossover without any projection of the vehicle or equipment into either lane of the highway.

4. The operator shall wait until he/she is absolutely positive there is no approaching traffic that would interfere with the safe crossing.

5. The operator shall then cross over onto the so-called breakdown lane, turning on the vehicle's right turn directional signal. After completing this operation, the operator shall
turn on the vehicle's left turn directional signal, increase the vehicle's speed, and safely join the flow of traffic.

Exception:

6. Vehicles operating in the passing lane (left) to plow, salt, or sand the passing (left) lane shall turn on left-turn directional signal, allowing adequate notice to motorists that may be following, slow down slowly, and make the turn into the crossover. From that point the procedure shall be the same as a vehicle operating in the right (traveling) lane except that he/she shall proceed from the crossover directly to the left (passing) lane without crossing breakdown (shoulder) lane.

7. NOTE: No authorized vehicle should use a U-Turn when, within 3 miles, an interchange is available except:

> Construction and maintenance equipment during the performance of construction and maintenance activity; and plow trucks "

CERTIFICATE

(list all Contractor's employees)
of
[Prime Contractor's Name]

INTERSTATE U-TURN AUTHORIZATION

On behalf of the
Vermont Agency of Transportation

The Bearer of this certificate, (Employee's name) as an employee of [Prime's Name] of [City and State of Business] working on the [Project name and number] project, is hereby authorized to utilize the U-turns from [Mile Marker to Mile Marker or Exit to Exit] on Interstate 91, 89, 189 or 93 [choose which one pertains and delete the rest], both northbound and southbound, in the execution of his/her duties on the above-noted construction project. The Anticipated Completion Date of this project is [AC Date]. If this project is not completed by said date, this Certificate shall remain in effect for the Bearer of this Certificate until such time as the project is complete.

Persons using the U-Turns shall abide by the following and the Guidelines for Using U-Turns noted on the reverse side of this Certificate:

1. Have this authorization in his/her possession.
2. Use the U-Turn with the utmost caution.
3. Use a flashing amber light located on the roof of the vehicle.
4. Yield to all Interstate-through traffic.
5. U-Turns will not be utilized during inclement weather or fog conditions.

Failure to comply with any of the above shall be grounds for revoking this authorization.

_____

David J. Hoyne, P. E. Date
Construction & Materials Bureau Director
Vermont Agency of Transportation
1 National Life Drive
Montpelier, VT 05633-5001

c: Vermont State Police, Sgt. Eric Albright and Lt. Garry Scott
Regional Project Files
Headquarters Project Files
Resident Engineer

Z:\Highways\ConstructionMaterials\Construction\Forms\2015 Construction Field Forms\2015 U-Turn Authorization – Prime Contractor.docx
Appendix J-18 - U-Turn Authorization – Prime Contractor

Proper Use of U-Turns on Limited Access Highways
Excerpt from VTrans "Safety Manual - Policy and Procedures"

5.0 VEHICLE AND EQUIPMENT SAFETY

5.9 Procedure For Use by Authorized Vehicles
Law Enforcement Vehicles will follow the procedures set forth by the head of the Agency or Force by which they are employed.

Other Emergency Service Vehicles will follow the procedures set forth by the Head of the Agency or Force by which they are employed.

Repair and Towing Vehicles will activate their installed amber warning lights and when proceeding to repair or recover a damaged or inoperative vehicle will, unless directed otherwise by a law enforcement officer, pull to the right shoulder and stop, allowing any on-coming traffic to clear before entering the U-Turn. When in the U-Turn, repair or towing vehicle will then yield the right of way and enter the other lane only when the way is clear. When proceeding with a vehicle in tow, the amber warning lights shall be operating and the use of the U-Turn shall be made with due care so as not to endanger other users of the highway.

Authorized Construction, Maintenance and Survey Vehicles will comply with the following procedures:

1. The operator shall turn on the vehicle's right turn directional signal well in advance of the crossover, reduce speed, and gradually drive to the extreme right onto the so-called breakdown lane (*shoulder).*

2. The operator shall stop the vehicle opposite the crossover, turn on the vehicle's left turn directional signal, wait until he/she is absolutely positive there is no traffic approaching from the rear that would interfere with a safe crossing; only then shall the operator attempt to drive over into the crossover.

3. The operator shall stop the vehicle on the crossover without any projection of the vehicle or equipment into either lane of the highway.

4. The operator shall wait until he/she is absolutely positive there is no approaching traffic that would interfere with the safe crossing.

5. The operator shall then cross over onto the so-called breakdown lane, turning on the vehicle's right turn directional signal. After completing this operation, the operator shall turn on the vehicle's left turn directional signal, increase the vehicle's speed, and safely join the flow of traffic.

Exception:

6. Vehicles operating in the passing lane (left) to plow, salt, or sand the passing (left) lane shall turn on left-turn directional signal, allowing adequate notice to motorists that may be following, slow down slowly, and make the turn into the crossover. From that point the procedure shall be the same as a vehicle operating in the right (traveling) lane except that he/she shall proceed from the crossover directly to the left (passing) lane without crossing breakdown (shoulder) lane.

7. NOTE: No authorized vehicle should use a U-Turn when, within 3 miles, an interchange is available except:

> Construction and maintenance equipment during the performance of construction and maintenance activity; and plow trucks "

CERTIFICATE

(List subcontractor's employee's names all at once)
of
[Subcontractor's Name]

INTERSTATE U-TURN AUTHORIZATION

On behalf of the
Vermont Agency of Transportation

The Bearer of this certificate, (Employee's name) as an employee of [Subcontractor's Name] of [City and State of Business] working on the [Project name and number] construction project, is hereby authorized to utilize the U-turns from [Mile Marker to Mile Marker or Exit to Exit] on Interstate 91, 89, 189 or 93 [choose effected roadway and delete the rest], both northbound and southbound, in the execution of his/her duties on the above-noted construction project. The Anticipated Completion Date for this project is [AC Date]. If this project is not completed by said date, this Certificate shall remain in effect for the Bearer of this Certificate until such time as their company's work is completed on this project.

Persons using the U-Turns shall abide by the following and the Guidelines for the Proper use of U-Turns on Limited Access Highways on the reverse side of this Certificate.

1. Have this authorization in his/her possession.
2. Use the U-Turn with the utmost caution.
3. Use a flashing amber light located on the roof of the vehicle.
4. Yield to all Interstate-through traffic.
5. U-Turns will not be utilized during inclement weather or fog conditions.

Failure to comply with any of the above shall be grounds for revoking this authorization.

_____

David J. Hoyne, P. E. Date
Construction and Materials Bureau Director
Vermont Agency of Transportation
1 National Life Drive
Montpelier, VT 05633-5001

c: Vermont State Police, Sgt. Eric Albright and Lt. Garry Scott
Regional Project Files
Headquarters Project Files
Resident Engineer

Z:\Highways\ConstructionMaterials\Construction\Forms\2015 Construction Field Forms\2015 U-Turn Authorization – Subcontractor.docx
Appendix J-19 U-Turn Authorization – Subcontractor

Proper Use of U-Turns on Limited Access Highways
Excerpt from VTrans "Safety Manual - Policy and Procedures"

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Exception:

6. Vehicles operating in the passing lane (left) to plow, salt, or sand the passing (left) lane shall turn on left-turn directional signal, allowing adequate notice to motorists that may be following, slow down slowly, and make the turn into the crossover. From that point the procedure shall be the same as a vehicle operating in the right (traveling) lane except that he/she shall proceed from the crossover directly to the left (passing) lane without crossing breakdown (shoulder) lane.

7. NOTE: No authorized vehicle should use a U-Turn when, within 3 miles, an interchange is available except:

> Construction and maintenance equipment during the performance of construction and maintenance activity; and plow trucks "

VTrans Lead Exposure Control

Management Commitment

Safe and healthy work environments are a priority for the Vermont Agency of Transportation (VTrans) and its employees. In order to ensure a safe and healthy work environment, VTrans employee's assigned projects which pose a lead exposure hazard will receive all appropriate training and be provided the required personal protective equipment (PPE) to ensure adherence to the VTrans Lead Exposure Control Procedures (LECP). The establishment and implementation of the LEPC is required to ensure compliance with 29 CFR 1926.62.

VTrans recognizes the hazards to both its employees and the environment of certain chemical utilized as part of the routine course of construction operations. VTrans is committed to implementing the controls required under these procedures, the Vermont Occupational Safety and Health Administration (VOSHA) and Vermont Department of Health (VDOH) regulations and the project specifications to reduce and/or minimize exposure to these hazards.

The management of VTrans fully supports the need to ensure the health and safety of its employees involved at work sites that have a potential lead exposure risk and authorizes project competent persons to take prompt corrective measures to mitigate safety, health and environmental issues as they arise.

Richard Tetreault

Richard Tetreault

Vermont Agency of Transportation

Director of Program Development

3-22-11

Date

LEAD EXPOSURE CONTROL PROCEDURES

Vermont Agency of Transportation
VTrans

October, 2010

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1. INTRODUCTION

The Vermont Agency of Transportation (VTrans) utilizes its construction inspection staff to inspect the surface preparation of complex steel structures such as bridges, etc. during re-painting operations by outside contractors. Many of these structures have installed coatings systems that contain lead, or other heavy metals. VTrans understands that lead is a cumulative and persistent toxic substance that can pose a serious health risk to its construction inspection staff.

Surface preparation operations by outside contractors such as abrasive blast cleaning, power tool cleaning, etc can create significant exposure to contractor employees to lead during their work. Exposure to VTrans construction inspectors can occur from residual lead dust and debris during inspection operations after surface preparation is completed.

The objective of this procedure is to outline a set of measures to, assign responsibilities, establish training requirements, and control potential lead exposure to VTrans construction inspectors while they are inspecting the contractor's work.

2. PROCEDURE ADMINISTRATOR

Implementation of these procedures is the responsibility of the VTrans Lead Exposure Control Procedure Administrator (Procedure Administrator). The Procedure Administrator is an individual that can recognize potential exposure

situations, and has the authority to enforce or adjust procedures to mitigate exposures at the job-site.

The Procedure Administrator also assists in completing the pre-job checklist attached in Exhibit A and assists in maintaining the post-job lead exposure control record.

The Lead Exposure Control Procedure Administrator will be:

Mr. Andy Shively
State of Vermont Operations Division
One National Life Drive
Montpelier, VT 05633-5001
802 828-2797 (office)
802 229-8740 (cell)
andy.shively@state.vt.us

2. TRAINING

Each VTrans construction inspector with potential exposure to lead will be trained. The training will be conducted by a competent industrial hygiene/safety professional approved by the Procedure Administrator and include, but not be limited to:

- The contents of the VOSHA Safety and Health Standard for Construction 29 CFR 1926.62, and its Appendices.
- The specific nature of the operations on projects that may result in exposure to lead above the Action Level.
- The purpose, proper selection, fitting, use, and limitations of respirators.
- The purpose and description of the medical surveillance program and the medical removal program including information concerning the adverse health effects associated with excessive exposure to lead.
- The engineering controls and work practices associated with the employee's job assignment including training of employees to follow relevant good work practices.
- Instructions to employees that chelating agents should not routinely be used to remove lead from the body, and not used at all except under the direction of a licensed physician.

In addition to the training listed above, the Lead Exposure Control Procedure Administrator will have an additional 32 hours of additional training outlined in the Society for Protective Coatings C-3 "Supervisor / Competent Person Training for De-leading of Industrial Structures" seminar.

3. ANTICIPATED EXPOSURE PATHWAYS

VTrans construction inspection during surface preparation of complex steel structures often involves inspection of areas that have been abrasively blast cleaned, or power tool cleaned, to remove the old deteriorated coatings system containing lead. While the inspection normally occurs after the blast or power tool cleaning surface preparation operations, these areas can contain residual dust and debris.

The primary exposure pathway to the finely divided residual dust and debris is mainly by inhalation of the dust within the area, or from work clothing contaminated by the material. A secondary, but important exposure pathway, is accidental ingestion from contaminated food, drinks, tobacco, etc.

It is therefore important for construction inspection personnel to wear all assigned personal protective equipment such as respirators, personal protective clothing, and not to contaminate food, drink, and tobacco products with lead containing dust and debris.

It is also important to use any installed ventilation system to thoroughly ventilate the area to be inspected to reduce dusts, and to require contractors to remove spent abrasives and paint waste debris in the area prior to inspection operations.

4. EXPOSURE ASSESSMENT

Determining construction inspection personnel exposure involves monitoring representative VTrans employees during typical inspection operations. This monitoring involves obtaining breathing zone air samples by methods established by the National Institute for Occupational Safety and Health (NIOSH) and comparing the results to allowable limits. The current VOSHA allowable limit to lead is 30 $\mu g/m^3$ (micrograms per cubic meter) as an Action Level, and 50 $\mu g/m^3$ as a Personal Exposure Limit. Both exposure limits are 8-hour time weighted averages.

Once typical exposures are known, adequate exposure control measures such as respirator types, frequency of follow-up monitoring, and medical surveillance can be determined.

Past exposure assessments indicate that exposures can range up to the Action Level. Additional monitoring will be accomplished to continue to track typical exposures as conditions during inspections will change. These conditions include, but are not limited to, increased areas to inspect, dust concentrations encountered, degree of cleanliness within the inspection area, etc. Personal monitoring will be repeated as recommended by a competent industrial hygiene/safety professional.

All VTrans employees monitored must receive a notification of their exposure within 5 days from the receipt of the analytical results.

5. PERSONAL PROTECTIVE EQUIPMENT

Preferred methods of exposure control during removal of installed coatings systems containing lead are engineering controls such as mechanical ventilation, power tools equipped with vacuum assisted dust collection systems, etc. However, these methods are employed during surface preparation and benefit those removing the installed coatings system. Construction inspection personnel are limited to using personal protective equipment such as respirators, and personal protective clothing such as disposable coveralls.

VOSHA requires medical surveillance, and training when exposures meet or exceed the Action Level. Respirators are required at the Personal Exposure Limit. A quick reference table listing of the VOSHA requirements according to exposure concentrations is attached in Exhibit B.

As a conservative approach, each VTrans construction inspector will wear a 1/2 face air purifying respirator with P-100 dust filtration cartridges during inspection operations to limit inhalation hazards of lead dust and debris. Each respirator wearer will be in compliance with the VTrans (Revised August 2010) Respiratory Protection Program including Medical Evaluation, Fit Testing, Respirator Use, and Cleaning, Maintenance, Change Schedules and Storage.

Adjustments to this level of respiratory protection equipment, will be made as recommended by a competent industrial hygiene/safety professional.

In addition, each VTrans construction inspector will wear disposable coveralls to limit contaminating work clothing with lead. Coveralls will be donned before entry into the inspection area, and removed when the inspection is completed. In this way, lead dust and debris will be limited to the work site and not taken off site to expose others at home, etc.

6. MEDICAL SURVEILLANCE

Current worker exposure assessments (personal breathing zone monitoring) indicate that exposure to lead can range up to the Action Limit. Therefore, the following medical surveillance is recommended:

- Initial blood testing for lead and zinc protoporphyrin (ZPP) prior to potential lead exposure assignment.
- Follow up blood lead and ZPP testing every six months.

VOSHA also requires additional blood lead testing, and other medical surveillance measures as inhalation exposures increase, blood lead concentrations increase, signs or symptoms of lead poisoning appear, etc. Adjustments to this schedule will be made as recommended by a competent medical professional and/or industrial hygiene/safety professional.

7. HYGIENE FACILITIES

Since the transfer of lead contaminated material to food, drinks, tobacco, etc can provide a secondary exposure pathway for lead, each VTrans construction inspector will practice good personal hygiene at the job site. This includes, but is not limited to:

- Wash their hands and face prior to lunch, all breaks, and at the end of the shift.
- Do not eat, drink, use tobacco, etc in the lead contaminated work area.
- Lunch and break areas must be free from lead dust and debris.
- Shower at the job site at end of the work shift if lead exposures meet or exceed the Personal Exposure Limit (50 $\mu g/m^3$).

8. RECORDKEEPING

Each construction inspector will carry the following records in a three ring binder to each job where potential to lead exists. These records are to be maintained as documentation that the Lead Exposure Procedure has been complied with, and presented to authorized regulatory personnel as necessary.

The records include:

- Copy of Lead Exposure Control Procedure
- Completed pre-job Checklist
- Training records for VTrans inspectors at the job site
- Current blood lead and ZPP testing records (de-personalized)
- Respiratory program records including current fit test, medical clearance, and respirator training
- Results of typical personal breathing zone monitoring results

The Lead Exposure Control Procedure Administrator will maintain these records in the three ring binder at the end of the job. Records such as personal monitoring results, blood lead test results, etc can be used as future reference when planning other projects, as well as demonstrating lead exposure control compliance.

EXHIBIT A

PRE-JOB CHECKLIST:
LEAD EXPOSURE CONTROL PROCEDURE

PRE-JOB CHECKLIST
LEAD EXPOSURE CONTROL PROCEDURE

Work Location _____

	Yes	No
Are all inspection personnel lead trained	☐	☐
Has personal monitoring been accomplished for this particular type of work task	☐	☐
Blood lead and ZPP testing current (within six months)	☐	☐
All respiratory protection equipment available and serviceable	☐	☐
All workers medically evaluated, fit tested, and trained to wear respirators	☐	☐
Are disposable coveralls available	☐	☐
Hand wash station available	☐	☐

_____ _____

Procedure Administrator Date

EXHIBIT B

QUICK REFERENCE TABLE: VOSHA SAFETY & HEALTH STANDARD 1926.62

OSHA 1926.62 LEAD EXPOSURE IN CONSTRUCTION REQUIREMENTS

SPECIFIC LEAD-IN-AIR LEVELS					During Assessment of Trigger Tasks
Any Level	≥ Action Level (30 μ/m^3)		> PEL (50 μ/m^3)	> 4 X PEL (200 μ/m^3)	
	1-30 Days/year	> 30 Days/year			
1926.62 (d) - Exposure Assessment and Interim Protection 1926.62(h) -Housekeeping 1926.62 (i)(5) Handwashing Facilities 1926.62 (l)(1)(i) - HazCom Training (and/or 1926.21 Safety Training and Education) 1926.62(k) - Medical Examination Upon Developing Lead Intoxication Symptoms, Procreative Concerns, Pregnancy, Difficulty Breathing During Respirator Fit test, or Upon Demand.	1926.62(d)(4) - Monitoring Representative of Exposure for Each Exposed Employee 1926.62(j)(1)(i) - Initial Medical Surveillance 1926.62(j)(2)(ii) - Follow-up Blood Sampling 1926.62(k) - Temporary Medical Removal Due to Elevated Blood Lead (50 μg/dl Whole Blood). 1926.62(l)(1)(ii-iv) - Information and Training	1926.62(j)(1)(ii) - Comprehensive Medical Surveillance Program 1926.62(j)(3) - Medical Examinations and Consultation at least annually if > 40 μg/dl blood lead. Content of exams as per (j)(3)(ii).	1926.62(e) - Engineering and Work Practice Controls 1926.62(f) - Respiratory Protection 1926.62(g) - Protective Clothing and Equipment (full-body coveralls, gloves, hats, shoes, face shield, vented goggles, etc.). 1926.62(i) - Hygiene Facilities and Work Practices 1926.62(m) - Signs	1926.62(g)(2) - Clean Protective Clothing Daily	1926.62(f) - Appropriate Respiratory Protection 1926.62(g) - Protective Clothing and Equipment 1926.62(i)(2) - Change Areas 1926.62(i)(5) - Handwashing Facilities 1926.62(j)(1)(i) - Biological Monitoring 1926.62(l)(1)(i) - HazCom Training 1926.62(l)(2)(iii) - Respirator Training 1926.21 Safety Training and Education

Fred L. Smith Jr. CIH, CSP
PO Box 2204
Niagara University, NY 14109

U.S. Department of Transportation **Memorandum**
Federal Highway Administration

Subject: Construction Changes and Extra Work Orders

From: Ellis L. Armstrong, Commissioner
22-40

To: Regional and Division Engineers

Date: April 13, 1960

There have been numerous comments from highway contractors concerning the problems that go along with contractual change or extra work orders issued both on Federal-aid and on direct Federal contracts. Two principal comments pertain to the time required to secure all necessary approvals and the time of issuance of such orders as related to the completion time of the contract.

As regards the first item, it is expected the Bureau personnel will give prompt consideration to proposed orders and expedite the transmission of decisions to either the State highway department the case of Federal-aid projects or to the contractor in the case of direct Federal projects.

As regards the second item, it should be the practice of the representatives of the contracting authority to review at an early date in the performance of the contract the probable items of changes or extras that may be considered necessary to satisfactorily "complete the project."

To the maximum extent practicable changes or extras should be agreed upon well in advance of the contract completion date so that construction work can be performed in orderly sequence at minimum cost and without disruption of the contractor's overall plan of operations.

U.S. Department of Transportation **Memorandum**
Federal Highway Administration

Subject: Participation in Engineering Errors

From: G.M. Williams
Director of Engineering and Operations

To: Mr. August Schofer
Regional Engineer
Hagerstown, Maryland

Date: July 12, 1963

Reference is made to your April 16 and June 27 memorandums, relative to the above-noted subject.

Your existing policy on this matter, as set forth in your April 21, 1960, memorandum to division engineers, was established with the advice of this office. This policy draws a distinction between engineering errors incorporated into the P.S.&E. approved by Public Roads and engineering errors committed by State personnel during construction operations. Federal participation in the costs of corrective work is allowed in the first instance but is denied in the second. As you indicate, our present thinking is that a more flexible policy would be appropriate in the latter instance.

In this regard, it is now considered that each such engineering error should be considered on its own merits to determine whether any corrective work is eligible for Federal participation. Where carelessness, negligence, incompetence, or understaffing on the part of the State are not contributing factors, favorable consideration may be justified for the type of errors that might occasionally occur despite the exercise of normal diligence. In all other instances Federal participation should continue to be denied. Questionable cases should be referred to this office for advance review and advice.

We believe that the foregoing will provide you with the requested information. Please advise if further comment is desired.

U.S. Department of Transportation **Memorandum**
Federal Highway Administration

Subject: Construction Engineering Costs – Staking Performed as Part of Contract

From: Associate Administrator for Administration

To: Regional Federal Highway Administrators
Region 1-10

Date: September 7, 1977

The definition for construction engineering contained in the Federal-aid Highway Program Manual (FHPM) 1-4-5, paragraph 3.b states (in part) relative to the subject costs:

"The work of supervising construction activities ... together with those staking activities necessary for the State to control construction operations..."

There have been some differing interpretations as to whether or not staking functions performed by a contractor either as a separate bid item or absorbed by him as a part of his construction, should be considered separately as construction engineering costs.

Generally, such a determination will be made on the basis of what constitutes the minimum necessary control points. A State is expected to provide sufficient vertical and horizontal control points to enable a contractor to layout and construct the required work. If a State's practices and procedures provide only minimum basic engineering controls which require the contractor to perform additional staking as a part of his contract, such costs may be considered an integral part of normal construction costs. That portion of the staking and layout work which is performed by State forces or by a consulting firm will be considered construction engineering.

This has been coordinated with the Construction and Maintenance Division, Office of Highway Operations, and may be used as guidance in your region as appropriate.

/s/ John R. Provan

U.S. Department of Transportation **Memorandum**
Federal Highway Administration

Subject: "Responsible Charge"

From: David A. Nicol
Director, Office of Program Administration
HIPA-10

To: Director of Field-Service Federal Lands Highway Division Engineers
Division Administrators

Date: August 4, 2011

The issue of "responsible charge" of Federal-aid construction projects has been raised on several occasions; most recently as it relates to Federal-aid projects that are administered by local public agencies. The following attachment provides guidance on the requirements and duties of the person designated to be in "responsible charge."

If you have any questions about the memorandum and attachment, please contact Mr. Bob Wright as Robert.wright@dot.gov.

VERMONT AGENCY OF TRANSPORTATION

HIGHWAY DIVISION

CONSTRUCTION SECTION

VAOT ACRONYMS & MNEMONICS

For convenience, acronyms frequently used by the Construction Section are listed here with their full titles. Some acronyms are defined within Sections of this manual.

3R – Resurfacing, Rehabilitation, Restoration

AASHTO – American Association of State Highway Officials

ACI – American Concrete Institute

ADA – American Disabilities Act

ADTT – Average Daily Truck Traffic

AISC – American Institute of Steel Construction

AISI – American Iron and Steel Institute

AITC – American Institute of Timber Construction

ANR – Agency for Natural Resources

AREA – American Railway Engineering Association

ASR – Alkali Silica Reaction

ASTM – American Society for Testing and Materials

BIA – Bureau of Indian Affairs

CB – Catch Basin

CE – Categorical Exclusion

CFR – Code of Federal Regulations

COE – US Army Corps of Engineers

CPEP – Corrugated Polyethylene Pipe

CRSI – Concrete Reinforcing Steel Institute

CSP – Corrugated Steel Pipe

DA – Department of Agriculture

DBE – Disadvantaged Business Enterprise

DOL – Department Of Labor

DTA – District Transportation Administrator

EA – Environmental Assessment

EEO – Equal Employment Opportunity

EIS – Environmental Impact Statement

ESAL – Equivalent Standard Axial Load

FA – Federal Aid

FAA – Federal Aviation Administration

FAPG – Federal Aid Policy Guide

FHWA – Federal Highway Administration

FMIS – Fiscal Management Information System (FHWA)

GIS – Geographical Information System

GPO – Government Printing Office

HDSB – Heavy Duty Steel Beam

HPC – High Performance Concrete

(I/D) – Incentive/Disincentive

ISTEA – INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT

ITE – International Transportation Engineers

LFD – LOAD FACTOR DESIGN

LGA – LOCAL GOVERNMENT AGENCIES

LOI—Level of Improvement

LRFD – LOAD & RESISTANCE FACTOR DESIGN

MH – MANHOLE

MPO – METROPOLITAN PLANNING ORGANIZATION

MTC – MODULAR TERMINATING CABINET

MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways

NCHRP National Cooperative Highway Research Program

NDS National Design Specification

NDT Nondestructive Testing

NEC National Electric Code

NEMA National Electrical Manufacturers Association

NEPA—National Environmental Policy Act

NETC New England Transportation Consortium

NHS National Highway System

NIST National Institute of Standards and Technology

NPDES – NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM

NPRM – NOTICE OF PROPOSED RULE MAKING

NPS Nominal Pipe Size

NSBA National Steel Bridge Alliance

NSPE – National Society of Professional Engineers

OFCCP – OFFICE OF FEDERAL CONTRACT COMPLIANCE PROGRAMS

OHSA – Occupational Safety and Health Administration

OIG – OFFICE OF INSPECTOR GENERAL

PAR – PROGRAM ACTION REQUEST

PCA – Portland Cement Association

PCC – Portland Cement Concrete

PCCSP - Polymeric Coated Corrugated Steel Pipe

PCI – PRESTRESSED CONCRETE INSTITUTE

PDT – Project Definition Team

PE – Professional Engineer

PPMS – Preconstruction Project Management System

PS&E – PLANS, SPECIFICATIONS AND ESTIMATE

PSI - Pounds Per Square Inch

PVC - Polyvinyl Chloride

QA – Quality Assurance

QC – Quality Control

QUALITY ASSURANCE

RAC – RESEARCH ADISORY COMMITTEE

RAP - Recycled Asphalt Pavement

RAPT - Rail, Air and Public Transit

RCP – REINFORCED CONCRETE PIPE

RC – Rapid Curing

RFP – REQUEST FOR PROPOSALS

ROW – Right of Way

RPC—Regional Planning Commission

RS – Rapid Set

RSPA – RESEARCH AND SPECIAL PROJECT ADMINISTRATION

SHPO—State Historical Preservation Office

STA – STATE TRANSPORTATION AGENCY

TEA-21 – TRANSPORTATION EQUITY ACT FOR THE 21ST CENTURY

USCG – UNITED STATES COAST GUARD

USGS—United States Geological Survey

USFS – UNITED STATES FOREST SERVICE

UTO – Uniformed Traffic Officer

VAOT—Vermont Agency of Transportation

VCP – Vitrified Clay Pipe

VOSHA - Vermont Occupational Safety and Health Act

VSA – Vermont Statutes Annotated

VSS—Vermont State Standards

WBE – WOMEN BUSINESS ENTERPRISE

2015 Construction Manual
Document Decisions & Guidance

Last Update: March 24, 2015

	Decision	Explanation
1.	VTrans	Throughout the manual all references to the Vermont Agency of Transportation such as AOT, the Agency, and the State shall be changed to VTrans
2.	Headquarters	Throughout the manual all references to the main office for the Construction Section shall be changed to Headquarters.
3.	Increments of 10	Throughout the manual all subsections shall be initially set up in increments of 10; odd or unconventional subsections shall be interjected in increments of 5 where appropriate.
4.	Appendix	All dynamic documents associated to text within the manual shall be included via appendices.
5.	Capitalization	a) Titles such as Contractor, Inspector, and Resident Engineer, as well as other titles of VTrans personnel shall be capitalized throughout the manual. b) Work related item descriptions will only be capitalized when preceded by the item number, otherwise will be treated as work descriptions and not capitalized. For example: "Where sand borrow is used to build up…" sand borrow would not be capitalized.
6.	Manual Formatting Rules	a) Item number format shall be as such – Item 201.10, Clearing and Grubbing b) Section format shall be as such – Section 201, Clearing c) Any book or manual title referenced shall be underlined as such – <u>Standard Specifications for Construction</u> d) Any document, form, or report title referenced shall be italicized as such – *Pavement Marking Placement Guidelines.* e) Referenced documents shall be titled as they appear within Section 105.05 Coordination of Documents – Contract Document Precedence f) When referencing a section of the manual within another section both the section number and title shall be included in the reference. g) Quotations " "shall <u>not</u> be used to denote titles of documents or books, if there is a true quote it shall be referenced directly after the quote within parentheses ( ). h) Item numbers must be associated by their proper item name, and likewise item names must be associated by their proper item number.
7.	Resident Engineer	Shall be titled Resident Engineer throughout the manual not; Engineer, Resident, or R.E.
8.	Change Orders	Change-in-Design, Change of Design, Change Order – shall be listed throughout the text as Change Orders.
9.	Metric & English	Throughout the text Metric will be listed first and (English) second.
10.	Metric & English Figures	Have not decided how these will be dealt with; incorporated or appendix etc.,
11.	Item Specific Discussions	When item specific discussions take place within the text, apart from its item number, the item description shall be capitalized. For example: Item 204.20, Trench Excavation of Earth; when used in a sentence without reference to the item number. i.e: " Trench Excavation of Earth shall consist of ….".

2015 Construction Manual
Short & Long Term Goals

Last Update: March 24, 2015

	Goal (Short Description)	**Explanation**	**Goal** (Short or Long)
1.	Write Section for Materials	Need to draft a section that covers the materials module of Site Manager and its use in Construction.	Long Term Goal
2.	Site Manager Section IX	Redevelop the entire Site Manager section	Long Term Goal
3.	G: Drive Format	Draft a description of the G: drive and how it is organized	Long Term Goal
4.	Change Order Manual	Refine the COD process and document examples and guidance for negotiating and completing a Change-in-Design	Long Term Goal
5.	Claims Process	Contractor Claims against the Agency & Public Claims against the Contractor. Document and revise in manual where appropriate	Long Term Goal
6.	Job Descriptions	In Section I – General Information – Update job descriptions	Long Term Goal
7.	Subcontractor Process	Review current and update the process	Long Term Goal
8.	Tracking Future Edits	Develop Process of Tracking Requested Updates for Future Edits	Immediate Goal
9.	Const & Inspect Section IV	Redevelop Section IV – w/ possible inclusion of document hierarchy language.	Long Term Goal
10.			
11.			
12.			
13.			
14.			
15.			

CONSTRUCTION MANUAL
FORMATTING RULES

1-110 RESPONSIBILITIES OF PERSONNEL Section headers 14 font, upper case

Spaces between cells or text 12 font

1-110.10 General Sub-section headers 12 font, lower case - indented three spaces

Spaces between cells or text 12 font

The primary focus of all personnel in the Construction Section involves the administration and oversight of transportation construction projects under contract. These functions primarily consist of the direct inspection of a Contractor's field operations and the administrative work associated with the execution of the contract. There are many ancillary tasks that support the primary function of the section and development of the staff is one of these. There is a need to maintain a highly skilled work force and this requires training in materials, safety, and environmental regulations.

In addition, some personnel may be temporarily assigned to other sections or divisions during the winter months to aid in road and bridge planning and design, right-of-way acquisition, traffic research, materials and research, and district work. This provides cross-training in addition to employee development.

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1-110.20 Construction Engineer

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The Construction Engineer is the manager of the Construction Section. This position is

←Text should line up with the Section or Subsection headers.

Responsible for directing the activities of the Section and may include, but not be limited to: the supervision of all staff in accordance with policies and labor contract provisions; the administration of the section budget; and overseeing the engineering, inspection, administration, and final payment of all transportation projects under contract. This position reports directly to the Director of Program Development.

- Item one
- Item two
- Item three Bulleted or numbered lists - indented two spaces (to the bullet) – past the initial three
    1. Item one
    2. Item two
    3. Item three Sub-lists - indented four spaces – beyond the initial five

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1-110.30 Construction Executive Assistant

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Under the general supervision of the Construction Engineer, the Construction Executive Assistant is responsible for providing administrative support to the Construction Staff and specifically the Construction Engineer.

Leave approx a 1" space, in its own cell, at the end of each page

Cells and text shall not be allowed to cross onto the following page.

Section I – General Information *I-1*

Footer is in 10 font, in italics, in the format shown

State of Vermont
Agency Of Transportation
Construction Section

Report an Error or Make a Suggestion

(Please copy this page and fill out)

Section Number: _____

Name: _____

Affiliation: _____

Please place an "X" beside appropriate category

_____ Typographical Error in Text

_____ Formatting problem

_____ Wording is confusing

_____ Text is inaccurate

- _____ Wrong Unit
- _____ Inaccurate Information
- _____ Inaccurate reference
- _____ Equation wrong

Other: _____

_____

_____

Comment or Suggestion: (Continue on back if necessary)