Report of the Vermont State Auditor

September 17, 2013

AGENCY OF TRANSPORTATION CONSTRUCTION CONTRACT

New Haven Paving Project:

Opportunities Exist to Shorten Project Timelines, Reduce Costs, and Limit Financial Risk to the State

On March 11, 2014, SAO reissued this report to correct the amount reported as additional costs associated with a delay caused by the contractor and revised the description of the additional costs. The revised amount and description may be found in the cover letter and page 6.

Douglas R. Hoffer
Vermont State Auditor
Rpt. No. 13-04

Mission Statement

The mission of the Auditor's Office is to hold state government accountable. This means ensuring that taxpayer funds are used effectively and efficiently, and that we foster the prevention of waste, fraud, and abuse.

Douglas R. Hoffer
STATE AUDITOR

STATE OF VERMONT
OFFICE OF THE STATE AUDITOR

September 17, 2013

Addressees (see last page of letter)

Dear Colleagues,

The following report is one of two audits of Agency of Transportation roadway construction contracts. The other report (Bennington Bypass Project) can be found at http://auditor.vermont.gov. Our audit objectives were to determine if the contracts were completed on schedule, were completed within budget, and met State insurance requirements and federally required wage provisions. We found that one project was on schedule and within budget (Bennington Bypass) and one was not (New Haven paving).

If a delay is caused by the contractor, the Agency can charge liquidated damages to help recover costs associated with the delay. The New Haven project was expected to be completed in 117 days but was 35 days over schedule. The Agency determined that the contractor was responsible for 24 of those days, a 21 percent overrun. The Agency charged the contractor $45,600, which was 1.2 percent of the original $3.8 million contract amount and only covered the additional costs of Agency oversight. The amount charged did not include $33,000 for flaggers and uniformed traffic officers that were needed during the delay. The Federal Highway Administration allows states to include these additional costs in the calculation of liquidated damages but the Agency does not currently do so. As a result, the added costs were paid by the Agency and ultimately the taxpayers of Vermont.

Limiting liquidated damages to the cost of Agency oversight captures only a fraction of the costs associated with delays. In addition to actual costs associated with delays, the Federal Highway Administration allows states to include additional amounts as liquidated damages to cover the costs of inconveniences to the state transportation department or the public.[1] Vermont does not include such costs in liquidated damages. Not considering and charging all eligible liquidated damages may increase the risk that contractors will not finish projects on schedule.

The Bennington Bypass project came in slightly under budget, but the New Haven paving project was 33 percent over budget due primarily to allowable asphalt and fuel price adjustments[2]. Our audits found that change orders were approved by authorized Agency personnel but approvals were based on limited documentation, and price adjustments were not calculated in a consistent manner. These weaknesses increase the risk that the Agency could make improper payments.

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[1] The FHWA provides specific guidance on how to calculate the loss of the use of roadway by the public.

[2] Due to the price volatility of asphalt, gasoline and diesel fuel, the Agency has contract provisions to adjust the cost of these commodities based on market prices.

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Our analysis of insurance coverage for the contracts found multiple deficiencies in the contractors' insurance coverage and that the Agency failed to perform insurance verification procedures prior to executing the contracts, which was contrary to Agency policy. In particular, our review of the contractors' insurance certificates indicated that certain types of required insurance coverage were excluded and coverage limits did not meet contract requirements. In addition, we found that review of insurance coverage did not occur in a timely manner, the State was not listed as an insured party on one of four insurance certificates applicable to the contract, and Agency personnel could not provide evidence that the contractors' insurance company was contacted to validate insurance coverage. These deficiencies put the State at risk of financial loss.

We found that the wage rates paid to contractor employees were in compliance with the contract's wage rate provisions as required by the Davis-Bacon Act. However, we noted that Construction Section practices are unnecessarily burdensome and could be streamlined without sacrificing accuracy.

Our audit identified numerous opportunities for the Agency to shorten project timelines, reduce financial risk to the State, and deliver increased value for every construction project.

Sincerely,

Doug Hoffer

Douglas R. Hoffer

State Auditor

<u>ADDRESSEES</u>

The Honorable Shap Smith
Speaker of the House of Representatives

The Honorable John Campbell
President Pro Tempore of the Senate

The Honorable Peter Shumlin
Governor

Mr. Jeb Spaulding
Secretary
Agency of Administration

Mr. Brian Searles
Secretary
Agency of Transportation

Mr. James Reardon
Commissioner
Department of Finance & Management

Contents

Report

Introduction

According to the U.S. Department of Transportation inspector general, the highway transportation community faces significant pressures to handle more challenges with fewer resources due to stretched budgets, reduced staff, the cumulative demands of maintaining an ever-growing infrastructure, and a host of other factors. To accomplish their missions, most state transportation agencies rely on contracted services for which they have oversight accountability. Each year, the Vermont Agency of Transportation (AOT) enters into approximately 60-70 roadway construction and paving contracts. The fiscal impact of each AOT construction contract, in addition to the everyday impact of transportation projects on the lives of Vermonters, demands that projects are managed to ensure that funds are used efficiently and that roadway disruptions are as brief as possible.

AOT receives a majority of its funding from the Federal Highway Administration (FHWA) for construction and repair of the State's roadways. During the construction phase, contracts are primarily supervised by AOT engineers or sub-contracted site engineers and inspectors on retainer with the Agency. Proper oversight and management of AOT's construction process is imperative to access and maximize available federal transportation funds, which help to support the goals of the Agency - to optimize the movement of people and goods and to protect the State's investment in its transportation system.

Given this level of oversight responsibility and the amounts spent on these projects, we decided to audit Agency construction contracts. Our audit objectives for this report were to assess the extent to which a construction contract was: 1) completed on schedule; 2) completed within budget; and 3) met contract insurance requirements and federally required wage provisions.

This report addresses our audit of the processes and internal controls related to a paving contract completed in 2008. The purpose of the New Haven-Ferrisburgh project[3] was to resurface a 10.5 mile stretch of U.S. Route 7, while adding new pavement markings, drainage, guardrails, traffic detectors, and signs. The contract was awarded at a contract price of $3,779,779 and was funded by a combination of federal and state funds at a ratio of 80/20.

The complete Scope and Methodology for this audit appears in appendix I. Abbreviations used in this report appear in appendix II.

[3] Project "New Haven –Ferrisburgh NH 2503(1)S".

Highlights: Report of the Vermont State Auditor

Agency of Transportation Construction Contract: New Haven Paving Project: Opportunities Exist to Shorten Project Timelines, Reduce Cost and Limit Financial Risk to the State

(September 2013, Rpt. No. 13-04)

Why We Did This Audit	Each year AOT enters into approximately 60-70 roadway construction contracts funded by approximately $175 million in state and federal dollars that the State is responsible for overseeing. Given this level of oversight responsibility and the amounts spent on these projects, we decided to audit Agency construction contracts. Our audit objectives for this report were to assess the extent to which a construction contract: 1) was completed on schedule; 2) was completed within budget; and 3) met contract insurance requirements and federally required wage provisions.
Objective 1 Findings	**The project was completed 35 days beyond the contracted completion date, leading to additional traffic delays and additional project costs.** Only a portion of the additional project costs due to the delay were recovered from the contractor in the form of "liquidated damages" totaling $45,600. The Agency's methodology of calculating liquidated damages does not include all the allowable costs that can be charged for project delays.
Objective 2 Findings	**The final contractor costs of $5.03 million exceeded the awarded contract amount by nearly $1.25 million, an increase of 33 percent**. This was mostly due to allowable price adjustments. The contract allows for price adjustments for changes in the market prices for fuel and asphalt, and during this project the market prices of asphalt and fuel increased significantly. We found that the Agency does not have adequate policies and procedures for calculating these price adjustments. Without well-defined policies and procedures, the Agency is exposed to the risk of improper payments. **We found the change order requests provided to approvers generally did not contain enough detailed documentation to support the calculation of revised quantities and costs.** Agency change order processes could be better developed to provide more supporting documentation to approvers. This can help reduce the risk of improper payments caused by miscalculation of project cost changes. Our review of the Agency's electronic change order approval controls revealed that 25 employees have the ability to override the electronic change order approval process within the software, effectively allowing them to initiate and approve change orders themselves on any project without requiring appropriate approvals. **We noted the Agency has not adopted policies and procedures addressing the periodic assessment of the appropriateness of the SiteManager™ user privileges.** Allowing a single person the opportunity to initiate and approve change orders without oversight could increase the risk that an unauthorized transaction will occur. **We also noted contract close-out procedures were protracted. The contract was not closed out until 40 months after the project was placed in service.** This is partially due to project management process redundancies, the under-utilization of technology in the field, and a delay by the contractor in paying liquidated damages. If project close-out information is not completed and distributed in a timely manner, management will not be able to identify or implement corrective actions, if

	necessary.
Objective 3 Findings	We reviewed contract provisions related to contractor insurance coverage requirements and wage rates for the contractor's employees. **Our review of the contractor's insurance certificates indicated that certain types of required insurance coverage were excluded and coverage limits shown on the contractor's certificates did not meet contract requirements** If there is a claim against the contractor's insurance for the project and the contractor does not have the required types and levels of insurance coverage for the required periods, the State could be liable for losses, expenses, or damages connected with the contractor's work on the project. Agency procedures require the resident engineers to review all entries on the project payrolls and fill out an Agency form to certify the wage rates are correct with respect to Davis-Bacon regulations. **We found wage rates paid by the contractor to its employees were compliant with the Davis-Bacon regulations**; however, the Agency's practice of verifying wage rates is unnecessarily burdensome as it requires a review of 100 percent of wages paid.
What We Recommend	We recommend the Agency revise liquidated damages assessments to include other costs of project-related delays, such as additional expenses related to traffic control and inconvenience to the public. In addition, the Agency should provide detailed documentation to enable adequate review for change orders and develop policies and procedures that provide a comprehensive, consistent framework for the calculation of price adjustments. We also recommend the Agency evaluate SiteManager™ user privileges to ensure access rights are commensurate with employee and consultant responsibilities and increase efficiency of the close-out process by eliminating procedural redundancies and increasing the use of technology in the field. The Agency should improve its insurance review practices by implementing procedures for comparing the adequacy of a contractor's insurance coverage to Agency requirements prior to the awarding of the contract, revising insurance monitoring procedures to require periodic verification that policies match the coverage types and limits, and implementing a supervisory review to ensure systematic review of the work performed on determining compliance with, and monitoring of, contractor insurance coverage. In addition, we recommend the Agency allow sampling of wage rates as opposed to 100 percent review.

Background

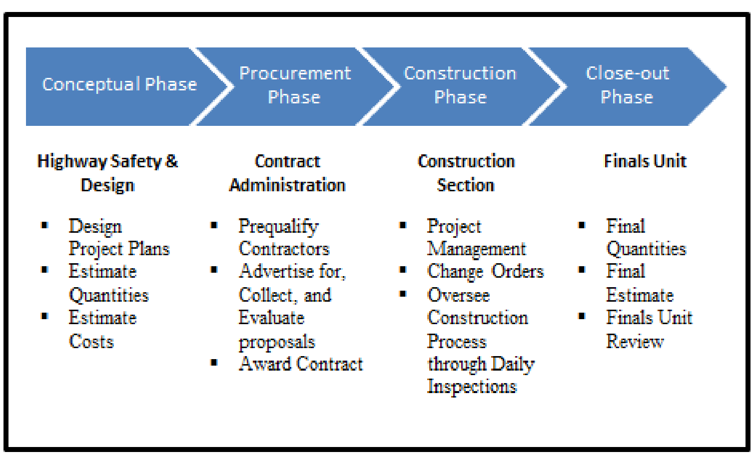
The Vermont Agency of Transportation manages 14,135 miles of roadway, 40,000 culverts, and 71,730 signs in addition to bridges, airports, railroads, park-n-rides, sidewalks, and other state transportation infrastructure.

Funding for Agency activities comes from two primary sources, federal funds and the State Transportation Fund. Federal funds generally contribute 85% of overall contract funding. The remaining monies are provided from Transportation Fund revenue which includes motor vehicle fees, purchase and use taxes, gasoline and diesel fuel taxes, and other sources such as the Transportation Infrastructure Bond Fund.

The Construction Section within the Program Development Division of the Agency supervises the construction phase for roadway construction projects. In FY 2012, this Division expended over $227 million in state and federal funds.

Each construction project proceeds in phases and is handled by a different section of the Agency, as illustrated in figure 1 and discussed below. The conceptual phase, which includes project design and estimation of budget and quantities, is handled by the Highway Safety and Design Section. Contract Administration handles prequalifying potential bidders, reviewing the project plans, and handling all aspects of procurement including bidding and awarding of the contract. Construction Section personnel supervise the chosen contractor during the project and determine the amounts to be paid to the contractor for work performed. The Finals Unit (within the Construction Section) handles the close-out procedures, mainly to verify that the amounts paid to the contractor are correct.

Figure 1: Construction Process



A single highway construction contract can easily generate 10,000 pages of documents—contract descriptions, site plans, daily field reports, estimates, and other project related documents. To help manage this voluminous amount of paperwork, AOT uses project management software called SiteManager™. This software automates and streamlines the management of highway construction projects by eliminating time-consuming repetitive tasks and duplicate information. The software includes functionality to monitor daily work progress, track equipment, generate bi-weekly estimates to enable contractor payments, process change orders, and track and report project quantities and costs. It can also automate the authorization of contracts and other documents, routing an authorization request to each person who needs to review a document. Upon receiving approval on a document, the program can then send it to the next person in line if additional authorizations are required.

The Standard Specification for Construction (Standard Specifications) is a compilation of provisions and requirements established by the Agency for the performance of prescribed work under construction contracts. In essence, it is the rule book all roadway construction contractors must adhere to. The contract for this project applied the provisions of the 2006 Standard Specifications for Construction. These specifications include requirements such the scope of work, control of the work and materials, legal and regulatory requirements, insurance coverage, and the contractor's responsibilities to the public.

Objective 1: Failure to Comply with Contract Completion Date

The project was expected to be completed in 117 days, but the Agency's contractor missed the scheduled completion date by 35 days. Each construction contract for a project contains a "contract completion date" which designates when the work should be completed. This is a key milestone in the contract. While the actual sequence of work is determined by the contractor, the contractor and the resident engineer (the onsite representative of the Agency) together monitor the progress of the project. The resident engineer can discuss delays with the contractor, but the ultimate responsibility for meeting the contract completion date rests with the contractor.

In the event of delays, per Agency policy the Agency may grant an extension of time, which reduces the number of days subject to liquidated damages by taking into consideration such factors as adverse weather conditions or approved changes to the project scope or schedule. However, if the delay to the schedule is caused by the contractor, the Agency can charge liquidated damages.[4] The New Haven paving project was late by a total of 35 days, but the Agency granted extensions of time for 11 days. The charge for liquidated damages on this project was based on 24 days over the agreed upon schedule, and resulted in $45,600 owed by the Contractor (1.2% of original contract amount).

However, this amount did not cover all of the costs associated with the delay because it only covered the additional costs of Agency oversight. SAO estimates as much as $33,000[5] for flagger and uniformed traffic officer costs incurred during the delay period caused by the contractor were not included in the liquidated damages amount. In addition to omitting additional contractor charges from the liquidated damages assessment, the Agency does not include the loss of use of roadway by the public due to traffic obstructions.

According to the Federal Highway Administration and the Code of Federal Regulations (CFR) the Agency "may, with FHWA concurrence, include additional amounts as liquidated damages in each contract to cover the anticipated costs of project related delays or inconveniences to the state transportation department or the public."[6] According to the Agency's Standard Specifications Manual, liquidated damages are not a penalty, but are assessed to defray the cost to the Agency to

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4 Liquidated damages contract provisions provides a mechanism for AOT to recover costs associated with contract time overruns. The Agency is required by FHWA to incorporate these provisions into Federal-aid contracts as a condition of project agreements.

5 AOT's Construction Engineer believes additional analysis is required to determine a definitive amount.

6 23 CFR 635.127 (c).

administer the contract, and can include (but are not limited to) the cost of engineering, inspection, supervision, inconvenience to the public, obstruction to traffic, and interference with business. The current potential liquidated damages, which are pre-established by the Agency and based on a range of contract amounts, are calculated to cover only the costs of additional Agency oversight (i.e., additional unexpected use of agency personnel). However, project delays may lead to other additional costs, such as project safety related costs such as additional flaggers and uniformed traffic officers and the loss of the use of the roadway.[7] In the case of this project, paving was performed on U.S. Route 7, a major roadway on the west side of the state. Traffic studies performed by the Agency in 2008 indicate that this stretch of U.S. Route 7 had annual average traffic volume of up to 12,000 vehicles per day, which would be affected by any roadway closures or delays.

Limiting liquidated damages to the cost of Agency oversight for the period of delayed completion captures only a fraction of the costs associated with delays. Not considering and charging all eligible liquidated damages costs decreases the impact to the contractor of missing contracted completion dates and may increase the risk that contractors will not finish projects on schedule.

Objective 2: Allowable Change Orders Increased the Cost $1.26 Million Above the Awarded Contract Amount

The final contract costs were significantly higher than the awarded contract amount. This was mostly due to several change orders for asphalt and fuel price adjustments[8] allowed under provisions of the contract. Although the price adjustments allowed by the contract were all approved, the documentation accompanying and supporting the justification for the change orders was limited. In addition, we found that verification of the calculations supporting some change order requests occurred subsequent to the approval of the change order. Further, the Agency lacks robust policies and procedures to ensure the accuracy and completeness of price adjustment calculations.

Our examination of the change order approval process also identified a number of individuals who have the ability to electronically process and approve change orders

[7] FHWA provides specific guidance to state transportation departments on how to calculate the loss of the use of roadway by the public.

[8] Due to the volatility of commodities such as asphalt, gasoline and diesel fuel, the Agency has established provisions in its construction contracts to adjust the cost of these commodities based on market prices. Each construction contract establishes an index price for asphalt and fuels based on market prices at the time the contract is executed. Over the course of the project, the Agency compares the baseline indices to market prices. Certain threshold differences in these prices trigger adjustments.

within SiteManager™. Further, we found the Agency's final close-out procedures[9] for this project were not completed until 40 months after the project completion date. Taken together, these weaknesses exposed the Agency to the potential of improper payments and cost overruns on the New Haven contract.

Contract Exceeded Expected Costs Mostly Due to Allowable Price Adjustments

The final contract costs exceeded the awarded contract by $1.25 million, or 33 %t, bringing the contract's cost to just over $5 million. This significant increase in final project cost over the awarded contract amount is mostly the result of allowable price adjustments, as illustrated in Table 2.

Table 2: Reconciliation of New Haven Contract Costs

Description		Amount
Awarded Contract		$ 3,779,779
Change Orders:		
Fuel and Asphalt Price Adjustments	1,036,104	
Bituminous Concrete Pavement	134,129	
Flaggers and Uniformed Traffic Officers	73,000	
Other	19,604	
Total Change Orders		1,262,837
Amended Contract		$ 5,042,616
Net underages		(12,696)
Final Contract Cost		$ 5,029,920

The price adjustments for fuel and asphalt were the result of sharp increases in the cost of oil during the project. In addition, a change order was issued because the project required more pavement than planned as a result of the Agency underestimating road conditions and quantities needed for paving a rest area and several side roads. Also, a change order was issued for additional traffic control (flaggers and uniformed traffic officers) due to the Agency underestimating the traffic control required for multiple operations and the project's work extending 35 days past the contract completion date.

[9] Final close-out procedures are performed to verify that the quantities of materials used by the contractor, to provide the contractor with a final estimate, and to notify management of project quantities and costs.

Change Orders Were Approved by Authorized Agency Personnel, but Approvals Were Based on Limited Documentation; Price Adjustments Not Calculated in a Consistent Manner

Overall, we found that all change orders were approved by appropriate authorized personnel. However, we identified weaknesses in the Agency's policies and procedures related to the providing of supporting documentation accompanying change orders submitted for approval. In addition, we found the Agency had not established adequate policies and procedures to ensure that the price adjustments were calculated accurately. Both of these weaknesses increase the risk that the Agency could make improper payments.

Change Order Approval and Review

Change orders occur on most construction projects and may represent a sizeable portion of a project's overall cost, in this case <u>one-third more than the awarded contract cost.</u> According to a recent economic analysis,[10] performed on behalf of the Agency by researchers from the University of Vermont and the University of Oklahoma, on average, over 80 % of AOT's highway and bridge projects have change orders. Furthermore, on average, change orders increase the overall costs of a project by 8% and the analysis also found that change orders are more likely to occur on large complex projects. We found that all change orders for the contract were approved by the appropriate Agency staff. However, the Agency's approvers were provided with only summary information accompanying the change order requests which did not contain enough detailed documentation to support the calculation of revised quantities and costs. This limits the approvers' ability to validate the propriety of any change prior to approval.

The Agency requires approval for change orders from specific assigned Agency management personnel. The level and extent of approval required is ***dependent*** on the dollar amount and type of the proposed change order. For high-dollar change orders or change orders that involve additions to scheduled time, as many as five approvers are required. The change order approvers for this contract reviewed only the summary information provided in the change order request and did not review the supporting quantity and price calculations. A review of the contract's change order calculations did occur, but it was during the project's close-out process, after the project was substantially complete.

[10] Richard Sicotte, Ph.D et al., *Renegotiation of Highway Construction Contracts: An Economic Analysis of Change Orders issued by the Vermont Agency of Transportation, 2004-2009,* State of Vermont Agency of Transportation – Materials & Research Section, May 2013.

According to Agency personnel, the change order request should be a stand-alone document, which should provide summary answers to the questions of who, what, where, why, when, and how much, but was not intended to include the support for the calculation of quantities and prices. It is the responsibility of the resident engineer for each project to ensure that supporting documentation exists on file and that the change order request has adequate support.

For example, change order #13 for $619,526, which authorized asphalt and fuel price adjustments, contained only a brief explanation indicating the adjustment was necessary due to rising asphalt and fuel prices. A review of the change order's supporting calculations was not performed until the approved change orders were reconciled as a part of the project close-out procedures.

Reviewing the calculations supporting change order requests prior to approval reduces the risk of authorizing changes to the project that may contain errors. This could result in unverified and/or unnecessary project costs as all approved change orders become legally binding contract amendments. Recognizing this, the Agency in 2011 (after this contract was substantially complete) implemented the requirement to review change order calculations prior to the approval of contract change orders.

Price Adjustment Change Orders

The Agency includes provisions for price adjustments in its contracts and has made available a spreadsheet to assist employees with price adjustment calculations. However, the Agency has not established formal policies and procedures that could provide employees a comprehensive, consistent framework for ensuring that price adjustments calculations are accurate and complete.

Price adjustments provide for either additional compensation to the contractor or payment to the Agency depending on the movement of market prices for fuel and asphalt during the construction of the project. The "Special Provisions" section in the contract provides details about the conditions that must be met for a price adjustment and sets the index (base) price for fuel and asphalt. For gas and diesel fuel, throughout the project, whenever the prices of these items change by 5 percent or more, an adjustment is calculated and applied to the project's costs. There is no such threshold trigger for asphalt price adjustments. These price adjustments are reviewed at the end of the project during the close-out process.

Although the Agency's price adjustment calculations contained only minor differences from auditor calculations, the Agency's process for calculating price adjustments lacks the structure required to ensure the accuracy and completeness of the calculations. For example, the agency provided us with three separate asphalt price adjustment calculations covering the same period but containing different information. In addition, the spreadsheet used for calculating the adjustments was not consistently used. Some adjustments were calculated using the Agency’s spreadsheet; other adjustments were manually calculated.

The Agency’s process for calculating price adjustments did not have any mechanism for ensuring completeness i.e., that all appropriate quantities were included in the calculations. For instance, the Agency uses SiteManager™, a project management software developed by the American Association of State Highway and Transportation Officials (AASHTO), to track project information. Data, including material quantities used, is entered by on-site engineers; this data could be used to verify that the quantities in the price adjustment calculations are complete and accurate. However, the Agency did not reconcile the quantities used in each separate calculation to the totals from the report of final quantities generated by SiteManager™.

According to the standards provided by the State over internal controls[11] reconciliation (or verification) is the determination of the completeness, accuracy, authenticity, and/or validity of transactions. Reconciliation is a control activity which enables management to ensure activities are being performed in accordance with requirements. The absence of a reconciliation process that ensures the accuracy of quantities in price adjustments can place the Agency at risk of making improper payments.[12]

SiteManager™ Change Order Approval System

All change orders are processed and approved in SiteManager™. Our review of SiteManager™ approval controls revealed that 25 employees have the ability to override the electronic change order approval process within the software, effectively allowing them to initiate and approve change orders themselves on any project without requiring appropriate approvals. While we identified this potential risk, our review and reconciliation of all change orders for this contract indicated that the change orders were approved by the appropriate individuals and were properly accounted for.

We also noted the Agency has not adopted policies and procedures addressing the periodic assessment of the appropriateness of the SiteManager™ user privileges. Allowing a single person the opportunity to initiate and approve change orders without oversight could increase the risk that an unauthorized transaction will occur. Lack of segregation of duties over initiating and approving change orders exposes the Agency to a higher risk of inappropriate behavior.

[11] Vermont Department of Finance and Management, “Internal Control Standards: A Guide for Managers”.

[12] An improper payment is any payment that should not have been made or that was made in an incorrect amount under statutory, contractual, administrative, or other legally applicable requirements.

Project Close-out Procedures Were Protracted

The close-out process, which occurs subsequent to project completion, is intended to verify that the quantities used in the project are in accordance with the contract and can alert management to cost overruns. According to the State's internal control standards, the close-out process should be completed in a timely manner to permit staff to perform their duties efficiently and enable management to take any required corrective action promptly.

The time frame for the close-out process for this project substantially exceeded the Agency's average contract close-out time of 17 months. The work on the project was substantially complete on November 14, 2008; the project was accepted by the Agency on May 27, 2009, but the final estimate[13]was not signed by the contractor until September 24, 2012; this equates to 40 months spent on the close-out process.

Part of the cause of the long close-out was process redundancies, which were noted in procedures that required information contained within the SiteManager™ system to be manually summarized in the paper-based project field books, instead of using existing reports available through SiteManager™. The Agency has recognized this and has started a pilot project to convert some field procedures from hard copy to electronic format in SiteManager™, which will reduce redundancy as well as facilitate the verification and reconciliation of the final quantities performed during the close-out process.

The lengthy duration of project close-out for this particular project was exacerbated by the contractor delaying by 20 months reimbursement to the State for one half of the liquidated damages charged. (The other half had already been retained from payments to the contractor.) Agency policies at the time allowed the contractor up to six months to make the reimbursement and the policy did not require follow-up to obtain prompt payment. To correct this, current policies in place now allow only two months for payment and penalize the contractor for not making a timely payment.

Agency personnel report that further work is being done to improve close-out procedures. According to the Agency, the time to perform the close-out has decreased from an average of 17 months to 10 months and further work is being done to improve the process.

[13] The final estimate is a compilation of item quantities identifying the amount of work done by the contractor and the final amount to be paid.

Objective 3: Contractor Did Not Meet Insurance Requirements but Complied With Federal Wage Rates

We found that the contractor's insurance coverage did not meet all of the Agency's construction contract insurance requirements, placing the State at risk for financial loss. We also found that Agency insurance monitoring practices were deficient. We did find that the wage rates paid to contractor employees were in compliance with the contract's wage rate provisions. This is important because if the Davis-Bacon Act requirements are not followed, the impact could include termination of the contract and contractor suspension or debarment[14] for three years. This could cause unnecessary delays in completing the project, exposing the State to the potential of increased costs and the risk of losing federal funding.

Insurance Requirements Not Met

According to State of Vermont Agency of Administration Bulletin 3.5,[15] before commencing work on contracts the contractor must provide certificates of insurance to demonstrate compliance with the State's minimum insurance requirements. The Agency's "Standard Specifications for Construction" manual echoes the provisions of Bulletin 3.5 and provides more specific guidance regarding additional insurance coverage requirements, including types of insurance required for construction projects, dollar amounts of coverage and periods that insurance must be in effect. Further, the Agency's manual specifies that contractors must have insurance in place before the contract is signed and the State and Agency are to be listed as additional insured parties on all policies except workers' compensation.

Our analysis of insurance coverage for the contract found multiple deficiencies in the contractor's insurance coverage and that AOT failed to perform insurance verification procedures prior to executing the contract, contrary to Agency policy.

In particular, our review of the contractor's insurance certificates indicated that certain types of required insurance coverage were excluded and coverage limits shown on the contractor's certificates did not meet contract requirements. For example, the certificates:

[14] Debarment or suspension is one means that agencies use to ensure that they deal only with contractors who are responsible in fulfilling their legal and contractual obligations. Debarment removes a contractor's eligibility for government contracts for a fixed period of time, while suspension temporarily debars a contractor for the duration of an Agency investigation or litigation.

[15] Bulletin 3.5 sets forth the State's administrative requirements for contracting procedures.

- Listed general liability coverage and automobile coverage, but certain other required types of coverage, such as independent contractor's protective, fire damage legal liability, and explosion coverage were missing.

- Showed general liability coverage of $1 million per occurrence, but the required coverage is $1.5 million.

In addition, we found that review of insurance coverage by the Construction Section of AOT did not occur in a timely manner. Also, Agency personnel could not provide evidence that the contractor's insurance company was contacted to validate insurance coverage.

These failures stem from multiple causes.

First, the database maintained by the Construction Section to record and monitor insurance coverage did not contain complete or accurate insurance coverage requirements. For example, the database lists types of insurance and a checkbox is utilized to record the types of insurance held by a contractor. However, the list of insurance was incomplete. In addition, a work aid within the database specifies required coverage levels, but the amounts did not always correspond to requirements per AOT's Standard Specifications manual.

Second, although staff was required to verify insurance coverage with the insurance company, the Construction Section's procedures did not contain an explicit requirement to maintain a record of the verification.

Third, AOT's written procedures regarding the insurance verifications were lacking in detail and scope. For example, no procedures address the requirement to ensure that Products and Completed Operations coverage continues past the project acceptance date. We also noted that there was no supervisory review or monitoring of the contractor data being entered into the database. According to the State's internal control standards, those individuals with the responsibility for supervision should approve work at critical points to ensure quality and accuracy and provide documentation of the review. Effective monitoring gives management the opportunity to identify and correct any deficiencies or problems and minimize the impact of unfavorable events

Finally, the timing of the Agency's process for verifying insurance coverage is flawed because the Construction Section is responsible for verifying that the contractor holds the correct types, levels, and terms of coverage subsequent to contract execution, despite policy requiring that this verification occur prior to contract signing. Further, prior to the Construction Section's involvement, the contractor submits an insurance certificate with the contractor-signed copy of the contract to Contract Administration. Contract Administration performs a review of the certificate, looking for blanks or apparent omissions, but does not check the insurance limits nor confirm with the insurance company that coverage is in effect.

If there is a claim against the contractor's insurance for the project and the contractor does not have the required types and levels of insurance coverage for the required periods, the State could be liable for losses, expenses, or damages connected with the contractor's work on the project. Without adequate verification of insurance coverage, the Agency cannot be certain that insurance policies are valid and still in effect, increasing the risk exposure to the State.

Federal Wage Rates Correct, but Verification of Contractor Payrolls Exceeds Requirements

The federal Davis-Bacon Act provides laborers and mechanics working on covered federally financed contracts over $2,000 the right to receive at least the locally prevailing wage rate and fringe benefits, as determined by the U.S. Department of Labor, for the type of work performed. To assure that prevailing wage rates are being paid, the federal government requires that contractors/sub-contractors submit payrolls to the Agency reporting the name and classification (type of work being performed) for each employee and the wage rate being paid, among other information.

Agency procedures require the resident engineers to review all entries on the projects payrolls and fill out an Agency form to certify that the wage rates were in general compliant with Davis Bacon regulations. We found the wage rates paid to contractor employees met the contract wage rate provisions and that all payroll amounts tested were compliant with Davis Bacon regulations. Compliance with Davis–Bacon is important because contractors or subcontractors found to have disregarded their obligations to employees, or to have committed aggravated or willful violations while performing work on Davis-Bacon covered projects, may be subject to contract termination and debarment from future federally funded contracts for up to three years. The federal government may have the work completed, by contract or otherwise, and the contractor and the contractor's sureties shall be liable to the Government for any excess costs the government incurs.

During our examination of the wage certification process, we noted that Construction Section practices, contrary to the Agency's Construction Manual, required the resident engineer to review one-hundred percent of all payroll distribution line items to verify that wage rates were compliant with regulations. The Construction Manual requires that the first two payrolls submitted by each contractor on each project should be fully checked, but allows for subsequent sampling if full compliance is shown on the initial two payrolls. Given the number of payroll line items on each project (approximately 650 for this contract), it is unnecessarily burdensome to review all entries.

Conclusion

Our audit identified numerous opportunities for the Agency to shorten project timelines, reduce financial risk to the State, and deliver increased value for every construction project.

The Agency's policy for assessing liquidated damages against the contractor should be strengthened to include additional costs now borne by the State in the case of project delays, which may serve as an incentive for contractors to complete projects on time and reduce costs. The Agency should develop price adjustment policies and procedures to ensure the accuracy and completeness of these calculations, thereby minimizing the risk of improper payments. Strengthening the controls over the change order approval process by requiring that underlying documentation be provided prior to approval can safeguard against unnecessary projects costs. Also, segregation of duties within the software used to process change order approvals will ensure that one individual cannot initiate and approve change order requests.

The savings associated with reduced project time and staff effort can be achieved by the Agency's continuing efforts to streamline the close-out process, which will enable resources to be redirected toward other projects. For example, simplifying the wage rate verification policy will ease the administrative burden of the resident engineers in the field, increasing the efficiency and effectiveness of construction administration.

The Agency could benefit from more thorough insurance review and verification procedures. Requiring that contractors provide adequate proof and levels of coverage combined with proper monitoring of contractor insurance coverage would minimize problems and reduce financial risk to the State.

Recommendations:

SAO recommends that the Agency:

- Revise liquidated damages policies to include other costs of project-related delays such as inconvenience to the public and traffic control in addition to the Agency's oversight costs.

- Provide detailed documentation to enable adequate review for change orders such that approvers can verify the accuracy and completeness of the revised quantities and prices prior to change order approval.

- Develop policies and procedures that provide a comprehensive, consistent framework for the calculation of price adjustment change orders to ensure that the price adjustments are calculated accurately and all quantities subject to adjustments are reconciled.

- Evaluate SiteManager™ user privileges to ensure access rights are commensurate with employee and consultant responsibilities and implement controls to ensure segregation of duties.

- Increase efficiency of the close-out process by eliminating procedural redundancies and increasing the use of technology in the field.

- Implement procedures in Contract Administration for comparing the adequacy of a contractor's insurance coverage to the requirements of the Standard Specifications prior to the execution of the contract, including validating with the insurance company that contractor policies are in force and documenting that the validation occurred.

- Revise Construction Section insurance monitoring procedures to require that policies match the coverage types and limits of the Standard Specifications, document verification of the insurance coverage directly with the insurance company, and implement supervisory review to ensure systematic performance of these verifications.

- Develop a monitoring procedure to ensure that Products and Completed Operations coverage extends past project acceptance.

- Align Construction Section wage rate practices with the Construction Manual to allow sampling of wage rates as opposed to 100 percent review.

Management Comments and Our Evaluation

On August 28, 2013, the secretary of Transportation provided written comments on a draft of this report. The secretary addressed each of our recommendations and committed to resolve the issues which were raised in the report. In the response, the secretary indicated that the Agency planned to implement or consider our recommendations. We have included the complete response and our evaluation of the comments in Appendix IV.

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In accordance with 32 VSA §163, we are also providing copies of this report to the secretary of the Agency of Administration, commissioner of the Department of Finance and Management, and the Department of Libraries. In addition, the report will be made available at no charge on the state auditor's website, http://auditor.vermont.gov/

Appendix I

Scope and Methodology

The scope of our audit was the universe of Agency construction contracts that were closed-out during calendar years 2010-2012. We selected this contract for audit because of the large number and dollar value of change orders in proportion to the awarded contract.

To address our objectives, we reviewed State statutes and Agency rules, policies, and procedures. We also reviewed the Agency's Standard Specifications for Construction Projects manuals, and the Regional Process Manual, as well as a University of Vermont research paper related to highway construction projects in Vermont. (See Appendix III) In addition, we reviewed FHWA guidance on construction audits and reports issued by other auditors in different states.

In planning and executing our work, we conducted multiple interviews with Agency personnel to obtain information about contract administration, project accounting, , construction operations, information technology relevant to SiteManager™ and employee wages and benefits oversight.

In determining if the project was on schedule, we examined two phases of the project - the construction phase and the project close-out phase. Our examination of the construction phase compared the contract completion date to the date the project was substantially completed by the contractor.

To determine if the project was within budget, we compared the awarded contract amount to the final contract cost. We also examined the underages and overages of quantities for individual pay items. To facilitate our review, we compiled a schedule reconciling the awarded and amended contract amounts to the change orders for all pay items and compared them to the contract costs. To validate the contract costs, we reconciled the total cost associated with the final quantities to reports generated by STARS, (the Agency's internal accounting system) and VISION (the State-wide accounting system). In addition, we compared the quantities for pay items whose final cost was greater than $50,000 to the resident engineer calculations. We reviewed change orders and cost analysis reports for pay items whose actual cost differed from the awarded contract cost by more than $50,000 to ascertain the reason for the differences. We also summarized the total number and dollar value of the individual pay items that were over and under budget.

We reviewed the Agency's change orders for this project to verify they were approved by the appropriate personnel. We gained an understanding of the approval process by reviewing the Construction Manual and performing walkthroughs with Agency personnel. From this review we identified the appropriate approvers for this project and confirmed this information with the construction engineer. We also reviewed the general IT controls over the change order approval process with the SiteManager™ system administrator.

Appendix I

Scope and Methodology

As part of our validation of high cost pay items, we reviewed the calculation of fuel and asphalt price adjustments. We examined the price adjustment calculation records, including placement reports, calculation worksheets, and pay item quantities detail. Since the Agency's calculations contained errors, we independently recalculated the price adjustments and compared our calculated amount to the amount recorded. To recalculate the price adjustments, we used formula information from the contract, posted prices from the Agency's website, and quantity information from field books, placement reports, and engineer's documented calculations.

Our examination of the project close-out phase included a calculation of the number of days it took the Agency to complete its project close-out procedures and we obtained an explanation for any irregularities in the process.

We selected contract provisions that would negatively affect the State if the provisions were not met - insurance requirements and wage rate requirements.

To determine if insurance requirements were met, we reviewed available insurance certificates kept on file by the Agency. We compared the certificates to the requirements in the standard specifications and noted what time periods were covered by the certificates. We interviewed staff tasked with tracking contractor insurance and viewed the insurance database.

Our review of wage rates started with a request to the Agency for all contractor and sub-contractor payrolls for the selected contract. From these documents, we determined the total number of payroll distribution line items for the project and calculated the number of items to be tested that would be statistically representative. We tested these items to determine if the federally required wage rate was used, if the mathematical calculation of the payroll was correct, and if the resident engineer had signed the certification of wage rates.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II

Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
AOT	Agency of Transportation
CFR	Code of Federal Regulations
FHWA	Federal Highway Administration
SAO	State Auditor’s Office

Appendix III

Renegotiation of Highway Construction Contracts: An Economic Analysis of Change Orders Issued by the Vermont Agency of Transportation, 2004-2009

For purposes of brevity, we have included only the executive summary of this report. The report in its entirety can be located on the Vermont Agency of Transportation web-site at:

http://vtransengineering.vermont.gov/sections/materials_and_research/research/projects/completed

EXECUTIVE SUMMARY

We provide a complete report of our research on change orders and strategic bidding in Vermont over the period 2004-2009. Our investigation provides the Vermont Agency of Transportation with a quantitative view of the scope of change orders, and their statistical determinants during this period.

Over eighty percent of highway and bridge projects have change orders. On average, change orders increase the costs of a project by eight percent, but in many cases the cost increase can be significantly higher. Change orders are not distributed evenly either across firms or items. In particular, we estimate that the probability that Vermont's top construction firms will submit change orders on a project that they win is 20 percentage points higher than that of other firms. In terms of items, change orders appear most frequently for asphalt and fuel price adjustments, pavement, steel and flaggers/traffic control. In addition, we estimate that change orders are more likely to occur in more large, complex projects than in smaller, simpler ones.

The evidence strongly suggests that contractors correctly anticipate Items that will later be subject to change orders, and adjust their bids accordingly. In particular, firms often use strategic bidding practices, bidding more aggressively in an auction to increase the probability of winning, and later recovering their foregone profits by frequently claiming change orders. The strategic bidding most often takes the form high bid prices on items later subject to a positive quantity adjustment, and lower prices on items that will be subject to negative quantity adjustments. Items that are the most frequently renegotiated have bids 7.5% higher, on average, than those that are not subject to change orders.

In accordance with these findings, we recommend that the Agency consider implementation of a reserve-price rule, either for the bid or on particular items we identified in the study. In addition, we recommend adopting smaller, simpler projects when feasible and examining the possibility of expanding usage of the design-build approach to contracting.

- 3 -

Appendix III

Renegotiation of Highway Construction Contracts: An Economic Analysis of Change Orders Issued by the Vermont Agency of Transportation, 2004-2009

Additional important findings are that increasing competition could yield substantial financial savings. We estimate that for every additional bidder, project bids of all firms decline on average by nearly two percent. We recommend a number of possible initiatives for increasing competition. Also, there are potentially large rewards available from adjusting the timing of the Agency's construction program in response to overall business activity. We found that a one percentage point increase in the unemployment rate is associated with four percent lower bids.

While there is no magic bullet that will address the problem of change orders, the evidence we found suggests that the combined effect of our recommendations could have a major impact on cost-savings and improved contractual performance.

Finally, we specify several possible directions for future research that could yield substantial cost-savings. In particular, further investigation would yield more precise understanding of how the fuel and asphalt price adjustment mechanisms could be altered in a manner to maximize cost-savings. Additionally, study of firm performance during the recovery from Tropical Storm Irene would yield recommendations about how the Agency might pursue new strategies to foster greater competition in project bids.

- 4 -

Appendix IV

Reprint of the Secretary of Transportation's Management Response and Our Evaluation

VERMONT

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Agency of Transportation

August 28, 2013

Mr. Douglas R. Hoffer
Vermont State Auditor
132 State Street
Montpelier, VT 05633-5101

Dear Mr. Hoffer:

Thank you for the opportunity to review the draft report entitled "New Haven Paving Project: Opportunities Exist to Shorten Project Timelines, Reduce Costs, and Limit Financial Risk to the State." The Agency of Transportation (VTrans) offers the following commentary and response to the findings, conclusions and recommendations expressed by the Office of the State Auditor in the report (the "Report").

Recommendation: Revise liquidated damages policies to include other costs of project-related delays such as inconvenience to the public and traffic control in addition to the Agency's oversight costs.

See comment 1 in the table after AOT's response.

Agency Response: The Agency will need time to reflect on this policy change and develop an action plan if the Agency accepts the recommendation. Liquidated damages should be reasonable and provide sufficient incentive for the contractor to complete work on time. Liquidated damages that are excessive can discourage bidders and thus reduce competition, and may result in higher bids as contractors increase prices to mitigate risk. Moreover, litigation costs associated with assessing liquidated damages on complex factors like "inconvenience to the public" (included as a recommendation) may far outweigh any potential benefit derived. Both in the findings and the body of the Report, the statement appears that current [liquidated damages] practice may "increase the likelihood that projects are not completed on time." Nothing in the Report substantiates such a statement. Absent circumstances specific to the Report which would make this statement appropriate, and mention of the risks associated with excessive liquidated damages, we ask that it be removed.

Recommendation: Provide detailed documentation to enable adequate review for change orders such that approvers can verify the accuracy and completeness of the revised quantities and prices prior to change order approval.

See comment 2 in the table after AOT's response.

Agency Response: The change order process is a defined process well understood by staff, amply documented in the VTrans Construction Manual, and includes redundancy throughout the process. The Resident Engineer consults with the Regional Construction Engineer and other support staff in negotiating the terms of a Change of Design (COD). This requirement provides management with oversight of the process. In addition, the project manager and the Federal Highway Administration (FHWA) (if necessary) are consulted prior to providing direction to the contractor, as is the Construction Engineer for more complex agreements. The extensive oversight alleviates the need to provide the review team with support documentation during the COD review process. Instead, the COD should continue to reference the supporting documentation, with the added note that the supporting documentation is available on request. This approach makes the material available without burdening the process.

VTrans Working to Get You There

Appendix IV

Reprint of the Secretary of Transportation's Management Response and Our Evaluation

Recommendation: Develop policies and procedures that provide a comprehensive, consistent framework for the calculation of price adjustment change orders to ensure that the price adjustments are calculated accurately and all quantities subject to adjustments are reconciled.

Agency Response: Agreed. We will provide staff guidance on the APA/FPA calculations and provide the tools to comply. This task will be completed as part of the 2014 changes to the Construction Manual.

Recommendation: Evaluate SiteManager™ user privileges to ensure access rights are commensurate with employee and consultant responsibilities and implement controls to ensure segregation of duties.

Agency Response: Agreed. This should be done on an annual basis. We recognize that some risk exists but believe that we monitor this activity to effectively manage any risk. We emphasize that the Report found no exceptions in this area.

Recommendation: Increase efficiency of the close-out process by eliminating procedural redundancies and increasing the use of technology in the field.

Agency Response: Agreed. This is in process through two pilot projects: one for electronic field books and the other is the BPMS (Business Process Management System) solution for the Finals Project.

Recommendation: Implement procedures in Contract Administration for comparing the adequacy of a contractor's insurance coverage to the requirements of the Standard Specifications prior to the execution of the contract, including validating with the insurance company that contractor policies are in force and documenting that the validation occurred.

Agency Response: Agreed. Contract administration will immediately implement measures to provide a thorough initial insurance verification with appropriate supervisory support.

Recommendation: Revise Construction Section insurance monitoring procedures to require that policies match the coverage types and limits of the Standard Specifications, document verification of the insurance coverage directly with the insurance company, and implement supervisory review to ensure systematic performance of those verifications.

Agency Response: Agreed. Construction will conduct a process review of its insurance monitoring procedures. Contract Administration will collaborate with the Construction Section for transition to an effective monitoring process to ensure that continues and provides sufficient coverage and protection to the state. This should be completed within six months.

Recommendation: Develop a monitoring procedure to ensure that Products and Completed Operations coverage extends past project acceptance.

Agency Response: Agreed. To be implemented within six months in conjunction with actions mentioned above.

Recommendation: Align Construction Section wage rate practices with the Construction Manual to allow sampling of wage rates as opposed to 100 percent review.

Appendix IV

Reprint of the Secretary of Transportation's Management Response and Our Evaluation

See comment 3 in the table after AOT's response.

Mr. Douglas R. Hoffer
August 28, 2013
Page 3

Agency Response: We believe there may have been a miscommunication between audit staff and Construction personnel on this item. The wage review is currently done utilizing sampling of the payroll distribution line items.

VTrans appreciates the efforts and recommendations of the Office of the State Auditor. We look forward to working with your staff to successfully resolve the issues raised in this Report to our mutual benefit, consistent with our shared goal of effective, efficient delivery of our services to the State of Vermont.

Sincerely,

Brian R. Searles
Secretary of Transportation

Appendix IV

Reprint of the Secretary of Transportation's Management Response and Our Evaluation

The following presents our evaluation of select comments made by the Secretary of Transportation.

Comment 1.	We agree with the Agency that liquidated damages should be reasonable and provide incentive for contractors to meet scheduled contract completion dates. We believe our recommendation to include the additional cost of flaggers and other traffic control expenditures in liquidated damages is reasonable given that these expenses represents less than 2% of the original contract amount and these costs were the direct result of the contractor's delays. Furthermore, it is difficult to discern why the Agency supports a policy that results in taxpayers bearing the costs of delays caused by contractors. In addition, we believe including in liquidated damages the costs of indirect impacts experienced by the state and its citizens as a result of contractor delays is reasonable and would <u>increase</u> the incentive for contractors to meet the contract completion dates. The FHWA allows for certain other costs to be charged and provides comprehensive guidance to state transportation agencies on how to quantify items such as road usage costs. States such as New Jersey and Texas include other costs associated with contractor delay in their liquidated damages contract provisions. Furthermore, as to the risk of increased litigation due to charging higher liquidated damages, in general, the purpose of liquidated damages is to avoid the need for litigation to establish the appropriate damages payable by specifying them in advance. These amounts are included in the State's standard construction contracts and accordingly, are an enforceable contract provision. Finally, The Agency objects to our statement that the failure to include all allowable costs in liquidated damages may "increase the likelihood that projects are not completed on time." The Agency stated that "Nothing in the report substantiates such a statement." However, the Agency itself acknowledged that liquidated damages should "provide sufficient incentive for the contractor to complete work on time." If liquidated damages are an incentive to complete work on time, then it's not unreasonable to suggest that de minimis liquidated damages are not likely to be an effective deterrent to delays. Including the full costs of delays would clearly provide greater incentive to contractors to complete work promptly.
Comment 2.	According to the Agency, ongoing communications between the parties negotiating the change order provides management with oversight prior to change orders being formally approved. However, without sufficient documentation accompanying the request for approval of the change order, members of the review team that have not been involved in negotiating the change order may not have information sufficient to give the change order careful consideration.
Comment 3.	To clarify our recommendation regarding that the wage rate review process use sampling of wage rates, the wage rate review by the Resident Engineer for Davis–Bacon compliance is a two-step process. The first step is a review of all payroll wages that are submitted by contractors each week. The second step is spot checking through contractor employee interviews, confirming that the job classification and the actual wages received by the employee are as indicated on the weekly payroll submissions. We acknowledge that the resident engineer is using sampling to select those employees to be interviewed; however, our recommendation is directed at the first step, which is the weekly review of all wages paid by the contractor. According to the construction manual, if full compliance is shown with the

	first two payrolls submitted by the contractor, then sampling is allowed on subsequent payrolls. We found that the subsequent payroll submissions made each week by contractors were not being sampled.