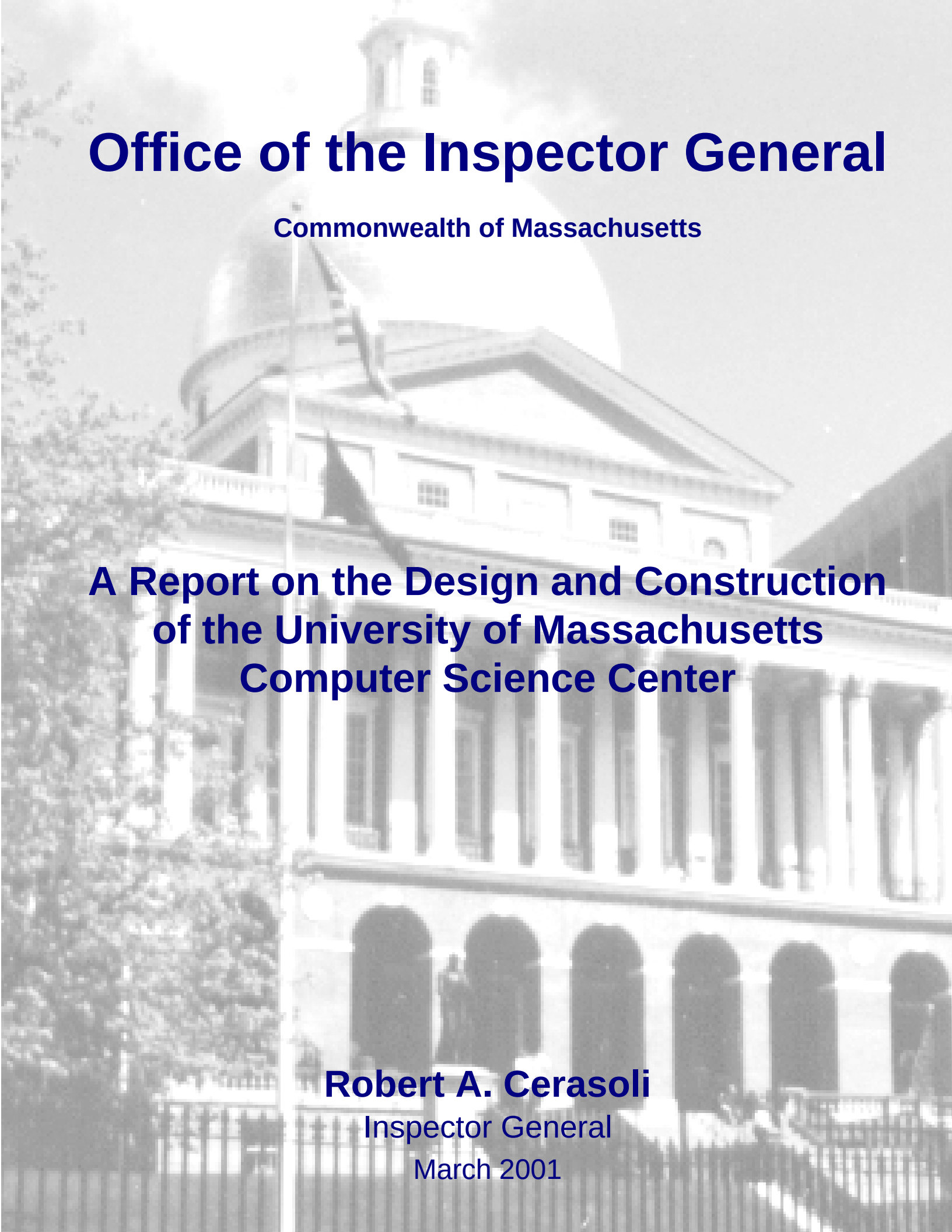

Office of the Inspector General

Commonwealth of Massachusetts

A Report on the Design and Construction of the University of Massachusetts Computer Science Center

Robert A. Cerasoli
Inspector General

March 2001

The Commonwealth of Massachusetts
Office of the Inspector General

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March 2001

His Excellency the Governor

The Honorable President of the Senate

The Honorable Speaker of the House of Representatives

The Honorable Chair of the Senate Ways and Means Committee

The Honorable Chair of the House Ways and Means Committee

The Honorable Chairman of the Senate Post Audit and Oversight Committee

The Honorable Chairman of the House Post Audit and Oversight Committee

The Directors of the Legislative Post Audit and Oversight Bureaus

The Secretary of Administration and Finance

Members of the General Court

Omnibus ad quos praesentes literae pervenerint, salutem.

I am today releasing a report concerning the design and construction of the Computer Science Center on the Amherst campus of the University of Massachusetts (UMass). The Computer Science Center project was undertaken by the Division of Capital Asset Management (DCAM) as a design-build project. This project had many of the key ingredients required for a successful construction project, including a design team headed by a highly qualified architectural firm, a capable general contractor with a strong track record, and conscientious DCAM field personnel skilled in contract administration. Nevertheless, this project was plagued by delays and construction quality problems. In addition, this $9.2 million project culminated in a $2.7 million claim against the Commonwealth.

The findings and conclusions contained in this report offer important lessons for DCAM and other public construction owners regarding the risks of, and the importance of exercising effective control over, design-build projects.

Sincerely,

Robert A. Cerasoli
Inspector General

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Executive Summary

Introduction

The Office of the Inspector General conducted a review of a project to construct the Computer Science Research and Development Center (Computer Science Center) on the Amherst campus of the University of Massachusetts (UMass). Completed in July 1999, the Computer Science Center is a flat-roofed, steel-framed structure with an exterior cladding of metal and glass building panels. The three-story building encompasses approximately 80,000 gross square feet and houses the Computer Science Department, including departmental and faculty offices, research space, a main computer room, classrooms, and conference rooms.

The Division of Capital Asset Management (DCAM), the state's centralized construction management agency, was responsible for planning, procurement, and contract administration for this project. Design work began in 1994 when DCAM contracted with an architectural firm for a feasibility study to confirm the need for a new building and to prepare a program and cost estimate. The feasibility study, completed in December 1995, included a program for a building that could be constructed at an estimated construction cost of $10.4 million.

The study designer determined that UMass placed a high priority on completing the project quickly and recommended a design-build approach to shorten the project schedule. DCAM adopted this recommendation and used the state's modular building procurement law to award a contract to Suffolk Building Corporation (Suffolk) for the design and construction of the UMass Computer Science Center.

The study designer projected that the UMass Computer Science Center could be completed in 18 months using a design-build approach. However, the project took 37 months to complete. DCAM's contract with Suffolk contained a completion deadline of September 9, 1998 and a total design and construction cost of $9,231,000. Suffolk completed the project in July 1999, 10 months late. In the course of the project, DCAM approved change orders that increased the contract cost by $475,985, and in October

1999, three months after project completion, Suffolk submitted a claim to DCAM seeking an additional $2,733,674. In total, the change orders sought by Suffolk would increase the cost of the project by more than one third. In its claim, Suffolk alleged that DCAM and UMass caused project delays by failing to approve design submissions in a timely fashion, by delaying design decisions, and by requesting design changes. However, the Office's review found that the delays and cost overruns were largely caused by factors under Suffolk's control. In addition, the Office found that the Suffolk claim was inflated by charges for damages not permitted under Suffolk's contract, overstated indirect costs, and charges for undocumented design services that cannot be verified.

Alternative Approaches to Construction: Design-Build vs. Design-Bid-Build

In general, public building projects in Massachusetts must be constructed using the design-bid-build approach required by the state's designer selection and construction bidding laws. Contract procurement for a design-bid-build project proceeds in two distinct steps. First, the awarding authority selects a designer to prepare complete and detailed plans and specifications for the project. Second, the awarding authority uses the plans and specifications to solicit bids for construction. For a Massachusetts public building project, the awarding authority solicits filed sub-bids for work to be performed by subcontractors, as well as bids from general contractors. The contract is awarded to the eligible and responsible general contractor submitting the lowest bid.

In contrast to the two-step procurement approach used in a design-bid-build project, a design-build project entails the award of a single contract to one entity – a design-build contractor – that is responsible for both design and construction. The purported advantages of the design-build approach include: potential time savings produced by overlapping design and construction schedules, the design-build contractor's single-point accountability to the owner, increased coordination and collaboration between the designer and the general contractor, and improved working relationships between the general contractor and subcontractors.

In general, public awarding authorities in Massachusetts must obtain special legislative authorization to waive the designer selection and construction bidding laws in order to use the design-build approach. On the UMass Computer Science Center project, the study designer recommended that DCAM use design-build procedures authorized by the state's modular building procurement law to avoid the need to obtain legislative authorization for a design-build project. The study estimated that this approach would save nine months in comparison with a design-bid-build process.

The Procurement Process

In June 1996, in accordance with the study designer's recommendation, DCAM issued a request for proposals (RFP) for a modular building under M.G.L. c. 149, §44E, the modular building procurement law. By the proposal deadline of September 24, 1996, DCAM had received five competing proposals. The DCAM Commissioner designated an evaluation committee that collectively assigned a point score to each of the proposals based on the following criteria: quality of proposed design and materials, qualifications of the contractor and its subconsultants, and completeness and feasibility of the proposed schedule. The proposal submitted by Suffolk and a team of design subconsultants headed by the architectural firm of Whitney Atwood Norcross Associates, Inc. (WAN) received the highest score.

On February 25, 1997, DCAM and Suffolk executed a contract in the amount of $9,231,000. The contract had an effective start date of March 18, 1997 and required the project to be completed by September 9, 1998.

Summary of Findings

The design-build approach to the UMass Computer Science Center did not produce the anticipated time savings: Suffolk did not complete the project until July 1999, 10 months after the contract deadline. The project also fell short of UMass's standards for quality in at least two significant respects. First, the underground steam line supplying the building with steam heat was directly buried rather than enclosed in a concrete tunnel in accordance with UMass's standards. According to the UMass Director of Capital Projects, the absence of a concrete tunnel will shorten the life expectancy of the

steam line and burden UMass with higher maintenance costs over the life of the building. Second, Suffolk's failure to achieve a smooth, architectural finish for exposed building foundation and retaining walls was remedied by applying a coating to fill in and disguise defects. This coating has already begun to show signs of wear and is expected to cost more than a smooth concrete finish to maintain over the life of the building.

After the project was complete, Suffolk submitted a $2.7 million claim against the Commonwealth, contending that project delays and cost increases were due to "apparent conflicts between DCAM and UMass about what was required under the Contract, and what UMass wanted in the finished product." According to Suffolk's claim, UMass representatives were unable to make decisions on final design items on a timely basis and changed those decisions after they were made.

DCAM contracted with a consultant to analyze Suffolk's claim and, based on the consultant's recommendation, initially agreed to pay Suffolk $1.4 million to settle the dispute. After the Office raised concerns about the claim, the DCAM Commissioner did not approve the settlement offer.

A more detailed summary of the Office's major findings is provided in the following pages.

Although DCAM used the modular building procurement statute to contract for this project, the UMass Computer Science Center is not a modular building.

The Computer Science Center was not constructed as a modular building. Instead, it is a conventionally constructed building that used steel components provided by a pre-engineered metal building systems manufacturer for the third-floor and roof structure. DCAM therefore improperly avoided the separate designer selection and construction bidding procedures required for public building projects.

In the RFP, DCAM stated that a building constructed with steel columns and beams provided by a pre-engineered metal building systems manufacturer would be deemed a modular building for purposes of the modular building procurement law. However, the

term “modular building,” as defined in M.G.L. c.149, §44E, refers to buildings that are either factory-assembled into three-dimensional modules or portable structures. In the opinion of the Office of the Inspector General, a building constructed on site from pre-engineered steel columns and beams does not meet this statutory definition; thus, the definition of a modular building contained in DCAM’s RFP permitted contractors to propose non-modular buildings. Moreover, the components provided by the pre-engineered building systems manufacturer for this project were limited to the third floor and roof structure. Regardless of whether a pre-engineered metal building is a modular building for purposes of the public construction bid laws, the first two floors of the Computer Science Center were conventionally constructed even by DCAM’s definition.

Most delays and cost overruns on the UMass Computer Science Center were caused by factors under Suffolk’s control.

The findings in this report show that, contrary to Suffolk’s claim, the problems contributing to delays and cost overruns were not caused by major design changes initiated by DCAM or by UMass after the project began. Rather, most major problems encountered on the project were attributable to Suffolk’s failure to ensure that design work was complete, accurate, and timely; Suffolk’s continual efforts to reduce construction costs through design revisions; and Suffolk’s failure to take timely steps to replace non-performing subcontractors.

A number of Suffolk’s decisions that had significant impacts on both the project schedule and the construction quality appeared to be aimed at minimizing its costs. For example, Suffolk failed to obtain complete survey and site information or to submit a complete and accurate civil/site design early in the project. The lack of complete and accurate design documents led to construction problems that required Suffolk to redo work. Suffolk continued to revise its steam line design, in part to lower construction costs, for more than six months after being directed to proceed with direct burial of the steam line. Suffolk failed to replace its concrete subcontractor, despite serious performance problems that contributed to delays and compromised the project quality. Suffolk’s problems with a drywall subcontractor and a subcontractor responsible for

fabricating and installing the building's three metal stairways also delayed project completion.

The design-build approach was not appropriate for the UMass Computer Science Center project.

The design-build approach streamlines design and construction, in part by giving the design-build contractor responsibility for and control over final design decisions. The primary advantage of this approach from the owner's viewpoint is that it can, if correctly managed, accelerate the schedule. The major disadvantage is that the owner must give up control over final design, increasing the risk that the completed building will not meet its needs or standards for quality.

Some of the problems encountered by the Computer Science Center project can be attributed to the design-build approach, which opened the door to disputes over the project design requirements. For example, the RFP called for a concrete tunnel for the steam line but contained little design information about such a tunnel. The lack of design specificity allowed Suffolk to argue that the tunnel was not required. The dispute between DCAM and Suffolk over the RFP requirements contributed to project delay and gave Suffolk an opening to submit a $1.2 million change order for the tunnel, seeking a 13 percent increase in the price of the contract. In the end, DCAM abandoned its initial position that the RFP design required a tunnel and instructed Suffolk to directly bury the steam line piping without a concrete tunnel. As a result, the steam line has a shorter life expectancy and will likely cost more to maintain. The steam line tunnel dispute highlights the importance of developing adequate design parameters in an RFP for a design-build project to avoid potentially costly disagreements over the RFP requirements.

Differing interpretations of the design requirements for the atrium lobby stairway also contributed to delay. From the outset, UMass envisioned a decorative, open stairway with a stainless steel handrail in the building's atrium lobby. The RFP described this design concept, which was to be a focal point of the building. However, Suffolk's proposal featured a lower-cost design alternative with a gypsum board half-wall and wooden handrail. UMass rejected Suffolk's proposed design deviation before the

contract was executed. Suffolk's next proposed alternative, a perforated metal panel rather than the stainless steel handrail, was also unacceptable to UMass. In the end, UMass got the higher-quality, open stairway with the stainless steel handrail described in the RFP, but delays in developing the final design held up project completion and increased the cost.

The Computer Science Center's cable tray system is another example of a problem that is more likely to occur on design-build projects, which tend to rely on performance specifications rather than the complete design specifications used for design-bid-build projects. The RFP contained a performance specification that required the building's cable tray system to be accessible to allow the building's users to easily reconfigure the computer cabling. After Suffolk began to install the cable trays, UMass determined that the installation did not provide adequate clearance for access. The ensuing dispute between DCAM and Suffolk over what constituted an "accessible" cable tray system led to delays and added costs. This dispute highlights the limitations of performance specifications for buildings, where it is often difficult to describe required functions with adequate specificity.

In sum, disputes over design requirements and problems with the quality and timeliness of Suffolk's design submissions highlight the disadvantage inherent in giving a construction contractor control over final project design. UMass's efforts to ensure that the building met its standards for quality and functionality were met with resistance by Suffolk and resulted in disputes, despite clear contract terms that required Suffolk to submit final design work to DCAM for approval.

This project also shows that the design-build approach, which is intended to foster collaboration between the designer and the contractor, does not guarantee a harmonious relationship between them. The Office found that Suffolk and WAN were engaged in a dispute over WAN's design fee almost from the outset. As the project progressed, Suffolk contended that errors on the part of WAN's design team had resulted in higher construction costs, escalating the amount of the fee dispute.

Top DCAM management did not support efforts of DCAM project personnel to enforce contract requirements and maintain control over the project.

DCAM recognized that relying on a design-build contractor to develop the final project design increased the risk that project quality could be compromised. DCAM's contract characterized the contractual arrangement as a "special relationship," which it described as follows:

> In order to accomplish the purposes of the Agreement efficiently, the parties hereby declare that a special relationship of trust, confidence, and professionalism exists between the parties and will continue to exist throughout the duration of the Agreement.

In addition, DCAM developed a comprehensive set of contract requirements and project management procedures to ensure adequate control and oversight. The contract required Suffolk to submit complete plans and specifications for DCAM's review and approval prior to beginning the related construction work. In addition, DCAM contracted with an independent design firm, Helene-Karl Architects, Inc. (HKA), to perform a comprehensive review of Suffolk's design submissions for completeness and accuracy.

Project records show that DCAM project personnel attempted to enforce design review and other contract requirements, including requirements for Suffolk to obtain approval for its proposed schedule. DCAM project personnel frequently reminded Suffolk of its schedule for submissions and documented Suffolk's failure to comply with the schedule. Despite these efforts on the part of DCAM project personnel, Suffolk failed to meet its own proposed schedule for submissions or to submit complete, revised design documents for approval as required by the contract.

In many instances, top DCAM management waived these contract requirements. For example, top DCAM management gave "partial and conditional" approval to construction documents for the civil/site design, over the vehement objections of HKA, despite significant unresolved design problems. Similarly, top DCAM management effectively waived the final approval requirement for the structural design by giving Suffolk permission to proceed with foundation work before the structural design was

complete. Given this lack of support from top DCAM management, it is not surprising that DCAM project personnel were unable to maintain effective control over the project.

Suffolk's failure to adhere to its proposed schedule suggests that it was unconcerned about the possibility that DCAM would enforce the $1,000 per day liquidated damages provision for late completion. At the conclusion of the project, the DCAM resident engineer recommended deducting $202,000 in liquidated damages from Suffolk's requisition. DCAM records contain no explanation for the decision made by top DCAM management to pay Suffolk's last requisition in November 1999 without withholding any money for liquidated damages.

Top DCAM management failed to conduct a rigorous assessment of the merits of Suffolk's $2.7 million claim.

Project records indicate that DCAM project personnel conducted an assessment of Suffolk's proposed change orders throughout the project, verifying the reasonableness of and seeking documentation for claimed extra costs. At the end of the project, DCAM project personnel had approved approximately $476,000 in change orders to Suffolk.

Many of the extra costs rejected by DCAM project personnel in proposed change orders were later incorporated into Suffolk's $2.7 million claim. In dealing with the claim, top DCAM management took an approach that differed dramatically from the careful assessment done by DCAM project personnel. DCAM hired a claims consultant under an agreement that contained no written instructions or scope of work to analyze the claim. The work product produced by DCAM's claims consultant and DCAM's subsequent negotiations with Suffolk reflect a lack of any substantial assessment of the legal merits or the costs included in Suffolk's claim. For example, the claims consultant recommended and top DCAM management agreed to pay the majority of Suffolk's claimed costs for 42 weeks of delay. However, the claim consultant's analysis contained no supporting evidence or rationale for recommending that DCAM accept responsibility for 42 weeks of delay. Moreover, the findings in this report show that the majority of delays were attributable to factors under Suffolk's control. In addition, the Office's review found that major cost items were not documented and could not be

verified and that the contractual and legal basis for many elements of the claim is doubtful. For example:

- Suffolk's claim included $314,000 for undocumented design services that cannot be verified;

- Suffolk entered into an agreement with one of its subcontractors that gave Suffolk an incentive to inflate the subcontractor's claimed costs;

- Suffolk acknowledged that its claim had overstated its general conditions costs by $287,108.

The failure of DCAM's claims consultant to closely scrutinize this claim suggests that the $1.4 million settlement that top DCAM management agreed to pay Suffolk represents a decision to seek a ready compromise rather than to ensure that taxpayers do not pay more than they should for this project. The public is ill-served by this kind of compromise, not only because it may result in paying too much for this project, but because it will convey the message that the Commonwealth does not carefully analyze construction claims and will pay a premium to resolve a dispute. This message is an invitation to inflated claims on future state construction projects. Moreover, contractors who succeed in getting questionable claims approved may believe that they can lowball future bids with impunity and recoup their costs through change orders. By not scrutinizing change orders and claims and by not enforcing the requirements of its own contracts, the Commonwealth undermines fair competition for its future construction contracts.

DCAM decided not to execute the $1.4 million settlement agreement after learning of the Office's concerns. Instead, DCAM retained a law firm to assess the consultant's report and recommendations. The law firm has reportedly recommended conducting a new analysis of Suffolk's claim.

Introduction

The Office of the Inspector General conducted a review of a project to construct the Computer Science Research and Development Center (Computer Science Center) on the Amherst campus of the University of Massachusetts. The Office initiated this review after receiving several unrelated inquiries raising concerns about the management of this project. The Office reviewed records obtained from the major project participants, including the University of Massachusetts (UMass); the state Division of Capital Asset Management (DCAM); the design-build contractor, Suffolk Building Corporation (Suffolk); the project designer, Whitney Atwood Norcross Associates, Inc. (WAN); an architectural firm hired to assist the state with design review, Helene-Karl Architects, Inc. (HKA); and one of the major trade subcontractors, N.B. Kenney Company, Inc.

The project records reviewed by the Office and referred to in this report include:

- Project Meeting Minutes pertaining to weekly meetings among project participants including DCAM, UMass, Suffolk, and WAN. These minutes were prepared by WAN for the bulk of the project.

- DCAM Daily Progress Reports prepared daily by DCAM field personnel reporting on manpower and activities.

- Issues for Project Manager's Meeting notes generated by Suffolk personnel. These records are internal Suffolk documents obtained by the Office from Suffolk.

- Contract documents, correspondence, memoranda, and other project-related records.

The Office also conducted interviews with representatives of major project participants, including the Suffolk Project Executive and Project Manager, the UMass Capital Projects Manager, DCAM officials, the WAN project architect, and the Project Manager for N.B. Kenney Company, Inc.

The Computer Science Center was a design-build project that DCAM procured under M.G.L. c. 149, §44E, the modular building procurement law. DCAM's design-build contract with Suffolk called for Suffolk to complete the three-story Computer Science

Center in 18 months at a cost of $9,231,000. Instead, Suffolk took 28 months to complete the project. In the course of the project, DCAM approved change orders that increased the contract cost by $475,985. In October 1999, three months after project completion, Suffolk submitted a claim to DCAM seeking an additional $2,733,674 payment. In its claim, Suffolk alleged that DCAM and UMass caused project delays by failing to approve design submissions in a timely fashion, by delaying decisions, and by requesting design changes.

The Office's review has shown that, contrary to Suffolk's assertions, most project delays were attributable to one or more of the following factors:

- Suffolk's failure to ensure that design work was complete, accurate, and timely;
- Suffolk's continual efforts to reduce construction costs through design revisions; and
- Suffolk's failure to take timely steps to replace non-performing subcontractors.

In addition, the Office found that the Suffolk claim was inflated by claims for damages not permitted under Suffolk's contract, overstated indirect costs, and charges for undocumented design services that cannot be verified. The Office also found that Suffolk failed to submit documentation to DCAM, as required under its contract, to support a major portion of its claim for payment for extra work.

Background

Completed in July 1999, the Computer Science Center is the first phase of a planned two-phase construction project on the UMass campus known as the Engineering and Computer Science Complex. The Computer Science Center building is a flat-roofed, steel-framed structure with an exterior cladding of metal and glass building panels. The three-story building encompasses approximately 80,000 gross square feet and houses the Computer Science Department, including departmental and faculty offices, research space, a main computer room, classrooms, and conference rooms.

DCAM, the state's centralized construction management agency, was responsible for planning, procurement, and contract administration for this project. DCAM staff worked in conjunction with UMass officials on the project in an effort to ensure that UMass's needs and expectations were met. Design work began in 1994 when DCAM contracted with the architectural firm of DiMarinisi & Wolfe for a feasibility study to confirm the need for a new building and to prepare a program and cost estimate. The feasibility study, completed in December 1995, included a program for a building that could be constructed at an estimated construction cost of $10.4 million.

The feasibility study recommended using a design-build approach rather than the state's usual design-bid-build construction method, for the reasons discussed below.

Alternative Approaches to Construction:
Design-Bid-Build versus Design-Build

In general, public building projects in Massachusetts must be constructed using the design-bid-build approach required by the state's designer selection and construction bidding laws. Contract procurement for a design-bid-build project proceeds in two distinct steps. First, the awarding authority selects a designer to prepare complete and detailed plans and specifications – referred to as construction documents – for the project. Second, the awarding authority uses the construction documents to solicit bids for construction. For a Massachusetts public building project, the awarding authority solicits filed subbids for work to be performed by subcontractors, as well as bids from general contractors. The contract is awarded to the eligible and responsible general contractor submitting the lowest bid.

In contrast to the two-step procurement approach used in a design-bid-build project, a design-build project entails the award of a single contract to one entity – a design-build contractor – that will be responsible for both design and construction. The purported advantages of the design-build approach include the design-build contractor's single-point accountability to the owner, coordination and collaboration between the designer and the general contractor, and improved working relationships between the general contractor and the subcontractors.

In general, public awarding authorities in Massachusetts must obtain special legislative authorization to waive the designer selection and construction bidding laws in order to use the design-build approach.

Comparison of Conventional and Modular Buildings

The design-bid-build approach contemplates a building to be constructed using conventional methods, sometimes referred to as a "stick-built" building. Conventional methods entail on-site construction using building materials and components, some of which are pre-engineered and/or prefabricated, such as window assemblies, pre-hung doors, and roof beams. Most of the on-site work on a conventionally constructed building is typically carried out by specialized trade subcontractors performing such work as masonry, carpentry, electrical work, plumbing, roofing, and drywall. The subcontract work is generally coordinated and supervised by a general contractor.

Another method for constructing buildings – modular construction – was developed in response to a demand for buildings that can be assembled quickly and/or may be needed only temporarily. In contrast to a building constructed using conventional methods, a modular building is typically composed of modules or sections that are prefabricated in a factory and may incorporate electrical, plumbing, and other building systems. These completed factory modules are transported to the construction site as three-dimensional structures, eliminating much of the on-site trade subcontract work.

Modular construction, which combines design and construction work in the manufacturing process, cannot be procured using the design-bid-build approach. To allow public awarding authorities to procure modular buildings without requiring legislative approval for each individual project, the state enacted a modular building procurement law in 1989. This law, M.G.L. c. 149, §44E, prescribes a one-step, request for proposals (RFP) process to award a design-build contract for a modular building.

DCAM selected a design-build approach using the modular building procurement law in order to shorten the project completion schedule.

DiMarinisi & Wolfe, the study designer for the Computer Science Center, determined that UMass placed a high priority on completing the project quickly. The study noted

that a design-build approach could shorten the project schedule by allowing construction work to begin before the design was complete. Observing that obtaining authorization for a conventional design-build project would require an act of the Legislature, the study designer recommended that DCAM instead use the design-build procedures authorized by the modular building procurement law. The study estimated that this approach would save nine months in comparison with the design-bid-build approach to constructing a conventional building.

The study acknowledged that the shorter schedule made possible by using the modular building procurement law involved a tradeoff: UMass would not be able to exercise complete control over the design of a modular building, which is predesigned by its manufacturer. On balance, however, the study concluded that faster completion was the paramount concern. The study contained the following projected completion schedules for a conventional versus a modular building:

Table 1.

Projected Modular Construction Schedule		**Projected Design-Bid-Build Schedule**	
Project Component	Duration/Months	Project Component	Duration/Months
RFP Process	2	Designer Selection	3
Contractor Selection/Negotiation	1	Design Preparation	9
Design Review and Approval	3	Bidding	2
		Contractor Selection	1
Construction	12	Construction	12
Total	**18**	**Total**	**27**

Source: DiMarinisi & Wolfe, *Study: Engineering and Computer Science Complex – Phase I.* Prepared for DCAM and issued December 1, 1995.

DCAM's design-build approach using the modular building procurement law did not produce the anticipated time savings.

The actual schedule for design and construction of the Computer Science Center bore little relationship to the schedule for modular construction projected by the study

designer. The RFP for the Computer Science Center was issued in June 1996 but the building was not completed until July 1999. The total project completion time of 37 months was 19 months longer than the projected schedule for modular construction and 10 months longer than the projected schedule for a design-bid-build project.

The Procurement Process

DCAM issued a request for proposals for the Computer Science Center project.

After DCAM and UMass adopted the study designer's recommendation to use modular building procurement procedures, DCAM contracted with the same firm, DiMarinisi & Wolfe, to prepare a design-build RFP for the Computer Science Center project. The RFP, issued on June 26, 1996, contained a comprehensive scope of work, a preliminary design for the building, contract terms for the project, and criteria that would be used to evaluate proposals.

The RFP also included diagrammatic drawings illustrating a site plan, a route for an underground steam line connecting the new building to a central steam distribution system, a floor plan with approximate sizes and functional relationships of rooms, and other programmatic requirements. Other RFP drawings provided schematic requirements for major architectural elements and for plumbing, heating, electrical, and other systems. The RFP also included room data sheets providing information not shown in the drawings for each room, including floor coverings, materials to be used for walls, ceilings, doors, and windows, and specific electrical, lighting, plumbing, and other requirements. Other technical specifications and procedural requirements in the RFP established quality requirements for building equipment, systems, and materials.

The RFP required proposers to prepare and submit the following design documents:

- site drawings, including a building footprint, a grading and drainage plan, and a utilities plan showing connections to existing utility lines;
- building drawings, including a foundation plan, floor plans, building sections, electrical and HVAC conceptual plans, and façade drawings; and
- presentation drawings depicting floor plans and elevations.

The RFP allowed proposers to make adjustments to the RFP design in developing their proposals. However, the RFP emphasized that proposers were required to comply with all construction specifications, materials, equipment, and standards in the RFP unless a proposed substitution was specifically described in the proposal and sufficient data was provided to clearly demonstrate that it offered comparable quality. The RFP stated:

> The design drawings and specifications in the RFP establish the design concept and minimum acceptable standards for the Project; it is intended that the design direction for the development of the Project shown in the RFP be followed. It is understood, however, that it may be necessary for Offerors to make design adjustments in order to accommodate their selected manufacturer's pre-manufactured components and/or modular units. . . . It is expected that such modifications will be minor, and should not materially alter the design shown in the RFP. In the interest of obtaining the most competitive bids other modifications may be proposed, but only if they produce equal quality and functionality. A proposed modification will not be deemed "equal" if it is not sensitive to the design shown in the RFP.

The RFP required each proposer to retain a complete team of design professionals, including civil, structural, mechanical and other engineering disciplines. The design team was to be headed and coordinated by an architectural firm, which was required to be legally separate and financially independent from the construction contractor.

As required by the modular building procurement law, proposers were asked to prepare and submit separate technical and price proposals. Each technical proposal was to include the design documents described above and information about major project participants, including the general contractor, the design firm, and the technical design subconsultants. The RFP also required each proposal to include a pre-engineered metal building systems manufacturer with at least ten years experience in manufacturing and erecting metal building systems. The RFP specified that the pre-engineered metal building systems must be certified as meeting state building code requirements, as determined by tests and inspections performed at the manufacturer's assembly plant.

Under the RFP, each technical proposal was to be assigned a point score based on criteria contained in the RFP. After the technical proposals were scored, the price

proposals would be opened. DCAM would then select the "most advantageous" proposal, taking into consideration the point score and the proposal price. Under this selection procedure, the lowest-priced proposal would not necessarily be selected.

DCAM evaluated and assigned a score to each technical proposal.

As of the proposal deadline on September 24, 1996, DCAM had received five competing proposals. The DCAM Commissioner designated an evaluation committee that included a project manager and two project engineers, all DCAM employees. These three individuals collectively assigned a point score to each of the five technical proposals based on the following criteria: quality of proposed design and materials; qualifications of the contractor and its subconsultants; completeness and feasibility of the proposed schedule; and business location of the modular or pre-engineered metal building system building manufacturer.

The proposal submitted by Suffolk, together with WAN and its team of engineering subconsultants, received the highest score. DCAM's evaluation of Suffolk's proposal included these comments:

> The Suffolk team clearly exhibited the highly advantageous proposal in terms of general compliance with the intent of the RFP, and strength of project management. The proposed building captured the overall design intent and functionality communicated in the RFP. . . . Descriptions and clear organizational structure indicate that the team is well qualified and fully capable of delivering the project on time within the constraints of an active University Campus.

Although UMass did not have a formal role in the evaluation process, DCAM provided the five competing proposals to the UMass Capital Projects Manager prior to finalizing the evaluation. The UMass Capital Projects Manager sent DCAM a memorandum dated October 14, 1996, summarizing the University's comments. The memorandum ranked the five technical proposals in the same order as the DCAM evaluation committee rankings, with the Suffolk proposal ranked highest. However, the UMass memorandum expressed concerns with the Suffolk proposal:

> This proposal is ranked highest largely because it is the most complete. In a number of areas the project has been "value engineered" without fully

understanding the reasons for the items being selected. This may create problems when the cost and the design are brought together.

The UMass memorandum listed 11 items in Suffolk's proposal that did not meet RFP requirements. Among the non-complying items was the atrium lobby stairway, which UMass described as too narrow with no open railing. The UMass memorandum also noted that the construction documents related to the new steam line were not complete enough to indicate Suffolk's intent. UMass's initial concerns with Suffolk's non-complying stairway design and the incomplete steam line design information in Suffolk's proposal would prove to be well-founded, as each of these items would later result in delays and cost overruns on the project.

Following the evaluation process, the proposers' prices were opened and compared. The prices ranged from the lowest price of $9,231,000 – submitted by Suffolk – to the highest price of $13,264,000.

Before a contract was awarded, UMass requested a change in the specifications to re-route the steam line.

After a preliminary determination that Suffolk had submitted the most advantageous proposal, DCAM and UMass officials met with representatives from Suffolk and WAN in December 1996. In a meeting on December 26, 1996, UMass requested a change involving the underground steam line that would bring steam from a central steam distribution system to heat the Computer Science Center. The RFP contained a drawing depicting a route for the steam line from the new building to a tie-in location that would entail installing approximately 712 feet of underground steam piping. At the December 26, 1996 meeting, UMass submitted a revised route for the steam line that would produce less disruption to the University during construction, but would require increasing the length of underground piping from 712 feet to approximately 947 feet. After reviewing the new route proposed by UMass, Suffolk wrote a letter to DCAM dated January 3, 1997, indicating that this change in steam line routing would increase the cost of construction by $146,000. Minutes from a preconstruction project meeting on February 4, 1997 report that UMass confirmed the change in routing and that DCAM

and Suffolk agreed to negotiate a change order with the specific design requirements and price for the revised steam line route.

Suffolk's proposal was selected for a contract award, subject to revisions.

On January 15, 1997, the DCAM Commissioner notified Suffolk that its proposal had been selected for a contract award, subject to Suffolk's acceptance of specified revisions to be made at no additional cost. These revisions did not include the re-routing of the steam line. In a January 21, 1997 letter, Suffolk accepted DCAM's terms and agreed to make the revisions to its proposal.

On February 25, 1997, DCAM and Suffolk executed a contract in the amount of $9,231,000. The contract had an effective start date of March 18, 1997 and required the project to be completed by September 9, 1998. The contract contained a provision that would require Suffolk to pay $1,000 per day in liquidated damages if Suffolk failed to meet the project deadline.

Findings

Finding 1. Although DCAM used the modular building procurement law to award a design-build contract, the Computer Science Center was not constructed as a modular building.

Based on the study designer's recommendation, DCAM issued an RFP and awarded a design-build contract following the modular building procurement procedures contained in M.G.L. c. 149, §44E. However, the Computer Science Center was not constructed as a modular building. Instead, it is a conventionally constructed building that used steel components provided by a pre-engineered metal building systems manufacturer for the third-floor and roof structure.

In the RFP, DCAM indicated that a building constructed with steel columns and beams provided by a pre-engineered metal building systems manufacturer would be deemed a modular building for purposes of the modular building procurement law. However, the term "modular building" as defined in the statute refers to buildings that are either factory-assembled into three-dimensional modules or portable structures. The definition of a modular building contained in M.G.L. c. 149, §44E is as follows:

> [A] pre-designed building or units of a pre-designed building assembled and equipped with internal plumbing, electrical or similar systems prior to movement to the site where such units are attached to each other and such building is affixed to a foundation and connected to external utilities; or any portable structures with walls, a floor, and a roof, designed or used for the shelter of persons or property, transportable in one or more sections and affixed to a foundation and connected to external utilities.

It is the Office's opinion that a building constructed on site from pre-engineered steel columns and beams does not meet this statutory definition, and that the definition of a modular building contained in DCAM's RFP therefore permitted contractors to propose non-modular buildings. But regardless of whether a pre-engineered metal building is a modular building for purposes of the public construction bid laws, the first two floors of the Computer Science Center are conventionally constructed even by DCAM's definition. For this project, the components provided by the pre-engineered building systems manufacturer were limited to the third floor and roof structure.

It appears that DCAM expected the winning proposer to construct the entire building using steel columns and beams provided by a pre-engineered metal building systems manufacturer, thereby satisfying DCAM's definition of modular construction. According to DCAM staff, it was not apparent to DCAM until after construction had begun that Suffolk planned to limit the use of the pre-engineered metal building systems manufacturer's components to the third-floor and roof structure.

Finding 2. A disagreement between Suffolk and WAN over WAN's design fee continued throughout most of the project.

Suffolk and WAN entered into a written agreement dated May 1, 1997 that established a lump-sum, base fee of $525,000 for a defined scope of services. This base fee covered the preparation of design documents by WAN and its subconsultants and a limited scope of construction phase design services, including interpreting drawings and specifications, reviewing and approving contractor submittals, and making periodic site visits to become generally familiar with the quality of the construction work. The scope of the contract did not include surveys, site evaluations, soil tests, or other investigations.

Although the written contract seems to clearly establish the parties' fee agreement, project records show that a disagreement arose early in the project and remained unresolved at the end. After the design services contract was executed, WAN submitted its first invoice, dated July 8, 1997, to Suffolk. That invoice and subsequent WAN invoices to Suffolk contained a base fee amount of $549,141. The Office found no explanation in the project records for the discrepancy between the contract base fee of $525,000 and the $549,141 base fee that WAN claimed in its billings.

Moreover, minutes of a Project Manager's Meeting dated June 22, 1998, reported that Suffolk's President had reduced WAN's base fee to $500,000. Project records contain no explanation of the reason for this decision. Project records indicate that in October 1998 Suffolk offered to pay WAN a total of $540,000 both to settle the base fee dispute and reimburse WAN for $26,750 in added structural engineering costs resulting from

construction problems on the project. Project records indicate that WAN rejected Suffolk's settlement offer and continued to demand a base design fee of $549,141.

As the project progressed, the amount of design fees in dispute between Suffolk and WAN continued to grow. In 1998 and 1999, WAN billed Suffolk for another $84,512 in added design costs that Suffolk declined to pay. As the project neared completion in June 1999, Suffolk informed WAN that Suffolk had reduced WAN's base design fee by another $55,403 to cover the cost of construction work required to correct design errors. Correspondence between Suffolk and WAN indicates that WAN did not agree to this reduction in its base design fee.

By the time the project was complete in August 1999, the total amount of design fees in dispute between Suffolk and WAN had grown to $175,806.

In October 1999, Suffolk filed a $2.7 million claim with DCAM. Suffolk's claim included an additional $471,503 from DCAM for additional design services, as discussed in Finding 12 of this report.

Finding 3. Suffolk failed to adhere to its proposed schedule for completing design work.

The DCAM contract called for Suffolk to commence work on March 18, 1997 and, within 10 days from that date, to submit a proposed project schedule for DCAM's approval. On April 8, 1997, Suffolk submitted a proposed schedule with projected dates for design submissions, design approvals, and construction activities. Within a month, Suffolk had fallen behind its proposed schedule for completing design work. Suffolk continued to drop further behind over the following six months.

DCAM's contract with Suffolk contained detailed design review and approval procedures.

DCAM's contract with Suffolk contained detailed procedures to be followed after contract award, for developing the proposal design to the final construction document stage. Under the contract, Suffolk was responsible for developing and submitting

complete drawings and specifications, prepared and stamped by a registered architect or engineer, prior to beginning construction work.

Contract design review procedures required Suffolk to submit drawings and specifications to DCAM at two different stages of completion. The first required submission was at the design development stage, a term typically used to describe a design that is between 30 percent and 80 percent complete. DCAM was required to review design development documents for general compliance with RFP requirements and return them with comments and corrections. After incorporating DCAM's comments and corrections, Suffolk was required to develop the drawings and specifications to 100 percent complete construction documents for the next submission. DCAM would review the construction documents and either approve or return them to Suffolk for corrections. If DCAM required corrections at this stage, Suffolk was required to submit corrected construction documents for DCAM's approval before commencing with construction work. Suffolk was responsible for ensuring that submissions were made sufficiently in advance of construction work to allow DCAM a minimum of two weeks for its review.

The contract also required Suffolk to submit shop drawings, coordination drawings, product data, and samples when necessary to illustrate construction details, show the interrelationship of separate units of work, and document the quality of proposed methods, materials, and equipment. As with construction documents, Suffolk was responsible for coordinating the timing of these submittals to allow DCAM adequate time to complete its review before the related work was to be performed.

To assist with this design review, DCAM contracted in August 1996 with the architectural firm of Helene-Karl Architects, Inc. (HKA). Under its contract with DCAM, HKA was responsible for reviewing plans, specifications, and other submittals to ensure compliance with all project requirements. Project procedures required Suffolk to simultaneously provide DCAM and HKA with copies of each submission. HKA was to complete its review and provide DCAM with written comments within 10 working days from receipt of design development documents and 15 working days from receipt of

construction documents. After reviewing HKA's comments, DCAM was required to either approve the submittal or to notify Suffolk that corrections were required.

In addition to the detailed design review procedures contained in the contract, DCAM, Suffolk, UMass, WAN, and HKA attended a preconstruction meeting on February 4, 1997 to establish basic procedures for administering the project. According to the minutes of this meeting, DCAM reiterated the design review requirements spelled out in the contract. DCAM explained its role in the design phase of the project as follows:

> While the Project is a design/build approach, [DCAM] views the process more as an accelerated traditional design and anticipates the same level of involvement in the design process. [DCAM] expects complete design submission packages at each stage (design development and construction documents) of the process.

The minutes of the February 4, 1997 meeting made it clear that design documents were also subject to review by HKA and by UMass, and required Suffolk to submit documents to DCAM, HKA, and UMass simultaneously. The procedures established at the preconstruction meeting required Suffolk to incorporate all comments from the previous design submission into the next design submission, unless otherwise noted.

Suffolk was responsible for the quality and accuracy of design work under its contract with DCAM.

The design review procedures were intended to ensure that DCAM and UMass had input into final design decisions, but the contract clearly stated that the design approval process did not relieve Suffolk of its responsibility for ensuring design quality. Because this was a design-build project, the contract sought to establish "single-point responsibility" for design and construction work through such contract provisions as the following:

> The drawings and specifications included in this RFP are for the Request For Proposal purposes only and are intended to serve as a program of and guide to the University's intentions. . . . The documents do not purport to have reconciled all the code, design and construction coordination issues which may be related to such a University research and teaching facility. That responsibility lies with the Offeror and their professional representative and will be assumed as part of the final contract

> agreement. . . . **The selected team will be responsible for preparing complete construction documents as described hereinafter and will be obligated to accept full responsibility and liability for both the design and construction, . . . as if all documentation had been developed by them from the start.** [Emphasis added]

3a. Suffolk failed to meet its proposed schedule for construction document submissions.

Suffolk's proposed progress schedule indicated that design development documents for structural steel, concrete foundations, and civil/site work would be ready for DCAM's review by March 19, 1997. This schedule also projected that the design review process for these submittals would be complete and all DCAM corrections incorporated into complete construction documents by May 12, 1997.

By June 1997, Suffolk's design submissions had fallen substantially behind Suffolk's proposed schedule, primarily due to the amount of time Suffolk and its design team took to respond to DCAM's comments on design development documents and to advance these documents to the construction document stage. For example, project records indicate that DCAM and HKA provided comments on civil/site design development documents on April 4, 1997, but that two months elapsed before Suffolk submitted civil/site construction drawings on June 5, 1997. Similarly, records show that Suffolk received DCAM's comments on design development structural and foundation drawings on April 16, 1997, but did not submit construction documents for this work until June 5, 1997.

During the month of May 1997, DCAM wrote at least three letters to Suffolk, expressing concern about the long lag time in producing construction documents and the impact on the schedule. In one of those letters, which was dated May 28, 1997, DCAM's Project Manager wrote the following:

> [DCAM] is very concerned at the slippage in the project schedule and not having a reasonable chance to recapture the lost time. The intent of this letter is not to review every late item but the following two items that have not started are an indication of [DCAM's] concern:

- Construction documents to [DCAM] for review April 8, 1997

- Start construction April 23, 1997

Based on current information it appears that construction cannot start until the end of June 1997.

Suffolk was responsible for obtaining survey and other site information under the contract.

In keeping with the design-build approach, the contract made Suffolk responsible for all design work performed after the contract was signed, including surveys and other site investigations. The contract stated that DCAM would provide available surveys, test reports, utility locations, and other site information, but that Suffolk would have to obtain any additional information required at its own expense. The following contract terms made it clear that Suffolk would be responsible for obtaining this information:

> [DCAM] does not guarantee the accuracy of information furnished with the Request for Proposals. **If the Contractor considers the information supplied by [DCAM] to be insufficient, the Contractor may at its own expense obtain the service of a consultant or perform the work necessary to provide correct data with his own employees. . . .**
>
> Drawings and/or specifications needed to obtain survey or subsoil information, and any other soil engineering shall be prepared by the Contractor within the lump sum contract amount. The Contractor shall then analyze and evaluate such surveys and tests and make his design conform to the results of such evaluation. [Emphasis added]

3b. Suffolk lagged behind its proposed schedule in obtaining field survey information.

The contract spelled out Suffolk's responsibility for ensuring that a site layout and survey were performed by a registered land surveyor to establish all construction baselines and establish grades, lines, levels, and benchmarks. A site survey taken in the field provides crucial information for designers as they prepare the civil/site design and is therefore typically performed at the beginning of a project. For this project, a site survey and investigation were also needed to establish the exact location of existing underground utilities.

At the start of the contract, Suffolk submitted a proposed project schedule indicating that a site survey and investigation would take two weeks and would be completed in April 1997. However, according to DCAM's Daily Progress Reports and WAN billing records, the WAN subconsultant responsible for field engineering had a crew on site for only one day in April 1997 performing a control survey to locate the building footprint. DCAM's Daily Progress Reports indicate that the subconsultant's survey crew did not return to complete the layout work for the project, but that Suffolk used its own personnel for survey work during the months of June, July, and August 1997.[1]

In an interview with the Office, the WAN project architect stated that a lack of field survey information hindered the progress of the project design. He also told the Office that the delay in obtaining field survey information stemmed from a disagreement over which party to the contract was required to pay for the work. The WAN project architect stated that he had believed that DCAM was required to provide a field survey. The cost of field survey services was not included in WAN's lump-sum design fee for the project. When it became apparent that DCAM did not have a field survey, neither Suffolk nor WAN was willing to absorb the cost, according to the WAN project architect.

The lack of adequate survey and site information appears to have affected the project schedule and cost. According to the WAN project architect, a lack of survey information impeded the ability of the civil/site design subconsultant to prepare complete and accurate construction documents. In addition, Suffolk encountered problems with the construction of the foundation walls and footings that appear to be related to the quality of the field survey work. In a letter dated April 3, 1998, WAN's structural engineering subconsultant described construction problems, including misalignment of foundation walls and footings, that necessitated additional design services and corrective construction work. Problems with the alignment of foundation walls and footings suggest poor layout control, indicative of substandard survey work.

[1] Correspondence between DCAM and Suffolk indicates that Suffolk's use of its own personnel to perform layout work violated a contract provision requiring a registered land surveyor to perform all field engineering.

Additional evidence that incomplete survey information hampered progress came from the WAN project architect, who told the Office in an interview that the design of the steam line was delayed by the lack of site utility information. The impact of steam line design delays on the project schedule is discussed in Finding 6 of this report.

3c. Suffolk's submission of flawed and incomplete civil/site construction documents contributed to project delay.

In addition to the lateness of Suffolk's submissions, their quality and completeness was called into question early in the project by DCAM and its design consultant, HKA. In particular, HKA expressed serious reservations about the civil/site drawings submitted by Suffolk on June 5, 1997.

Civil/site drawings for a building project depict an overall site plan, including a location plan for all new work in relation to established benchmarks, such as subsurface utilities. In addition, civil/site drawings provide construction details for new utility connections, roads, sidewalks, and other surface improvements, including a plan for grading and surface drainage. Complete and accurate civil/site drawings are a crucial prerequisite to construction of a building project.

The contract terms allowed DCAM two weeks to review the civil/site drawings and specifications submitted on June 5, 1997 and either accept them, reject them, or return them to Suffolk for corrections. In a memorandum dated June 16, 1997, UMass conveyed the following concerns to DCAM about the civil/site drawings and specifications submitted by Suffolk:

> The University has review[ed] these drawings and the accompanying specifications and its comments are indicated in red ink on them. The University is very concerned with the degree of completeness of these documents as they do not reflect a number of the comments made by the University on the Design Development submission nor are they any more complete than the previous submission. As submitted, the University is not convinced that work will be done in accordance with the RFP.

On June 19, 1997, HKA provided DCAM with extensive comments on problems with drainage and grading plans, including this strong recommendation against acceptance of Suffolk's submission:

> ***HKA recommends that [DCAM] does not accept the civil construction document submission.*** In addition to the obvious omission such as the landscape plan, transite pipe, etc., the grading and drainage plan does not work. In particular, the design has existing catch basin located 2'0" below grade, water draining over sidewalks, and most seriously, water draining towards the building at the south elevation. Overall, there appears to be insufficient catch basin and/or area drains. It is HKA's opinion that these grading and drainage issues are serious infrastructure related items that can not be easily changed and/or corrected at a later date.
>
> In addition, the handicap accessible parking does not comply with the intent of MAAB [Massachusetts Architectural Access Board] regarding an accessible route to the building. [Emphasis in the original]

According to the WAN project architect, the lack of survey information impeded the preparation of the civil/site design and contributed to Suffolk's problems with this required design submission.

Given the seriousness of UMass's and HKA's concerns with the civil/site design, DCAM could have required Suffolk to submit revised drawings before beginning construction. However, by mid-June, the project had been underway for three months, and Suffolk had already fallen significantly behind its proposed schedule.

Project Meeting Minutes show that DCAM did not heed HKA's recommendation not to accept Suffolk's civil/site document submission. On June 19, 1997, DCAM authorized Suffolk to commence site preparation and demolition work, despite Suffolk's failure to submit complete civil/site construction documents. DCAM returned the civil/site documents to Suffolk along with a letter dated June 19, 1997, stating:

> This letter represents a partial and conditional approval as corrected of Civil/Site Construction Documents requiring that all comments, questions and corrections be addressed and nine (9) copies of the revised drawings and specifications be resubmitted to [DCAM]. Particular attention should be paid to site grade and drainage and handicap parking. Also, Site

> Improvement and Landscaping Drawings and Specifications are missing from the package and must be submitted for [DCAM] review and approval.

In a June 24, 1997 letter to DCAM, HKA cautioned DCAM that allowing Suffolk to move forward with construction prior to completing and correcting the civil/site design carried a risk of project delay:

> As [DCAM's] technical advisor for the Project, HKA understands that it is paramount to maintain the progress of the Project schedule. However, we must advise [DCAM] that we strongly believe the partial and incomplete construction documents being submitted by Suffolk's Team for review will only delay the Project in the long term because of the serious outstanding design and coordination issues. . .

Project records indicate that Suffolk submitted revised civil/site drawings to DCAM on July 17, 1997, and again on September 9, 1997, but that DCAM did not formally approve a revised submission. According to the UMass Capital Projects Manager, the revised drawings Suffolk submitted on September 9, 1997 addressed most, but not all, of the issues identified by HKA. Among the design problems that were not adequately addressed were grading, drainage, and handicapped parking issues. Suffolk's failure to correct these design problems before proceeding with construction work ultimately contributed to project delay, as described below.

Site work and grading for the project was largely complete by September 1998. By the end of November 1998, 80 percent of the walkways, parking, and roadway surfaces had been paved. According to Project Meeting Minutes for November 12, 1998, DCAM questioned whether the grades of the sidewalks and the parking areas complied with regulations established by the state Architectural Access Board. After further investigation, WAN concluded that the grading in these areas did not satisfy the state building code requirements for handicapped accessibility. Suffolk records show that the grading was then redesigned to meet the code and that the area was excavated and repaved between April 15 and May 5, 1999. In addition to contributing to the late completion of the project, this paving rework cost Suffolk $16,023. Suffolk records show that Suffolk attributed the repaving expense to design error and deducted half of the cost – $8,012 – from design fees owed to WAN and its subconsultants.

Another site design problem became apparent on January 28, 1999, when DCAM informed Suffolk that a drainage problem was causing a pool of water to collect at the south entry of the building. To correct this condition, WAN submitted a design in March for a new trench drain to be located at the building entrance. DCAM approved the design on April 27, 1999, and Suffolk's site subcontractor installed the trench drain in May 1999 at a cost of $5,486. According to Suffolk records, Suffolk deducted the full cost of this additional work, which it attributed to design error, from fees owed to WAN and its subconsultants.

3d. Structural construction documents were delayed for five months awaiting design drawings for the third-floor and roof structure to be provided by the pre-engineered metal building systems manufacturer.

Because DCAM had elected to use the modular building procurement law for this project, proposers were required to furnish a building that met DCAM's definition of modular construction. As discussed earlier in this report, DCAM has taken the position that buildings constructed from steel columns and beams provided by a pre-engineered metal building systems manufacturer are modular buildings.

Suffolk's proposal indicated that the pre-engineered metal building system would be supplied by Star Building Systems, Inc. (Star). The WAN project architect stated in an interview with the Office that after Suffolk and WAN had selected Star for this project, WAN learned that Star designs one-story buildings only. WAN was required to design the UMass building around the limitations of Star's capabilities. Because the project called for a three-story building, WAN designed a "hybrid" building, using Star's one-story metal building system components for the third floor and roof, to be placed on top of a two-story, steel-frame structure.

Suffolk first submitted construction documents for the structural design to DCAM on June 5, 1997. However, this submission related only to the lower-level structure of the building and did not include the third-floor and roof structure. The submission indicated

that design drawings for the pre-engineered metal building systems structure would be submitted at a later stage of the project.

In a June 10, 1997 letter, HKA informed DCAM that it could not review the structural construction documents without the pre-engineered steel metal building system manufacturer's design drawings. HKA explained:

> Without the pre-engineered roof design/drawings, HKA's review team can not determine the adequacy of the lower level structure to support the pre-engineered structure.

DCAM concurred with HKA's view that the structural construction document submission was inadequate and advised Suffolk that DCAM could not commence its design review without the additional design information. In response, WAN provided DCAM with a summary of the methodology it had used to determine that the structural design would meet building code requirements.

In a June 27, 1997 letter to DCAM, HKA emphasized that the design information WAN had provided to date was inadequate and that HKA could not perform a comprehensive structural design review without design information on the pre-engineered steel third floor and roof. On July 10, despite HKA's objections to reviewing an incomplete design, DCAM directed HKA to complete a technical review of the structural design documents that had been submitted to date. On July 18, 1997, HKA provided DCAM with design comments, noting that the drawings and design calculations for the pre-engineered steel structure were still missing.

In a letter dated August 8, 1997, DCAM gave Suffolk "partial and conditional approval" of the structural construction documents, despite Suffolk's failure to submit design information on the pre-engineered steel third floor and roof. Under the terms of the contract, Suffolk needed this approval from DCAM in order to commence construction work on the building foundations.

Although DCAM waived a contract requirement to allow Suffolk to begin foundation work before the structural document submission was complete, other factors under

Suffolk's control delayed the start of foundation work beyond August 8, 1997. These factors included Suffolk's failure to submit reinforcing steel shop drawings for the foundations until September 2, 1997 and Suffolk's inability to get its concrete subcontractor on site immediately, as discussed in Finding 8.

Project records show that Suffolk began foundation work on September 22, 1997. As of that date, Suffolk had not submitted a complete structural design for the building. According to DCAM's Daily Progress Reports, Suffolk submitted a complete structural design for the pre-engineered steel portion of the building on October 9, 1997, five months later than the date shown on Suffolk's proposed schedule.

3e. Suffolk's belated decision to change subcontractors for the pre-engineered metal building system structure contributed to the delay in completing the structural design.

Suffolk's records indicate that the five-month delay in providing design information for the third-floor and roof structure was at least partly caused by Suffolk's belated decision in July 1997 to change subcontractors for the pre-engineered metal building system components.

Under Suffolk's proposal, Star would provide the pre-engineered metal building system components. As discussed in the previous subfinding, WAN designed a hybrid building that used Star's pre-engineered components for the third floor and roof only. As a result of this hybrid approach, the structural design for the first two floors was prepared by WAN's structural subconsultant, while the design information for the third-floor and roof structure was to be provided by Star.

However, Suffolk and Star were not able to reach a final agreement. More than four months after signing the contract with DCAM to undertake the Computer Science Center project, Suffolk made a decision to change subcontractors. On July 3, 1997, Suffolk entered into a contract with Chief Industries, Inc. (Chief), replacing Star as the pre-engineered metal building system manufacturer. Chief's drawings and calculations

for the third-floor and roof structure were not provided to the WAN design team until August 1997.

Finding 4. Suffolk took delivery of the structural steel five months behind schedule.

Suffolk's original schedule called for structural steel installation to begin in mid-August 1997. The timing of this work was critical to having the building closed in before winter so that interior work could proceed during the cold weather. As discussed in Finding 3, delays in construction document submissions and other factors had already caused the schedule to slip, delaying the start of the foundation work until September 1997. However, even if the foundation work had proceeded according to schedule, Suffolk's erection of the building would have been delayed by the late delivery of structural steel for the building's first two floors. Project records show that the structural steel was finally delivered on January 6, 1998, some five months behind Suffolk's projected schedule. Although the Office was unable to determine all of the reasons for this delay, correspondence between Suffolk and its structural steel supplier, Novel Iron Works, Inc. (Novel) suggests that at least part of the problem may have stemmed from Suffolk's delay in providing Novel with design information needed to fabricate the steel.

On July 3 and again on July 29, 1997, Novel wrote letters to Suffolk requesting design information on the pre-engineered metal building system structure to be placed on top of the structural steel erected by Novel. Novel's letters indicated that Novel could not guarantee a delivery date for that steel until it received the design information from Suffolk. In a letter to Novel dated September 9, 1997, Suffolk referred to a telephone conversation in which Novel had indicated that steel would not be delivered prior to December 1997 and stated that a December delivery date was unacceptable to Suffolk. In a September 15, 1997 memorandum to Suffolk, Novel provided a list of unresolved design issues delaying steel production.

In a memorandum to Suffolk dated October 15, 1997, Novel stated that it was reviewing revised structural drawings it had received on October 7, 1997. In that memorandum,

Novel indicated that Suffolk's delay in providing this design information could affect the delivery schedule for the structural steel:

> Please be advised that due to fact that we did not receive these drawing(s)[sic] in a timely manner, we cannot guarantee delivery of this project as previously discussed.

According to project records, Novel finally delivered the structural steel on January 6, 1998.

Finding 5. A dispute between Suffolk and DCAM over steam line requirements contributed to project delay.

Like other buildings on the UMass Amherst campus, the new Computer Science Center is heated by steam pumped through an underground pipe from a central steam distribution system. UMass established a policy in the 1980's of enclosing new steam line pipes in concrete tunnels rather than simply burying the pipes directly in the ground. According to the UMass Capital Projects Manager, the concrete tunnel system, although more costly to construct, has proven to be more cost-effective over time because it protects and extends the life of the iron pipe. The concrete trench system also lowers maintenance costs by facilitating pipe repairs.

The RFP contained a drawing for a steam line enclosed in a tunnel.

The RFP for the Computer Science Center contained a drawing for a steam line enclosed in a tunnel. The drawing illustrated a route for the new steam line that was approximately 712 feet in length. In addition to the drawing, the RFP contained the following written specification for the steam line:

> Pipe conduits shall be installed within poured concrete steam trenches or tunnels.

Suffolk and its design team interpreted an addendum to the RFP as a major modification that made the concrete tunnel optional.

During the RFP process, one of the prospective proposers submitted the following written question to DCAM pertaining to the steam line:

> Outside piping: How much of the piping is direct burial, and how much is in tunnel?

Under the rules set out in the RFP, all questions relating to the RFP were submitted in writing to DCAM, and DCAM's answers were incorporated into written addenda sent to all prospective proposers. The questions themselves, however, were not included in the addenda. DCAM incorporated the answer to the proposer's question about the steam line into Addendum #4 to the RFP. The single-sentence answer read as follows:

> The outside piping shall either be direct burial or in a steam tunnel (trench) as shown on the Drawings.

In an interview with this Office, the WAN project architect said that he interpreted this sentence in Addendum #4 to alter the meaning of both the written specification and the drawing in the RFP depicting a concrete tunnel. The WAN project architect said that in his opinion, Addendum #4 allowed proposers to provide either a steam line in a concrete tunnel or a steam line that was directly buried for its entire length. The WAN project architect said that because a concrete tunnel would add considerably to the cost of the project, Suffolk elected to submit a price based on direct burial of the entire length of the steam line.

According to the UMass Capital Projects Manager, the WAN project architect's interpretation of Addendum #4 was a misreading. In an interview with the Office, he noted that the RFP drawing showed a relatively short length of pipe from the building to the first manhole that was directly buried, with the remainder of the pipe enclosed in a tunnel. The UMass Capital Projects Manager contended that the phrase "as shown on the Drawings" in Addendum #4 referred to the entire sentence; hence, the addendum was consistent with the drawing. Both the addendum and the drawing called for direct burial to the first manhole and a tunnel for the remainder of the steam line.

The UMass Capital Projects Manager argued that if Addendum #4 were interpreted to permit the entire steam line to be directly buried, the addendum would be inconsistent with the drawing. He maintained that Addendum #4 should be read in conjunction with

the drawing depicting the tunnel. This argument is supported by the RFP rules for interpreting conflicts in plans and specifications. The RFP stated:

> In the event that there is a conflict between the specifications and any other part of the RFP, the most stringent requirement given in the RFP, either in the Drawings, Room Data Sheets, Specifications or elsewhere in the RFP, shall take precedence and govern the work.
>
> In cases of discrepancy amongst the various RFP Documents which have not been clarified by Addenda, the greatest quantity or more costly interpretations shall be included in the Price Proposal.

Following this rule, if the change in specifications introduced in Addendum #4 created an inconsistency between the written specification and the drawing, the inconsistency should have been resolved by reference to the RFP drawing because it contained the more stringent and costly requirement – the tunnel.

In selecting Suffolk's proposal, DCAM was not aware that Suffolk did not intend to build a concrete tunnel for the steam line.

During the proposal evaluation process, neither UMass nor DCAM believed that Addendum #4 had modified the steam line tunnel requirement. Neither Suffolk nor any other proposer asked for clarification of the addendum, and project records indicate that UMass and DCAM were of the opinion that the requirement for a concrete tunnel was clearly specified. In fact, one proposal, rejected by DCAM, was rejected in part because it stated that the proposer planned to install a direct buried steam line.

Suffolk's proposal was vague about how the proposed steam line would be constructed. The specification section of Suffolk's proposal largely repeated the steam line requirements in the RFP but deleted a sentence stating that the pipe would be installed within a poured concrete steam tunnel. Suffolk's proposal also stated:

> Steam supply system shall comply with all University standards and requirements and the RFP including Addendum No. 4.

On May 19, 1997, three months after executing the Computer Science Center contract, Suffolk wrote to DCAM to state Suffolk's intention regarding the steam line:

> Consistent with the contract and specifically Addendum #4, we are writing to inform [DCAM] of our intention to install a direct buried steam system at the Engineering and Computer Science Complex. The submittals for this work will be arriving by mid June 1997 and installations to begin by late July 1997.

In response, DCAM wrote a letter dated May 20, 1997, disputing Suffolk's interpretation of Addendum #4 and stating DCAM's position that the contract required a concrete tunnel encasing the steam line:

> [I]t is [DCAM's] position that the contract, including but not limited to the RFP and all addenda to the RFP, clearly calls for all underground steam lines to be run in a new cast-in-place concrete tunnel and a review of Suffolk's proposal indicates that a steam tunnel was included in the proposed scope.
>
> [DCAM] fully expects that the design and installation of a cast in place concrete steam tunnel will be included in the project without delay or added cost.

DCAM asked Suffolk to submit a proposed change order for rerouting the steam line and encasing it in a concrete tunnel.

As discussed earlier in this report, UMass had requested a change in the routing of the steam line in December 1996, prior to the award of a contract to Suffolk. The route depicted in the RFP entailed 712 feet of steam line piping; the revised route requested by UMass would increase the length to approximately 947 feet. Suffolk had reviewed the new route proposed by UMass and had indicated in a January 3, 1997 letter that the added cost for the longer steam line would be $146,000. As of May 20, 1997, when DCAM informed Suffolk of its position that Suffolk was required to build concrete tunnel at no additional cost, Suffolk had not yet submitted a proposed change order for the revised steam line route.

In a letter to DCAM dated May 27, 1997, Suffolk provided a cost estimate of $755,000 for steam line changes, including the cost for rerouting the steam line and the cost for designing and constructing a concrete tunnel. This cost estimate did not include design information for the proposed steam line and tunnel.

DCAM did not continue to argue for the position stated in its May 20, 1997 letter: i.e., that Suffolk was required under the contract to build a concrete tunnel at no additional cost. Project records provide no explanation for DCAM's reversal on this issue; however, by June 1997, DCAM appeared to take the position that Suffolk was entitled to additional compensation to cover the cost of a concrete tunnel.

In a letter dated June 20, 1997, DCAM instructed Suffolk to submit a proposed change order with a design for the steam line and tunnel, as required under the change order provisions of DCAM's contract.

5a. Suffolk took six months to submit a design for the rerouted steam line in a concrete tunnel.

After DCAM's June 20, 1997 request, Suffolk did not submit a design for the steam line relocation and tunnel until January 7, 1998. It appears that the long delay in submitting the design may have been caused in part by Suffolk's failure to obtain site information in a timely fashion. In a letter dated June 4, 1997, WAN's mechanical engineering subconsultant advised WAN that it did not have information showing the elevations of buried utilities that intersected the proposed steam line route. The locations of these buried utilities were crucial to the steam line design, yet project records show that Suffolk did not begin to dig test pits to determine utility locations and elevations until August 1, 1997. Although Suffolk would later assert in its claim that DCAM was responsible for providing site information, the DCAM contract clearly placed the responsibility with Suffolk. Specifically, the contract stated that DCAM would furnish *available* surveys but did not guarantee their accuracy. The contract further specified that if Suffolk deemed the information furnished by DCAM to be inadequate, it was Suffolk's responsibility to perform or contract for additional site investigation and survey services at its own expense.

By July 1997, Suffolk appeared to be impatient with WAN's pace in producing a design for the steam line tunnel. In a letter dated July 14, 1997, Suffolk reminded WAN that Suffolk was waiting for design parameters in order to prepare a proposed change order. Specifically, Suffolk asked WAN to provide design details such as wall thickness,

waterproofing types, and soils information to allow Suffolk to develop its proposed change order price for the tunnel. WAN replied in a letter dated July 21, 1997 that it was forwarding construction drawings for a related UMass project, showing the University's standard construction for underground steam lines. This information, however, was apparently not adequate to permit Suffolk to prepare a proposed change order price.

In a memorandum dated August 19, 1997, Suffolk asked WAN to confirm a date when the steam line tunnel design would be completed for pricing purposes. WAN responded in a letter dated August 20, 1997 that the design would be complete by September 30, 1997. Suffolk's internal records indicate that as of September 23, 1997, Suffolk expected steam line design documents to be ready for pricing by October 1, 1997, thereby allowing Suffolk to submit a proposed change order price to DCAM on October 14, 1997.

Project records show that for a brief period, DCAM considered eliminating the steam line from Suffolk's contract in order to seek bids from other contractors for the work. According to Suffolk Project Manager's Meeting notes dated October 13, 1997, however, Suffolk's President and DCAM officials had held a meeting, resulting in a decision by DCAM to keep the steam line in Suffolk's contract.

On January 7, 1998, Suffolk submitted a proposed change order with a design and a proposed price of $1,244,600 for a rerouted steam line and tunnel. Suffolk's proposed price for the steam line changes was 65 percent higher than the $755,000 cost estimate Suffolk had submitted six months earlier.

5b. DCAM took four months to review Suffolk's proposed change order for rerouting the steam line and enclosing it in a concrete tunnel.

After receiving Suffolk's $1,244,600 proposed change order, DCAM was faced with a major decision. This single proposed change order would increase the cost of Suffolk's initial contract by nearly 13 percent. Moreover, a major purpose of the change order

was to provide a design quality standard – a concrete tunnel – that both UMass and DCAM believed had been included in Suffolk's contract price when the contract was originally executed. Confronted with a major contract price increase, DCAM contracted in February 1998 with a cost estimating consultant, Tishman Construction Corporation of Massachusetts (Tishman) to perform an analysis of Suffolk's proposed change order. Between February 10 and April 30, 1998, Tishman reviewed specifications, prepared cost estimates, requested supporting documentation for Suffolk's cost calculations, and met with DCAM, Suffolk, and Suffolk subcontractors to evaluate the reasonableness of the proposed change order price.

After Tishman's analysis was complete, DCAM determined that the proposed change order price was too high. DCAM rejected the proposed change order on May 8, 1998, four months after Suffolk had submitted it.

5c. Tishman concluded that Suffolk's proposed change order price for the steam line was inflated by more than $400,000.

At DCAM's request, Tishman prepared a cost estimate based on specifications for both a direct buried steam line following the route shown in the RFP drawing and another estimate for a steam line following the longer, revised route and enclosed in a concrete tunnel.

On April 2, 1998, Tishman submitted estimates to DCAM indicating that the rerouted steam line in a concrete tunnel should cost $1,299,953 to build and that the direct buried steam line carried in Suffolk's original contract price should cost $596,305. According to Tishman, a reasonable price for Suffolk's proposed change order would therefore have been the cost differential between these two steam line alternatives, or $703,648.

Suffolk's proposed change order contained a total cost of $1,413,600 for constructing the rerouted steam line in a concrete tunnel, a figure that was only 15% higher than Tishman's estimate. However, Suffolk contended that the total cost carried in its proposal for the direct buried steam line was only $169,000, compared with the

Tishman estimate of $596,305. After reviewing Suffolk's documentation for its cost calculations, Tishman concluded that the $169,000 credit offered by Suffolk did not reflect a realistic price for building the direct buried steam line specified in the RFP.

According to an April 30, 1998 letter from Tishman to DCAM, Tishman met with DCAM, Suffolk and two Suffolk subcontractors on April 24, 1998 to discuss the difference between Tishman's estimate of $596,305 for the RFP steam line and Suffolk's proposed credit of $169,000. In the letter to DCAM, Tishman's Chief Estimator stated that several items in the RFP plans and specifications for the project were not addressed in Suffolk's proposed credit, including the cost of concrete manholes, general conditions items, and demolition, temporary construction and site preparation items. The letter stated that:

> The credit established by way of the Suffolk Construction Company's PCO #1, was not established according to the way the plans [in the RFP] were drawn or the specifications written. . .
>
> In reviewing this PCO with construction executives at Tishman Construction Company, if the Contractor was not directed by persons in authority on this project to alter the project's proposal, the risk of submitting a bid that does not meet the plans and specifications is all on the Contractor. They (Suffolk Construction) still owe [DCAM] and UMass-Amherst what is shown on the plans and specifications unless directed otherwise. If the originally proposed steam line is removed from the project, they owe, as a credit, the full value of the originally proposed steam line. . .
>
> Please note that though the contractors involved chose to take a risk and submit proposals not reflecting the plans and specifications of the original work, they appear to have submitted proposals reflecting the full values for the plans and specifications for the additional work claimed.

Tishman concluded that Suffolk's proposed change order price was not reasonable because it did not reflect a realistic credit for the work that Suffolk should have included in its proposal price.

After considering the Tishman analysis and cost estimates, DCAM determined that Suffolk's proposed change order price of $1,244,600 was too high.

DCAM rejected Suffolk's proposed change order and directed Suffolk to proceed with a direct buried steam line.

On May 8, 1998, DCAM wrote to Suffolk to confirm that Suffolk's proposed change order for the steam line concrete tunnel had been rejected because the price was too high. In the same letter, DCAM directed Suffolk to proceed with design and construction of a direct buried steam line "as per your RFP proposal."

Finding 6. Suffolk's work on the steam line was fraught with delay and error.

After DCAM directed Suffolk on May 8, 1998 to proceed with the steam line in accordance with Suffolk's proposal, both DCAM and Suffolk expected the design work to be completed promptly so that steam line construction could proceed before winter weather set in. Instead, Suffolk again delayed the project by failing to develop the steam line design in a timely manner.

6a. Suffolk and the WAN design team spent six months redesigning the steam line.

According to minutes of Suffolk's Project Manager's Meeting on May 26, 1998, Suffolk expected WAN's design work on the direct buried steam line to be completed by June 30, 1998. The minutes indicate that Suffolk projected the completion of the steam line itself by mid-December 1998.

On May 28, 1998, representatives of UMass, DCAM, Suffolk, and WAN discussed possible alternative routes for the direct buried steam line and established a preferred route, according to Project Meeting Minutes. On June 17, 1998 Suffolk provided DCAM with a progress drawing for the direct buried steam line. On June 18, 1998, Suffolk requested permission to dig test pits to aid in the design of the steam line route. DCAM granted this approval on June 23, 1998.

According to the Project Meeting Minutes for July 2, 1998, DCAM, UMass, and Suffolk agreed at that meeting on a steam line schedule that required WAN to complete the design work on the steam line by July 17, 1998. The same schedule called for Suffolk to begin construction on the steam line on September 21, 1998, and to complete the steam line by January 1, 1999.

Project Meeting Minutes dated July 17, 1998 show that WAN had not completed the steam line design in accordance with the schedule set on July 2, 1998. The minutes indicate that WAN planned to distribute progress prints of civil and mechanical drawings for the steam line by the following week. However, project records show that WAN did not submit revised civil drawings until August 6, 1998. Project Meeting Minutes dated August 6, 1998 noted that the structural drawings for the steam line were still in progress.

Between August 21 and 28, 1998, Suffolk performed additional field surveys to confirm as-built information. Project Meeting Minutes dated August 27, 1998 indicate that Suffolk was then projecting an increased cost for installation of the steam line because of the need to avoid conflict with existing underground utilities. The minutes stated that a less expensive alternative configuration was discussed and that WAN's design team would prepare preliminary sketches for review. Those rough sketches were transmitted to DCAM on August 28, 1997. The DCAM Daily Progress Report for August 28, 1997, noting that Suffolk's late design revisions could produce further delay, observed:

> Suffolk is just now looking into options to reduce their cost on construction of the steamline.

Suffolk's decision to change the steam line route necessitated additional test pits to determine the location of underground utilities in the path. An August 31, 1998 memorandum from Suffolk to DCAM stated that UMass had rejected a request by Suffolk to dig additional test pits. However, Project Meeting Minutes for September 3, 1998 stated that UMass did not object to digging of test pits, provided that the excavations were backfilled. During that meeting, DCAM made it clear that Suffolk had made the decision to change the route and that DCAM would approve no additional payments for steam line routing that varied from the routing shown in Suffolk's proposal.

Project Meeting Minutes dated September 10, 1998 indicate that test pits to determine the location of utilities in the proposed alternative steam line route were in progress at that time. According to an internal Suffolk memorandum dated September 14, 1998, Suffolk was then projecting completion of the steam line by January 11, 1999.

Suffolk notified DCAM that the steam line would cost more than anticipated.

In a letter dated September 11, 1998, Suffolk notified DCAM that design criteria provided by UMass for the direct buried steam line were "above our RFP submission" and would require additional pipe, excavation, valves, gauges, and other items totaling an estimated $200,000. In a separate memorandum sent to DCAM on that same day, Suffolk stated that it would cost $20,000 to $25,000 to install steam lines to the first manhole across from an adjacent building, as UMass had requested. In a memorandum to DCAM dated September 14, 1998, UMass objected to allowing a change order for this feature, arguing that it did not represent a change to the RFP design requirements. In a September 14, 1998 letter to Suffolk, DCAM concurred with UMass, making it clear that DCAM did not consider the steam line design features identified by Suffolk to be changes in the work required under Suffolk's contract. DCAM's letter directed Suffolk to install the steam line, as requested by UMass, at no additional cost. DCAM added:

> This is a design-build project and Suffolk is required to get steam from a source as indicated in the RFP and deliver the steam to the new building you are constructing as indicated in the RFP.

Although DCAM had directed Suffolk to proceed with the steam line design included in Suffolk's proposal, Suffolk would continue to insist that the design had changed radically, increasing the cost of the work. Suffolk would later submit another proposed change order, PCO #65, for this work as discussed in Finding 7 below. In addition, Suffolk would eventually file a claim after the project was completed, seeking additional compensation for building the steam line, as discussed in Finding 12.

On September 15, 1998, DCAM sent a letter advising Suffolk that DCAM had approved Suffolk's steam line drawings, with comments, and directing Suffolk to proceed with the work at once. However, Suffolk's records indicate that Suffolk continued to initiate design changes. According to an internal Suffolk memorandum, Suffolk convened a meeting with DCAM, UMass, Suffolk's mechanical and site subcontractors, and the WAN designers on September 22, 1998 to seek agreement on additional design changes, including reducing the number of manholes from five to four.

On November 5, 1998, Suffolk again submitted revised steam line drawings to DCAM, according to Project Meeting Minutes. By this date, six months had elapsed since DCAM had first directed Suffolk to proceed with the direct buried steam line. Suffolk's delay in producing the steam line design had now foreclosed the possibility of completing the steam line work before winter weather conditions set in.

Billing records from WAN's structural engineering subconsultant indicate that Suffolk and the WAN design team continued to make design modifications, revising the steam line manhole design during the months of December 1998 and January 1999.

6b. Suffolk's failure to coordinate its subcontractors' work produced delays in steam line construction.

According to DCAM Daily Progress Reports, Suffolk began excavation work for the steam line in October 1998, and started construction of the formwork for concrete steam line manholes in early November 1998. Project records show that Suffolk's subcontractor coordination problems hindered progress on the steam line. The mechanical subcontractor selected by Suffolk to install the piping system in the steam line trench, N.B. Kenney Company, Inc., (Kenney) had originally projected a start date for its work of December 14, 1998, according to a November 25, 1998 memorandum to Suffolk. The start date was subsequently moved to December 28, 1998. Kenney wrote a memorandum to Suffolk on December 24, 1998, expressing concern over Suffolk's scheduling and coordination of steam line work:

> I am concerned that with the installation scheduled to begin next week that no clear direction has been given as to how, when, who and where certain functions will be performed. Functions such as protection of open trenches to prevent freezing, what procedures will be taken when trenches do freeze, the sequence of events that will be required to effectively and efficiently perform the work and who is going to pay for the inevitable extra costs that will be incurred due to the time of year that this installation is taking place.

Kenney's concern about the steam line schedule appears to have been well founded. The start date for the mechanical work was postponed again until January 11, 1998.

On January 18, 1999, Kenney wrote to Suffolk to express frustration at Suffolk's failure to coordinate work:

> As of today, N.B. Kenney Company had four people on site trying to find things to do to "keep busy" as manhole #1 is still not stripped and ready to work in and the trench is saturated to the point we can not lay any pipe. . . . The site contractor was on site and proceeding to backfill the manhole and said that tomorrow they would place some stone in the trench so we could start placing pipe. The point is that N.B. Kenney geared up manpower, materials and machinery for January 11, 1999, per your direction and to date has not been able to do anything productive.[2]

Two days later, Kenney again wrote to Suffolk to complain about coordination issues. The January 20, 1999 letter stated:

> I again received another call from my foreman on site stating that no work had been performed in manhole #1 and the forms are still not stripped preventing us from working this area. In addition the site contractor is not on site preventing us from installing any pipe in the trench from manhole #1 to manhole #2. . . . I will again state to you that Suffolk has made a commitment to work with us to get this very sensitive project completed and have it run smoothly and efficiently for everyone concerned. As of this date you have not fulfilled your commitment.

Suffolk's work on the steam line progressed in January and February 1999, as the site subcontractor continued to excavate the trench and to backfill, while Kenney installed the steam line pipe. In a letter to Suffolk dated February 25, 1999, Kenney again criticized Suffolk's poor coordination efforts:

> During our meetings prior to this work commencing Suffolk Construction agreed to do whatever was needed to ensure that this installation goes as efficiently and safely as possible. To date this had not occurred. N.B. Kenney Company has had to endure a multitude of additional costs due to Suffolk's contractual problems with their subcontractors. These costs include dewatering the trench so welding procedures could continue, shoveling our own dirt and mud to continue with the piping installation due

[2] Suffolk notified H.W. General Construction, Inc., Suffolk's concrete and formwork subcontractor, on January 12, 1999 that it had defaulted by abandoning its work on steam line manholes. (As noted in Finding 8, Suffolk hired H.W. General Construction to replace Newbury as the concrete and formwork subcontractor after Newbury allegedly abandoned the project in January 1998.)

> to the lack of laborers supplied, and waiting on trench and manholes that were not ready which resulting in lost time to name a few.

DCAM's Daily Progress Reports show that on April 7, 1999, the new steam line was connected to the live main and that as of April 16, 1999, the steam line installation work was completed.

6c. Errors by Suffolk's designers further delayed completion of the steam line.

According to Suffolk's projected schedule, live steam was to be delivered to the building by the week of April 19, 1999. However, internal Suffolk meeting notes dated April 15, 1999, identified a "design issue" with the steam line, which threatened to delay the start of its operation. The DCAM Daily Progress Report for April 16, 1999 also flagged the problem:

> [S]team cannot be turned on from [manhole #] 4 until TMP [WAN's mechanical engineering subconsultant] designs anchor and hold for existing steam pipe at Polymer Center tie-in.

This design omission delayed the completion of the steam line for another month. WAN's mechanical engineering subconsultant prepared drawings to correct the design problem, and on May 3, 1999, Suffolk's site subcontractor excavated to expose the steam pipe anchor and prepare it for removal. The steam line anchor was connected to the new anchor, and the steam line was successfully activated on May 13, 1999, approximately one month later.

But a new design-related problem had become apparent on May 19, 1999. The DCAM Daily Progress Report for that day stated that the elbow at the tie-in was filling with water and not allowing steam to pass into manhole # 4. Internal Suffolk meeting notes for May 24, 1999 stated:

> TMP [the mechanical design subconsultant] has informed Suffolk that their design has created a low point to the system. TMP is now requiring a drain/trap be added to this line. This will involve major work to excavate, add the trap, build a manhole and restore the patio.

A June 9, 1999 memorandum from Suffolk to DCAM stated that Suffolk intended to concurrently develop the structural design for the new manhole and begin excavation work. DCAM Daily Progress Reports indicate that Suffolk's site subcontractor began excavation on June 18, 1999 and that Suffolk completed the corrective work for the steam system on or about July 21, 1999, more than 10 months after the contract completion deadline for the Computer Science Center project.

Suffolk's records show that Suffolk attributed the cost for constructing the new manhole to design error and deducted $30,000 from WAN's design fee to recover this expense.

Finding 7. Suffolk and its mechanical subcontractor entered into an agreement to split the subcontractor's change order payment.

Suffolk's initial subcontract with its plumbing subcontractor, N.B. Kenney Company, called for Kenney to perform all of the plumbing and HVAC work, including the installation of steam line piping, for a lump-sum price of $2,090,000. This subcontract was executed in August 1997, at a time when Suffolk was preparing a proposed change order price for rerouting the steam line and building a concrete tunnel. Kenney's subcontract price was therefore based on the longer, alternate steam line route that UMass had requested rather than on the shorter route indicated in the RFP. After DCAM rejected Suffolk's $1.2 million proposed change order in May 1998 and directed Suffolk to install the steam line according to the RFP route, Suffolk determined that Kenney's subcontract price should be reduced to reflect the shorter route. However, as the steam line design developed over the summer and fall of 1998, Kenney advised Suffolk that other changes to the specifications had increased the cost of Kenney's work and that Kenney was entitled to additional compensation.

Suffolk disagreed with Kenney's proposed price for changes to the steam line work.

Representatives of Suffolk and Kenney met on October 6, 1998 to discuss the dollar amount of the change order Kenney was entitled to for changes in the steam line specifications. According to the minutes of that meeting, Suffolk asked Kenney to prepare a proposed price for the final, revised steam line specifications and a credit for the steam line work included in Kenney's original subcontract price. Pursuant to that

request, Kenney submitted a proposed price of $376,605 for the revised steam line and offered Suffolk a credit of $157,819. Based on these cost estimates, Kenney calculated that it was due a change order from Suffolk increasing its subcontract price by $218,786 for the increased cost of the steam line work.

In a memorandum dated January 6, 1999, Suffolk's project manager informed Kenney that Suffolk considered the credit Kenney offered for the original subcontract work – $157,818 – to be too low. According to the memorandum, Suffolk's own cost estimates indicated that Suffolk was due a credit from Kenney of approximately $210,000 under its subcontract with Kenney. Using Kenney's proposed price of $376,605 for the revised steam line and Suffolk's own estimate of the cost of Kenney's original subcontract work, Suffolk concluded that Kenney was entitled to a change order amount of only $166,605 for increased costs, rather than the $218,786 that Kenney had calculated.

Suffolk and Kenney entered into an agreement under which Suffolk would receive a portion of the change order payment for Kenney's increased costs.

Project records indicate that Kenney was reluctant to begin work on the steam line until Suffolk agreed that Kenney was entitled to increased compensation for the changed specifications. In an apparent effort to settle their disagreement over the amount of extra compensation Kenney was owed, Suffolk and Kenney negotiated and signed an agreement, dated January 8, 1999, to split the change order payment approved by DCAM for Kenney's portion of the steam line work. This agreement called for Kenney to receive the first $110,000, for Suffolk to receive the next $90,000, and for Kenney and Suffolk to divide evenly any amount over $200,000.

In an interview, a Kenney official told the Office that he signed the change order splitting agreement with Suffolk because he believed a written agreement was necessary to ensure that Kenney would be compensated for its increased costs. A Suffolk official told the Office that in Suffolk's view, the change order splitting agreement was devised as a means to give Suffolk a credit for the steam line work included in Kenney's original subcontract price. However, the Office's review shows that the practical effect of the change order splitting agreement was to allow Suffolk to pay Kenney less than the

amount to which Kenney would have otherwise been entitled under the subcontract, as discussed below.

Suffolk submitted a proposed change order to DCAM that included $252,240 for Kenney's increased costs resulting from changes in the steam line work.

On January 19, 1999, Suffolk submitted a proposed change order designated PCO #65, seeking a total of $742,079 for increased costs it claimed it would incur as a result of changes to the RFP specifications for the steam line.[3] Of this amount, $252,240 represented changes in the work to be performed by Kenney.

Had DCAM approved the $252,240 included in PCO #65 for Kenney's work, Suffolk would have owed Kenney either $166,605 or $218,786 under the parties' original subcontract, depending on whether Kenney owed Suffolk a credit of $210,000, as Suffolk claimed, or $157,819, as Kenney calculated, for steam line work under their original subcontract. In contrast, the change order splitting agreement would allow Suffolk to pay Kenney only $136,120 out of the same approved change order payment.[4]

DCAM approved $83,432 of the costs requested in PCO #65.

DCAM reviewed all of the $742,079 in extra costs sought by Suffolk in PCO #65 and determined that most of the costs did not result from a change in the work required under the RFP. On April 13, 1999, DCAM issued a change order approving $83,432 of the amount requested by Suffolk.

DCAM's analysis of PCO #65 shows that it disallowed additional costs requested for design work, excavation, and other expenses. The $83,432 approved by DCAM consisted of $78,373 in additional steam line piping costs for Kenney plus a 20 percent

[3] Suffolk made a mathematical error by subtracting a $124,365 credit for Kenney's RFP work twice in computing the proposed change order total. Had Suffolk corrected this error, the total amount sought in PCO #65 would have been more than $742,079.

[4] These calculations of amounts Suffolk and Kenney would receive for approved change order work do not include an overhead and profit markup.

overhead and profit markup.[5] Under the change order splitting agreement between Suffolk and Kenney, Kenney was entitled to the first $110,000 of the approved change order; Suffolk should therefore have paid Kenney the entire $83,432 amount. Instead, Suffolk rejected the $83,432 change order approved by DCAM.

Kenney's claim for payment for increased steam line costs would later be incorporated into Suffolk's $2.7 million claim to DCAM. The change order splitting agreement, which was not disclosed to DCAM, entitled Suffolk to half of any amount over $200,000 and therefore provided Suffolk with an incentive to maximize the amount of Kenney's claim, as discussed in Finding 12 of this report.

Finding 8. Suffolk's problems with its concrete subcontractor affected construction quality and may have contributed to project delay.

Suffolk's contract with DCAM contained a scope of work for cast-in-place concrete work for the project, including building foundations and footings. The contract required Suffolk to prepare a 12-foot-by-12-foot, mock-up foundation wall as a sample to illustrate the quality of the concrete work for the exposed portions of the foundation. Under the contract, Suffolk was required to obtain DCAM's approval of the sample mock-up wall before proceeding with concrete foundation work.

On February 18, 1997, Suffolk signed a subcontract with Newbury Constructors, Inc. (Newbury) with a lump-sum price of $339,273 to provide the concrete work called for in Suffolk's contract with DCAM. Suffolk's original proposed schedule called for the foundation work to be completed in just over one month, starting on June 18, 1997 and finishing on July 29, 1997. However, Newbury did not begin foundation work until mid-September and had not fully completed the work when it stopped work four and one-half months later on January 30, 1998.

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[5] The DCAM contract provided for an overhead and profit markup of 20 percent of the cost of labor and materials on change order work. Neither the DCAM contract nor the subcontract between Suffolk and Kenney specified how the 20 percent markup would be allocated between Suffolk and Kenney. A Kenney official told the Office in an interview that the parties had agreed that Kenney would receive 15 percent of its costs for overhead and profit and Suffolk would receive 5 percent.

On June 17, 1997, Newbury started work on the mock-up wall. On June 23, UMass inspected it and wrote a memorandum to DCAM stating that the concrete portion of the mock-up was unacceptable. UMass noted that the concrete was gray rather than white, the color required by the project specifications, and that there were voids in the exposed surface. The DCAM Daily Progress Report for June 23, 1997 noted that the surface planes of the mock-up were not level, plumb, or square; that the formwork used was damaged and did not provide square corners; and that there were many voids in the finished wall. DCAM notified Suffolk on June 25, 1997 that DCAM had rejected the sample wall.

According to the DCAM Daily Progress Reports, Newbury began to repair and patch the mock-up wall on June 30, 1997, until Suffolk informed Newbury that repairing the sample was not a satisfactory solution and that a new mock-up wall would be necessary. Project records show that Newbury did not return to the site to build a new mock-up wall until August 7, 1997.

Project records suggest several possible reasons for the long delay in constructing a new mock-up wall.[6] A series of letters between Suffolk and Newbury from July 14 to July 30, 1997 indicate that Suffolk and Newbury were embroiled in a dispute over Newbury's right to be paid for its work, notwithstanding DCAM's rejection of the mock-up wall. In a letter to Suffolk dated July 29, 1997, Newbury contended that Suffolk was "at least 50 percent responsible for . . . the ultimate rejection of the Mock-Up." Newbury claimed that the mock-up was difficult to "set/level" because of adverse site conditions and that Newbury had been advised by Suffolk personnel at the Project site to order standard, gray concrete. This correspondence suggests that the dispute between Suffolk and Newbury over payment may have been a factor in delaying Newbury's resumption of work. In addition, Project Meeting Minutes for July 31, 1997 report that the second mock-up wall was delayed by Suffolk's materials procurement problems.

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[6] Suffolk's problems with the mock-up wall were not the only cause of the long delay in starting foundation work on the project. As discussed in Finding 3d, Suffolk's delay in submitting structural design documents also delayed the start of foundation work.

On August 7, 1997, Newbury returned to the site to resume work on the mock-up wall. Project records show that Newbury finished the second mock-up wall on August 11, 1997. This mock-up wall was subsequently accepted by DCAM.

As discussed in Finding 3d, Suffolk submitted reinforcing steel shop drawings for concrete work on September 2, 1997. DCAM approved this submittal on September 5, 1997 and authorized Suffolk to begin foundation work.

According to a letter from Newbury to Suffolk, Suffolk called Newbury on September 12, 1997 to ask Newbury to begin work on the foundations on the following Monday, September 14. Newbury's letter stated that Newbury's crew would not be available until the following week. In a subsequent letter dated September 17, 1997, Newbury noted that its crew had been prevented from starting work on the UMass project during April and May 1997 and was now working on another unrelated project.

Two days later, on September 19, 1997, Suffolk wrote to Newbury pointing out that Newbury had still not begun the foundation work and threatening to exercise its right to use another subcontractor to perform the work. On September 22, Newbury started erecting forms for the foundation, according to a DCAM Daily Progress Report. As of the end of September 1997, completion of the foundation work was projected for October 24, according to Suffolk Project Manager's Meeting notes for September 30.

By late October 1997, concerns about workmanship arose again. In an October 20, 1997 memorandum to DCAM, UMass objected to the quality of Newbury's work on the foundation walls. UMass noted that the work did not meet "agreed upon standards for finished appearance." In a letter dated October 20, 1997, DCAM advised Suffolk that any concrete foundation walls poured after that date and prior to DCAM's acceptance of Suffolk's resolution to the problems noted by UMass would be done at Suffolk's risk. In an October 20, 1997 memorandum, Newbury acknowledged the quality problem with the wall and attributed it to the concrete mix and to problems with the form liners.

On October 22, 1997, Suffolk wrote to DCAM proposing to repair the concrete foundation walls. The letter included step-by-step methods for repairing and patching

"bug holes" and "rat holes" in the concrete surface. Two days later, on October 24, 1997, DCAM responded by instructing Suffolk to proceed with the repairs. The letter included the following warning:

> [DCAM] is very concerned with the poor quality of work on a relatively simple concrete pour such as this wall. The major work to date has been site work and concrete work. Both [DCAM] and [UMass] are not pleased with the direction the work is taking. Having to repair work, redo work and reschedule work is not to anyone's advantage. We expect to see substantial improvement in the way this job is conducted in the future.

According to project records, DCAM continued to point out problems with the quality of the concrete foundation work. DCAM wrote to Suffolk again on October 30, 1997, stating:

> To date not one item of work promised in your October 22 letter has been completed. Not only is [DCAM] still concerned with the poor quality of concrete finish, we are also concerned with Suffolk's total lack of commitment.

On November 6, 1997, Suffolk provided DCAM with samples to show its proposed method for repairing foundation walls, according to Project Meeting Minutes for that date. This method involved applying a coating to the concrete to fill in and disguise defects in the surface finish. The minutes state that DCAM found the appearance of the sample repairs acceptable but did not formally approve the repair method because of concerns about the durability of the finish. In a letter dated November 7, 1997, HKA wrote to DCAM stating that short of tearing down the foundation walls and starting over again, the repair method proposed by Suffolk, known as "pargeting," was a reasonable corrective method to achieve the desired finish on the walls. However, the HKA letter added that DCAM should seek a credit from Suffolk:

> [HKA] must advise [DCAM] that the overall life cycle of a parged finish is inferior to the rubbed finish originally specified for the architectural concrete. [HKA] suggests that [DCAM] request a credit and/or establish an agreement with the Contractor to set aside moneys for future maintenance of the parging.

In a letter to WAN dated November 11, 1997, Suffolk detailed its "most acceptable" patch repairs to the foundation walls. The proposed repair process involved applying an acrylic latex bonding agent to fill in and disguise holes. In addition, some of the foundation walls were out of plumb and required cutting with a diamond concrete saw to allow the placement of the metal building panels.

On November 17, 1997, Suffolk notified Newbury that it would reduce its next payment to Newbury for the foundation installation in light of DCAM's decision to reduce DCAM's payment to Suffolk for the foundation walls. The letter also stated that Suffolk would deduct the cost of foundation repairs from Newbury's payment.

DCAM wrote to Suffolk on December 5, 1997 to confirm that Suffolk had agreed to repair the south wall by saw cutting and patching or pargeting it, to repair the east wall, and to prepare wall finish samples at various locations, and that all of these tasks would be completed prior to December 11. DCAM's letter rebuked Suffolk for its handling of the concrete wall repairs:

> This whole concrete wall repair issue has slipped two weeks. You have now made the steel erection contingent upon repairing the wall. This is a ridiculous situation to be in. It appears to [DCAM] and [UMass] that Suffolk must give this project much more top-level attention than has been given in the past.

In a letter to Suffolk dated December 12, 1997, DCAM complained that Suffolk had failed to meet the agreed-upon December 11 deadline for making saw-cut repairs to the foundation walls. According to DCAM's letter, Suffolk had now agreed to have a sample sawcut and proposed wall finish ready for review by December 18, 1997. If the sample were not approved, DCAM's letter stated, Suffolk would be required to remove the existing foundation walls and start all over again. In addition, DCAM's letter stated that a new mock-up for the wall system that was to have been ready for inspection on December 11, 1997 had been so poorly done that the designer had refused to present it to DCAM for review.

In late December 1997, UMass inspected a concrete sample that had been covered with the finish to disguise holes and found it to be acceptable, according to December

22, 1997 Project Meeting Minutes. However, in a letter dated December 29, 1997, DCAM advised Suffolk that applying a very thick, built-up finish was not an acceptable method for repairing one of the foundation walls, which was out of plumb by three-quarters of an inch and leaning to the west.

Newbury continued as Suffolk's concrete subcontractor on the project until January 30, 1998. In a subsequent claim for payment, Newbury stated that it had substantially completed its work on January 23, 1998. Suffolk disputed this contention.

Although Newbury did no further work on the project after January 30, 1998, repair work on the foundations was far from complete at that time. As of March 23, 1998, Suffolk was preparing shop drawings detailing proposed materials and procedures for corrective concrete finishing on the foundations, according Project Meeting Minutes for that day. On March 23, 1998, Suffolk wrote to Newbury indicating that Suffolk expected Newbury to return to the job to complete an area way wall and punchlist work. Newbury did not return to complete the work, however, and on April 17, 1998, Suffolk selected another concrete subcontractor to complete Newbury's remaining work on the project.[7]

Additional problems with the building's foundation work are described in a letter to WAN from WAN's structural engineering subconsultant dated April 3, 1998. In the letter, WAN's subconsultant sought an additional $26,750 in design fees for work necessitated in part by improper construction work. According to the letter, additional design services were required to correct problems with foundation work, including misalignment of anchor bolts and inadequate anchor bolt projection.

As of late June 1998, Suffolk was employing its own personnel to patch and repair the foundation walls, according to DCAM Daily Progress Reports. The DCAM Daily

[7] Suffolk's new concrete subcontractor, H.W. General Construction Co., Inc., would also come under fire from Suffolk several months later when Suffolk alleged that it had defaulted on its subcontract. Suffolk alleged in January 1999 that H.W. General Construction had abandoned the tasks of removing forms from one steam line manhole and pouring concrete walls in another.

Progress Report for June 24, 1998 stated that a Suffolk mason was saw cutting and patching foundation walls.

According to the UMass Capital Projects Manager, Newbury poured 60 to 70 percent of the exposed foundation and retaining walls before leaving the project. Newbury's work on these exposed walls did not meet the RFP standard of quality for an architectural finish, free of holes, cracks, and gaps, with a smooth uniform surface. Although the repairs produced an acceptable appearance, the UMass Capital Projects Manager told the Office that the finish will require more maintenance than the smooth, architectural concrete surface called for in the project specifications would have required.

Finding 9. Suffolk's problems with its drywall subcontractor contributed to project delay.

On February 9, 1998, Suffolk signed a subcontract with Sapphire Construction for $630,000 to install drywall partitions and ceilings in the building and to furnish and install veneer plaster and exterior wall stud work. Suffolk's original schedule had called for the drywall installation to begin on November 17, 1997 and to be completed by January 16, 1998 – an installation period of two months. Instead, drywall installation did not begin until March 5, 1998 and was not completed for nearly eight months, until November 1998. In September 1998, before the work was complete, Suffolk alleged that Sapphire was in default of its subcontract and replaced Sapphire with another subcontractor.

Correspondence between Suffolk and Sapphire suggests that several factors may have delayed Sapphire's progress, including Suffolk's failure to coordinate its subcontractors and Sapphire's inability to meet its payroll and provide adequate manpower. In a letter to Suffolk dated April 29, 1998, Sapphire noted several reasons for delays in completing the first third of its work, including the incomplete building frame and concrete work on the first floor, and obstructions caused by heating ducts and equipment on the second floor. On May 28, 1998, Sapphire wrote again to Suffolk stating that it had been forced to spend more than 200 manhours repairing metal interior studs, which had been taken apart by Suffolk's electrical subcontractor in order to run conduits through the walls.

In a letter dated June 17, 1998, Suffolk informed Sapphire that Suffolk was "deeply concerned with the lack of coordination and performance of the plastering operations at the project." Suffolk also noted that Sapphire's plasterers on the site had walked off the job that day in a payment dispute with Sapphire. The letter added:

> Plastering is a major component of this project. We also indicated [in a meeting with Sapphire on June 10, 1998], in strong terms, our apprehension to allow the plastering to remain a part of your contract due to what we saw then as floundering in follow through. This situation has only become worst [sic].

In a June 22, 1998 letter to Sapphire's attorney, Suffolk noted that Sapphire had agreed to increase its crew sizes to ensure that agreed milestones in the subcontract work would be met. The milestone dates included completion of the third-floor stud work by June 26, 1998 and completion of first floor plaster by August 10, 1998.

As of June 29, 1998, the agreed-upon increase in Sapphire's crew had not taken place, according to a letter that day from Suffolk to Sapphire's attorney. Suffolk's letter stated that on June 29, there were still only two plasterers on the job – five fewer than Sapphire had promised to provide. According to DCAM Daily Progress Reports, Sapphire increased its workforce in the month of July, bringing more plasterers on the job. Nevertheless, on July 24, 1998, Suffolk stated in a memorandum to Sapphire's attorney that Suffolk had reluctantly agreed to revisions of the milestone dates for Sapphire's work. Completion of second floor plaster was moved from July 16 to July 31, 1998, and first floor plaster from August 10 to August 14.

In a July 29, 1998 letter to Suffolk, Sapphire's attorney stated that Sapphire would meet the July 31 date for completion of the second- and third-floor plastering, with the exception of areas in which the cable trays had not been completed.[8] The letter also

[8] A July 14, 1998 DCAM Daily Progress Report noted that Suffolk's electrical subcontractor had not yet lowered the cable trays on the third floor, thereby preventing Sapphire's carpenters from framing soffits in the atrium area on the third floor. Finding 10 contains a discussion of the cable tray installation problems that led to project delays.

stated that a stop-work order by Suffolk on the east and west staircases[9] was hampering Sapphire's work, as were Suffolk's electrical, mechanical, and plumbing subcontractors, which had not completed work on the first floor.

Meanwhile, Sapphire's low staffing levels continued to cause friction with Suffolk. On July 31, 1998, Suffolk wrote to Sapphire contending that Sapphire was still not providing adequate manpower and had failed to meet the July 31 deadline for completing the second- and third-floor plaster work. On August 11, 1998, Sapphire wrote Suffolk stating that faulty circuit-breakers were causing power outages to the building as many as three times a day for a half hour at a time, thereby further hampering the progress of its crew.

Sapphire's work stretched into September 1998, well past the August 14 deadline that had been set in July. According to a letter dated September 2, 1998, from Sapphire to Suffolk, Sapphire was having difficulty paying its suppliers and workers:

> This brief letter is to inform you that I have tried everything within my power to keep the job going, but like I have told you previously, our working capital was poured into the job in the beginning. Every payment received from you has also been used for this purpose. We have complete documentation of this fact.
>
> Needless to say, today is payday. We cannot meet payroll due to the fact that our funds are exhausted.

According to DCAM Daily Progress Reports, Sapphire's carpenters walked off the job on September 3, 1998 because they had not been paid. They did not return to the site until September 8, 1998.

In a September 9, 1998 letter to Sapphire, Suffolk confirmed that the parties had agreed on a completion deadline of September 28, 1998 for Sapphire's work. However, Suffolk wrote Sapphire again on September 16, 1998 – prior to the agreed completion deadline – alleging that Sapphire was in default of its subcontract. Suffolk cited Sapphire's

[9] Finding 11 contains a discussion of the problems encountered by Suffolk in the installation of the east and west stairways.

failure to meet agreed-upon schedules and its failure to pay its suppliers for materials and equipment. As of September 18, 1998 Suffolk had replaced Sapphire with a new drywall subcontractor, according to a DCAM Daily Progress Report. DCAM Daily Progress Reports indicate that the second subcontractor was performing plastering work in the building as late as November 23, 1998.

Finding 10. A dispute between DCAM and Suffolk over a contract requirement for accessible cable trays contributed to project delay and cost overruns.

Because of its intended functions, the Computer Science Center had specific requirements related to the building's computer and telecommunications systems. One of these requirements called for a system of cable trays, designed to hold computer and telecommunications cables in place, to be installed in a manner that would permit the building's users to reconfigure the cabling easily. The cable trays, along with HVAC ductwork and other mechanical systems, were to be installed above a suspended ceiling with removable panels to permit access.

The project RFP required the Computer Science Center's cable trays to be accessible. The accessibility requirement was included in the RFP as a performance specification, i.e.; a specification that described the functional requirement for the design but did not specify the exact number of inches of clearance required above the cable trays. The RFP specified that:

> Accessible cable trays are to be provided above the ceiling throughout the building to allow rearrangement/relocation of the computers as needed to accommodate computer science research changes; . . . .

In addition, another section of the RFP relating to requirements for specific rooms and corridors contained the following requirement:

> Computer/Telecom cable trays to be located above ceiling. Provide adequate space above ceiling for cable tray access.

10a. Suffolk failed to submit required coordination drawings depicting the relationship of the cable trays to the ductwork.

Suffolk's contract listed and described the submittals for which Suffolk was required to obtain DCAM's approval. Among these submittals were coordination drawings, defined in the contract as drawings that:

> show sequencing and relationship of separate units of work which must interface in a restricted manner to fit in the space provided, or function as indicated.

On June 5, 1997, Suffolk submitted construction documents for the mechanical, electrical, and plumbing systems. HKA and DCAM reviewed this submission and on July 2, 1997, provided the following written comment:

> First, Second, and Third Floor Plan – Cable Tray: Provide coordination drawing depicting how the cable tray will interface with the HVAC duct work and sprinklers.

Despite this reminder, Suffolk failed to submit the required coordination drawings depicting the relationship of the cable trays with the HVAC ductwork.

On March 18, 1998, Suffolk's electrical subcontractor began installing cable trays under the HVAC ductwork. On March 30, UMass inspected the cable tray installation on the second floor and wrote a memorandum informing DCAM that the work was unacceptable because the trays were located so close to the ductwork that they were not accessible. The UMass memorandum described the problem as follows:

> As installed, the tray is not accessible where it is located below the duct work because the clearance between the side of the tray and the duct above is not over 2½" a dimension too small to allow reaching over the edge of the center of the tray.
>
> Accessibility of the tray has been a concern of the University for some time. As early as the Design Development submission the University has questioned the details . . . at the corridor ceiling and their impact on the accessibility to the tray. There has been no response to this concern except assurances from the designers that there would be adequate

> clearance. It was also noted that if there were conflicts they would be taken care of when the coordination drawings were developed.
>
> Given the critical nature of this issue to the successful use to the building the University requests that no further ductwork or cable tray be installed until an acceptable solution to the problem is found.

On April 2, 1998, the UMass Capital Projects Manager provided WAN with sketches showing possible options for correcting the accessibility problem. In an April 3, 1998 memorandum to DCAM, Suffolk acknowledged receiving the sketches from UMass, but warned DCAM that a change in the cable tray installation method would have cost and scheduling implications. Suffolk's memorandum stated:

> The second floor duct work has been 70% installed. The second floor cable tray has been 80% installed. . . . The third floor duct work is fabricated and is scheduled to arrive on site Tuesday April 7, 1998. The third floor cable tray system began installation yesterday. All of these activities will be affected by the requested modification to above ceiling mechanical work.

10b. Suffolk's subcontractor continued to install cable trays that DCAM did not consider accessible for a month after DCAM informed Suffolk that the installation would not be accepted.

DCAM responded to Suffolk's memorandum in a letter dated April 6, 1998, making it clear that DCAM would not accept the cable tray installation because it did not provide the clearance needed by UMass and required by the contract specifications. DCAM wrote:

> Suffolk is responsible to coordinate this project. Apparently you have not done this with the duct work and the cable tray installation. You are responsible to provide the required clearance between the duct work and the cable tray. The current duct/cable tray installation, as installed, does not provide the necessary clearance.
>
> You are required to remove, re-fabricate, reinstall any or all of the installed duct work/ cable tray to provide the proper clearance at no additional cost to the Commonwealth. Any fabrication and/or installation you do that does not give the proper duct work/ cable tray clearances, you do at your own risk.

In a letter to DCAM dated April 17, 1998, Suffolk denied responsibility for correcting the cable tray access problem:

> It is our opinion that any changes in the duct work are not the responsibility of Suffolk or our contractors. . . . We have tried to accommodate the University's wishes for total access to the tray but total access is not possible due to the constraints of space. Unless we are directed differently, we will restart the installation of items on Tuesday April 21, 1998 as called for on the drawings.

In a letter to Suffolk dated April 22, 1998, DCAM reiterated that Suffolk had installed duct work and cable trays without approved coordination drawings and that Suffolk was responsible for any changes needed to correct the problem.

Despite DCAM's clear communications directing Suffolk to correct the cable tray problems, DCAM's Daily Progress Reports show that Suffolk's subcontractor continued to install cable trays on the second and third floors until May 5, 1998, without attempting to resolve the clearance problem.

10c. After UMass approved a solution to the cable tray access problem, Suffolk's subcontractor took three months to lower the cable trays, thereby impeding the progress of drywall work.

In a letter to DCAM dated May 5, 1998, Suffolk proposed a solution to the cable tray access problem: to lower the ceilings in the main corridors to allow a minimum of eight inches of clearance between the top of the cable trays and the bottom of the ductwork. On May 7, 1998, UMass informed DCAM that lowering the ceilings was an acceptable solution.

On June 10, 1998, more than a month after UMass had approved Suffolk's proposed solution, Suffolk's electrical subcontractor began lowering the installed cable tray system. According to the DCAM Daily Progress Reports, Suffolk's electrical subcontractor was working under protest on this task, claiming that it was entitled to be paid for extra work for lowering the cable trays. According to DCAM records, DCAM

held to its position that Suffolk was responsible for correcting the cable tray access problem without additional compensation.

Six days after starting to lower the cable trays, Suffolk's electrical subcontractor discontinued its work. The DCAM Daily Progress Report for June 16, 1998, reported that the electrical subcontractor was now refusing to lower the cable trays:

> Foreman said he is not lowering any more cable tray since he feels that it is acceptable as industry standard accessible.

Project records show that the subcontractor stopped lowering cable trays for a period of approximately six weeks and that this hiatus hindered Suffolk's other subcontract work. The DCAM Daily Progress Report for July 14, 1998 reported that cable trays still had not been lowered on the third floor, and that the delay was holding up the drywall subcontractor's progress. A memorandum dated July 14, 1998, from Suffolk to its electrical subcontractor also called attention to the delay and its impact on the drywall subcontractor:

> On May 28, 1998 you were directed by Suffolk Building Corp. to lower the cable tray in certain areas on the 2nd and 3rd floors. This has not been completed.
>
> The drywall sub-contractor is being delayed in framing the soffits on the third floor and some drywall around columns might have to be removed so that the cable tray can be lowered.

On July 28, 1998, Suffolk's electrical subcontractor resumed lowering cable trays and, by August 6, 1998, had substantially completed the task.

10d. Suffolk submitted a proposed change order seeking $33,390 for costs associated with lowering the cable trays.

On June 23, 1998, Suffolk submitted a proposed change order for all of the costs associated with improving access to the cable trays. The $33,390 in additional costs included $4,969 for the electrical subcontractor's work as well as costs resulting from changes in the layout of sprinkler heads, relocation of air grills and fire alarm devices, and revisions to drywall and acoustical ceilings. DCAM later rejected the proposed

change order, claiming that the extra costs resulted from Suffolk's failure to coordinate systems and equipment as required in the contract.

Finding 11. Suffolk's problems with the fabrication and installation of the Computer Science Center's three metal stairways added to project delay.

The Computer Science Center features three custom fabricated steel stairways: exit stairs at the east and west ends of the building and a central stairway in the atrium lobby. The RFP contained a design concept for the central stairway, which was to be an open stair, custom fabricated with slate treads and landings and a stainless steel railing system.

From the early planning stages of the project, UMass envisioned the atrium lobby stairway as a major design feature of the building. The UMass Capital Projects Manager worked with UMass faculty and staff to create the decorative, open stairway design concept described in the RFP. In a December 29, 1998 letter to DCAM, the UMass Capital Projects Manager described UMass's design concept as follows:

> As envisioned in the RFP the central stair was to be the focus of the building, a place that would encourage contact between faculty, staff and students. It was intended to be as open as possible allowing the stairs and surrounding areas to be naturally lit from the skylight above.

11a. Suffolk's proposed stairway and handrail for the atrium lobby deviated from the RFP design concept.

In an interview with this Office, the WAN project architect stated that Suffolk's proposed stairway design, which featured a solid, gypsum-board half-wall supporting a wooden handrail, was modeled on the stairway in another building on the UMass campus. He acknowledged that the stairway and handrail in the Suffolk proposal represented a departure from the RFP design.

The UMass Capital Projects Manager told this Office that Suffolk's proposed stairway and handrail design for the atrium lobby, in addition to deviating from the RFP specifications, did not convey the aesthetic qualities UMass had envisioned for this

central design element of the building. In an October 14, 1996 memorandum to DCAM commenting on the Suffolk proposal, UMass took exception to the proposed stairway and handrail design, noting that it did not conform to the RFP, that it was too narrow, and that it lacked the open railing specified in the RFP.

Suffolk responded to UMass's objection that the proposed stairway was too narrow by submitting a revised floor plan drawing in December 1996, showing a widened central stairway. With respect to UMass's objection to the proposed handrail, Suffolk wrote a letter to DCAM dated January 3, 1997, stating:

> After further review, we have determined that our stair design appears to comply with the intent of the RFP. If an open rail system is required, our team will work in conjunction with UMA [UMass] through alternate means and methods during the design stage to investigate different types of cost effective open rail systems.

Based on Suffolk's response, DCAM expected that WAN would develop a final handrail design in consultation with UMass to achieve the design objectives described in the RFP. The following contract terms clearly placed responsibility for developing the revised design with Suffolk:

> Should the proposed design vary materially from the design concept illustrated in the RFP drawings, Offeror shall promptly initiate the necessary design review process with the [DCAM], and pursue approvals as necessary so as to cause no delay in the Project.

11b. Suffolk took eight months to submit design details for the atrium lobby stairway and handrail.

Suffolk initially proposed a project schedule indicating that the final architectural drawings and specifications, including stairway and handrail details, would be complete on May 2, 1997. As was the case with other design submittals, however, Suffolk lagged months behind its own proposed schedule in bringing the stairway and handrail design to the next stage of completion.

Suffolk first submitted architectural construction drawings for review by DCAM and UMass on August 29, 1997. This submission did not include specifications for the

materials Suffolk proposed to use for the atrium lobby stairway and the handrail. HKA (DCAM's design consultant) and UMass officials reviewed the architectural drawings and provided extensive written comments that were transmitted to Suffolk on September 24, 1997. HKA's comments noted several apparent problems with the proposed atrium lobby stairway design and requested a more detailed design to evaluate. UMass's response to this submission included the following comments:

> Need detail of railing for main stair. If open design is to remain, detailing of steel stringers, platform framing should be fully worked out so that stairs have higher level quality appearance than utility exit stairs – this is a major design/appearance feature to the building.

In the September 24, 1997 letter that accompanied DCAM's comments and questions on the drawings, DCAM noted that Suffolk had not yet submitted specifications for the atrium lobby stairway and handrail.

On November 28, 1997, Suffolk submitted additional architectural design documents, this time providing specifications for the materials to be used for the atrium lobby stairway and handrail. This submission provided DCAM and UMass with their first opportunity to review and comment on these design details and materials.

The proposed design submitted on November 28, 1997 featured a perforated metal panel between the outside handrail and the floor rather than the stainless steel railing system described in the RFP. According to the UMass Capital Projects Manager, when he and other UMass officials reviewed this submission, they were surprised to learn that Suffolk did not plan to provide the handrail described in the RFP. After discussions among faculty and staff, UMass formally rejected the proposed design in a memorandum to DCAM dated January 26, 1998.

Under the terms of Suffolk's contract and the project administration procedures agreed upon at the beginning of the project, Suffolk and the WAN design team were responsible for responding promptly to UMass's comments on the design submission. According to Project Meeting Minutes, WAN indicated on February 5, 1998 that it would respond to the objections raised in UMass's January 26, 1998 memorandum.

Beginning in March 1998, WAN proposed alternative approaches to the atrium lobby stairway handrail design. Over the following four months, UMass considered options proposed by WAN, including a handrail system with a glass infill between the floor and the rail. Project Meeting Minutes indicate that UMass requested samples of glass colors from WAN on April 23, 1998 and that glass samples were presented at a project meeting on July 2, 1998. During the month of July 1998, UMass representatives visited existing buildings to view and evaluate different handrail designs. In mid-July, UMass rejected the glass infill option proposed by WAN because of concerns about the labor required to keep the glass clean. In a project meeting held on July 16, 1998, UMass directed Suffolk and WAN to proceed with a stainless steel cable handrail, consistent with the original RFP design.

Although UMass made this decision on July 16, 1998, the handrail installation was not completed until June 25, 1999 – nearly a year later. Suffolk would later claim that UMass was responsible for delaying project completion because UMass spent several months considering alternative handrail options developed by WAN before finally instructing Suffolk to proceed with the stainless steel cable. However, Suffolk's claim does not acknowledge that the handrail design became an issue primarily because Suffolk's design team departed from the RFP handrail design. Suffolk had been aware of UMass's objection to this proposed design deviation since the inception of the project and had pledged in its January 3, 1997 letter to work in conjunction with UMass "during the design stage to investigate different types of cost effective open rail systems."

11c. Suffolk's subcontractor performance problems held up the completion of the east and west exit stairways for approximately six months.

Suffolk contracted with Global Steel Erectors and Fabricators (Global) on December 8, 1997, for metal fabrication. Global's subcontract included fabrication and installation of all three sets of metal stairways, including the atrium lobby stairway. In a memorandum to Global dated April 28,1998, Suffolk instructed Global to begin fabrication of the east and west stairways. According to the memorandum, Suffolk expected the two stairways

to be on site in two weeks. Another Suffolk memorandum to Global dated May 14, 1998 expressed concern that the stairways had not arrived and asked for a confirmed delivery date. Finally, in a letter to Global dated June 9, 1998, Suffolk wrote:

> We were informed by Global Steel to expect the East and West stairways today. The stairs did not arrive. . . . We can not stress in stronger terms that the stair ways must be installed now. We are held by contract to liquidated damages. If Global continues to miss schedule or does not follow thru with delivery dates, we will be passing on the liquidated damages to your firm.

Global delivered the east and west stairways on June 11, 1998.

Soon after Global's installation work was underway, however, deficiencies in fabrication and the installation work became apparent. In a memorandum to Global dated July 10, 1998, Suffolk wrote:

> This note is to inform Global Steel of Suffolk's concern with the slow pace of the East and West stair erection. We are also concerned with the lack of detailing quality of the rails and stringers. . . . The quality of the details in alignment and railings require more field modifications than would be normally expected in stairs of this simple design, The East stair's rails are not complete. The stair is not aligned to the walls. The West stair is also in the same state. Global must make every effort to increase the quality and complete the stairs now. We are unable to place concrete fill in the stairs due to the work which has to be completed.
>
> **Due to the state of the two simple stairs, we are apprehensive of the fabrication and installation of the main stairway. This stair is to be a focal point in the building.** We will not accept a stair of lesser quality than expected. . . . Please advise in writing how Global will bring the stairs to acceptable conditions. [Emphasis added]

UMass and DCAM shared Suffolk's concern with the quality of the east and west stairways. In a letter dated July 20, 1998, DCAM wrote to Suffolk:

> This letter is to inform Suffolk that the steel stair components which have been installed to date at the East and West ends of the building are not in compliance with the contract documents and/or the approved shop drawings.
>
> Several attempts have been made to correct the many deficiencies and it is apparent that the final product as presently installed is unacceptable.

> The issues are too numerous to list in this letter but include undersized material used in structural connections as well as a serious lack of dimensional uniformity and poor overall workmanship. It is DCAM's opinion that the stairs should be removed and that new stairs should be installed which meet industry standards and project specifications.

Suffolk responded to DCAM's concerns in a memorandum to DCAM dated July 26, 1998:

> We have received certain correspondence from the DCAM concerning the low quality of the East and West stairs. We concur with the letters. We have contacted the subcontractor to submit an acceptable resolution of the issues. As well as doing this we have begun the process of contacting other fabricators to either supplement or replace the existing contractor.

Suffolk records indicate that on July 31,1998, Suffolk instructed Global to attempt further repairs to the defective stairways. Suffolk records also indicate that on August 4, 1998, Suffolk obtained two bids from other contractors for the fabrication and installation of the east and west stairways as well as for the atrium lobby stairway, which had not yet been fabricated. Suffolk did not, however, take further steps at that time to replace Global, but instead continued to urge Global to complete the installation. In a memorandum dated August 12, 1998, Suffolk wrote to Global:

> We are concerned with the slow pace of the repairs to the two fire stairs at UMass. We can not understand why Global has only one Ironworker making these repairs. . . . The west stair has been worked on for two weeks and is still not ready for inspection. The east stair has not yet started to be repaired. . . . We direct Global Steel to immediately inform us in writing how the schedule will be met.

In response to Suffolk's mounting concern, Global informed Suffolk in a letter dated August 14, 1998 that Global was replacing Steel Connections, Inc., the subcontractor it had hired to repair the east and west stairways. Global's new subcontractor – Mobile Welding and Fabrication, Inc. – started to work on the stairs on September 8, 1998. But Global's decision to change subcontractors did not bring about a prompt resolution to the problems. In a memorandum to Global dated September 29, 1998, Suffolk wrote:

> This is to confirm a phone conversation we had yesterday concerning the status of repairs to the east and west stairs. You stated Global will

> consider the total removal and replacement of both stairs after the report is received by your field representative. . . . This issue had been unresolved for months. Global has been given ample opportunity to correct the non conformance of the stairs. We can not allow this issue to remain unresolved. Therefore, if we do not receive a written plan for correction or replacement satisfactory to the DCAM by today, we will have no alternative but to supplement your work to resolve this issue as called for in the subcontract section 8.6.2. We can not stress the importance of an acceptable resolution to this very old problem.

Project records indicate that Global's subcontractor worked on repairs to the east and west stairs over the following six weeks, substantially completing the work in late November 1988. The two exit stairways were finally inspected and accepted by DCAM on December 18, 1998. By this time, the project schedule had extended more than three months past the contract completion date of September 9, 1998.

Despite Global's unsatisfactory work on the east and west stairways, Suffolk did not replace Global for the fabrication and installation of the atrium lobby stairway until November 5, 1998.

Given Global's apparent inability to perform the quality of work required for the relatively simple exit stairways, Suffolk had ample cause for concern about the remaining work under Global's contract, which included the fabrication and installation of the atrium lobby stairway.

Project records indicate that Suffolk's attention was primarily focused on keeping the cost for the atrium lobby stairway low. Suffolk obtained shop drawings for the atrium lobby stairway from Global in June 1998 but did not submit the drawings to DCAM. In a letter dated October 19, 1998, DCAM reminded Suffolk that DCAM was waiting for the shop drawings. In the same letter, DCAM commented on a rumor that Suffolk intended to use channel steel, a lower cost alternative to tube steel, for the stairway stringers. DCAM made it clear that channel steel stringers, which would provide a lower quality level for the stairway, were unacceptable. After receiving DCAM's letter, Suffolk apparently advised WAN to revise the stairway design to substitute tube steel for channel steel. In a memorandum dated October 29, 1998, Suffolk asked Global for revised shop drawings reflecting the change to tube steel. Suffolk's actions indicate that Suffolk still planned to rely on Global for the atrium lobby stairway.

Suffolk's records indicate that on November 5, 1998, Suffolk finally instructed Global to evaluate a credit proposal to delete the atrium lobby stairway from Global's contract. On that same date, Suffolk entered into a new contract with another company, Steel Fab, Inc., for the fabrication and installation of the atrium lobby stairway. This contract did not include the stainless steel handrail. The contract with Steel Fab, Inc. required the stairway installation to be complete by December 24, 1998.

11d. Suffolk's belated decision to select a new subcontractor for the atrium lobby stairway delayed completion of the project.

By waiting until November to award a new contract for the atrium lobby stairway, Suffolk compounded the project schedule slippage. The installation of this stairway had to be completed before field measurements could be taken for the stainless steel handrail. This meant that, in addition to the time required to fabricate and install the stairway, Suffolk needed to allow approximately another two months for its subcontractor to fabricate the handrail. Suffolk acknowledged this critical sequence of activities in a letter to DCAM dated January 19, 1999:

> The stainless steel cable rail system must be field dimensioned prior to the submission of shop drawings. . . . Stainless steel cable rail shop drawings will then be submitted for final approval. Fabrication time is approximately eight weeks after approval.

By waiting so long to initiate the fabrication of the stairway – the first activity in the critical sequence leading up to the installation of the handrail – Suffolk essentially ensured that project completion would be delayed until at least March 1999.

Suffolk submitted shop drawings for the main atrium stairway two months after the project completion deadline.

Project records indicate that Steel Fab, Inc.'s shop drawings for the stairway were submitted to DCAM on November 20, 1998 and that DCAM returned the drawings to Suffolk on December 3, 1998 with comments requiring revisions. According to the December 3 Project Meeting Minutes, UMass also requested additional sketches showing the relationship between the stairs and surrounding partitions. The minutes

show that Suffolk agreed to revise the shop drawings to reflect the changes requested by DCAM. The contract required Suffolk to submit the revised drawings for DCAM's approval prior to proceeding with the construction work.

Suffolk failed to submit revised shop drawings prior to proceeding with installation of the main atrium stairway.

On December 21, 1998, Steel Fab, Inc. delivered the stairway to the site and began installation, despite the fact that Suffolk had not yet submitted revised shop drawings. According to December 23, 1998 Project Meeting Minutes, DCAM expressed concern that the stairway installation had begun without the required shop drawing submission. Following the project meeting, UMass inspected the work and identified two major problems: the subcontractor was planning to use tile rather than the slate floor covering specified in the RFP for the landings and was installing the stair stringers tight to the wall. On December 24, 1998, Suffolk instructed Steel Fab, Inc. to stop work on the stairway pending a resolution of the problems identified by UMass.

The December 28, 1998 Project Meeting Minutes indicate that Suffolk and WAN presented DCAM with proposed revisions to the stairway under construction to address the problems identified by UMass. One of these revisions involved moving the entire stairway, which had been installed flush to the wall, two inches away from the wall to allow space for a handrail. Other revisions required added structural supports recommended by DCAM. Once again, DCAM and UMass asked Suffolk to produce revised drawings to reflect these changes.

Steel Fab, Inc. continued to work on the stairway on December 29 and 30, but on December 31, 1998, project records indicate that Suffolk halted work again. According to project records, Suffolk submitted a revised drawing showing the changes in the atrium lobby on January 11, 1999. On January 13, 1999, Steel Fab, Inc. again resumed work on the stairway and finally completed the installation on January 29, 1999.

11e. Suffolk took more than four months to contract for the stainless steel cable handrail system after being directed to proceed by UMass.

After Steel Fab, Inc. had started work on the stairway, Suffolk contracted with another company – Stainless Fabricators, Inc. – to fabricate and install the stainless steel cable handrail. Suffolk entered into the contract with Stainless Fabricators, Inc. on December 1, 1998, four and one-half months after UMass had directed Suffolk to proceed with the stainless steel cable handrail.

Suffolk's contract with Stainless Fabricators, Inc. set out the sequence of activities required to complete the contract and established a target timetable. The contract timetable allowed Stainless Fabricators seven calendar days following the installation of the stairway to perform the necessary field measurements and prepare and submit handrail shop drawings for DCAM's approval. After receiving DCAM's approval, Stainless Fabricators was to fabricate the handrail within approximately four weeks.

Suffolk's subcontractor took more than two months longer than anticipated to fabricate and install the stainless steel cable handrail system.

Project records indicate that Stainless Fabricators, Inc. was on the site on January 29, 1999 to take field measurements of the atrium lobby stairs. The records also show that Stainless Fabricators, Inc. prepared shop drawings that were submitted to DCAM on February 18, 1999. According to Project Meeting Minutes, DCAM had reviewed and returned the shop drawings to Suffolk by February 25. In a memorandum dated March 2, 1999, Suffolk directed Stainless Fabricators to begin fabrication of the stainless steel cable handrail system.

Fabrication of the handrail system was expected to take approximately four weeks and, according to the terms of the contract between Suffolk and Stainless Fabricators, Inc., should have been completed by early April. Correspondence between Suffolk and Stainless Fabricators, Inc. during the months of March, April, and May of 1999 indicates that the fabrication took nearly two months longer than the parties had anticipated. In a letter to Stainless Fabricators, Inc., dated May 21, 1999, Suffolk wrote:

> Suffolk Building Corp. was notified by Stainless Fabricators on May 20, 1999 that the stainless steel handrail which was scheduled to ship on 5/21/99 was delayed (again) and would not be shipped until 6/7/99. This delay and current ship date are totally unacceptable to Suffolk Building Corp. . . .
>
> As we have discussed, Suffolk Building Corp. is unable to obtain the Certificate of Occupancy from the State Building Inspector without the central stairs complete. The Stainless Steel handrail is the final piece of work to be incorporated in the central stairs. Stainless Fabrications [sic] failure to furnish, deliver and install the rail on the agreed date(s) has delayed the project and has prevented us from obtaining the Certificate of Occupancy as scheduled.

As Suffolk's letter indicated, the handrail fabrication delays ultimately delayed project completion because the building inspector could not issue the Certificate of Occupancy required by the state building code without a handrail in place. The handrail was finally delivered on June 7, 1999. According to Suffolk's project schedule, the handrail installation was expected to take one week. Project records indicate that the work took twice as long as anticipated and was finally complete on June 25, 1999. The building inspector inspected the Computer Science Center building and issued the Certificate of Occupancy on July 6, 1999.

Suffolk submitted a proposed change order seeking an additional $119,647 for the atrium lobby stairway and handrail.

On January 19, 1999, Suffolk submitted a proposed change order for enhancements to the stairway and handrail. The $119,647 proposed change order included approximately $48,000 for upgrading the gypsum board half-wall handrail in Suffolk's proposal to the stainless steel handrail described in the RFP. On April 21, 1999, DCAM approved a change order in the amount of $75,765 for the stairway and handrail.

Finding 12. Suffolk submitted a $2.7 million claim that would increase the contract price by approximately 30 percent.

On October 5, 1999, approximately four months after completing the project, Suffolk submitted a request for equitable adjustment to the contract price in the amount of $2,733,674. The amount sought by Suffolk in this claim would increase the initial contract price of $9,231,000 by approximately 30 percent.

In its claim, Suffolk contended that the project was delayed by 47 weeks – from the contract completion date of September 9, 1998 until an actual completion date of July 31, 1999 – due to "apparent conflicts between DCAM and UMass about what was required under the Contract, and what UMass wanted in the finished product." According to the claim, UMass representatives were unable to make decisions on final design items on a timely basis and changed those decisions after they were made. Suffolk's claim stated that Suffolk was:

> unable to plan and execute the work in any kind of logical sequence, and was constantly forced to stop work in process, remove and replace work already completed, and leave large areas of construction untouched because final decisions on what would be installed in those areas had not been made.

The claim listed "primary impacts" to the schedule, which Suffolk claimed caused it to incur cost increases, including:

- Steam line owner-requested changes, indecision and unforeseen conditions;
- Lack of timely design approvals;
- Central staircase owner-requested changes;
- Cable tray owner-requested changes.

The damages under Suffolk's $2.7 million claim fell into the following categories:

- Direct steam lines costs plus interest: $1,260,340. This category included compensation for extra work required to complete the steam line, purportedly due to design changes initiated by UMass or DCAM or due to unforeseen site conditions.
- Extended general conditions: $767,534. This category consisted of Suffolk's overhead costs, including salaries for Suffolk personnel and field office expenses for the entire 47-week claim period.
- Extra fees for design services: $471,503. This category included $435,088 for construction administration services allegedly provided by WAN and its subconsultants during the 47-week claim period.

- Other disputed changes: $234,297.

12a. Suffolk's claim included $314,000 for undocumented design services that cannot be verified.

Suffolk's claim incorporated a demand for payment from WAN for $471,503 for additional design services necessitated by project delay and design changes. This $471,503 demand would nearly double the total project design fee of $525,000 established in the contract between Suffolk and WAN. According to Suffolk's claim, DCAM was responsible for paying the entire $471,503 in design fees claimed by WAN.

According to the claim, the major portion of WAN's demand – $435,088 – consisted of compensation for construction administration services, including field visits and meetings as well as continued oversight and project management, performed during the 47-week claim period. The remainder of the WAN demand included $7,569 for design services for the atrium stair rail, $13,846 for field survey work to uncover existing site conditions, and $14,999 for steam line upgrade design work.

In support of its demand for payment, WAN submitted a weekly breakdown of hours worked by WAN personnel and by WAN's subconsultants providing construction administration services. These hours were multiplied by hourly rates to arrive at a total charge of $435,088 for construction administration. On its face, this hourly breakdown appears to represent the actual number of hours of work performed during this period. However, a letter from WAN to Suffolk attached to WAN's demand for payment suggests that WAN did not attempt to ascertain the actual hours of work performed on the UMass project. According to the WAN letter:

> In an effort to simplify review and approval, we have submitted the same weekly manhours negotiated and approved by Suffolk and the Commonwealth for the Time Extension on the Reggie Lewis Track. Given the fact that the Track project is located in Boston, there should be no problem approving the same manhours for the extended services on this project given its location in western Massachusetts.

In other words, WAN's demand for payment was based on a formula used on an entirely different project. This rationale is illogical. Moreover, the contract between DCAM and Suffolk makes it clear that any increase in fees for design services on the UMass project must be based on actual hours worked and hourly rates established in the contract.

To determine the relationship between the work hours reported in WAN's demand for payment and the actual hours of design work performed during the claim period, the Office compared WAN's demand for payment with WAN's internal time records and the invoices submitted to WAN by its own subconsultants. Based on those time records and invoices, the total fees documented by WAN and its subconsultants during the claim period amounted to $157,271. Of WAN's $471,503 demand for payment, $314,232 is undocumented. (See Table 2)

Table 2.
WAN's Demand for Payment vs. Documented Design Fees
(September 9, 1998 – July 31, 1999)

	Demand for payment	Documented design fees	Difference
WAN personnel	$190,282	$107,951	$82,331
Mechanical design subconsultant	$76,481	$17,573	$58,908
Structural design subconsultant	$16,652	$9,800	$6,852
Civil/site design subconsultant	$58,330	$21,947	$36,383
Plumbing design subconsultant	$64,879	none	$64,879
Electrical design subconsultant	$64,879	none	$64,879
Total	**$471,503**	**$157,271**	**$314,232**

Source: WAN's internal time records and invoices submitted to WAN by its subconsultants.

In addition to the undocumented and therefore unverifiable charges, the WAN demand for payment appears to seek additional compensation for remedial design work that was necessitated by errors in the initial design of the steam line.

WAN's demand for additional design fees bore no relationship to its previous demand for payment of $175,805 in outstanding design fees.

WAN's demand for $471,503 in additional design fees is troubling not only because it appears to seek payment for work that was not performed, but also because it bears no relationship to WAN's regular project invoices to Suffolk. As noted in the previous Finding 2, Suffolk and WAN had been engaged in a dispute throughout most of the project over the base design fee amount, with WAN claiming a base design fee of $549,121 and Suffolk maintaining that the base design fee was only $500,000.

The base design fee dispute escalated after WAN billed Suffolk $84,512 for additional design fees that Suffolk declined to pay. In June 1999, Suffolk informed WAN that Suffolk intended to reduce WAN's base design fee by another $55,403 to cover the cost of remedial construction work needed to correct design errors. Correspondence between Suffolk and WAN indicates that WAN did not agree to this reduction in its base design fee. Thus, disagreements over the base design fee amount, over Suffolk's responsibility for additional design costs, and over Suffolk's decision to reduce WAN's base design fee for design errors resulted in a total of $175,806 in disputed design fees at the end of the project.

Correspondence between Suffolk and WAN indicates that in August 1999, WAN was demanding an additional $175,806 from Suffolk for the UMass project. Suffolk responded to this demand for payment in a letter to WAN dated August 4, 1999, stating that Suffolk was "in disagreement to the monies requested by your firm." A handwritten note on Suffolk's copy of the letter, which was signed by Suffolk's Project Executive and directed to the Project Manager, stated:

> Per JFF [Suffolk's President], No more payments on UMass to WAN.

In a letter dated August 4, 1999, WAN notified Suffolk that WAN was discontinuing work on both the UMass project and on another Suffolk construction project at Curry College

due to Suffolk's "stated intention not to pay WAN the agreed fees for design services" on those projects.

Less than three weeks later, WAN submitted its new demand for payment of $471,503 to Suffolk. Inexplicably, this new demand for payment did not incorporate WAN's previous $175,806 demand but instead sought payment for services for which WAN had never billed Suffolk. The $175,806 WAN had demanded from Suffolk at the end of the project consisted mostly of outstanding design fees that Suffolk could not pass through to DCAM. The newly minted $471,503 demand for payment, on the other hand, consisted entirely of charges that Suffolk claimed DCAM was responsible for and for which Suffolk demanded payment from DCAM.

The fact that most of the additional services underlying WAN's $471,503 demand for payment are undocumented and cannot be verified, coupled with WAN's unexplained failure to include its previous demand for $175,806 in outstanding design fees cast considerable doubt on the validity of WAN's $471,503 demand for payment.

12b. The change order splitting agreement between Suffolk and its mechanical subcontractor created an incentive for Suffolk to inflate mechanical costs for the steam line.

After the project was completed, Suffolk's mechanical subcontractor, Kenney, submitted a revised proposed change order to Suffolk dated August 2, 1999 for costs incurred in the construction of the steam line due to changes in the specifications and unanticipated project delays. This revised proposed change order superceded the $252,240 for changes to Kenney's work included in Suffolk's previous PCO #65.

Kenney revised its proposed change order for steam line work by adding $183,390 in delay damages.

Kenney's revised proposed change order to Suffolk was based in part on Kenney's calculation that design changes and delays had resulted in an increase of $213,443 in labor and materials costs, including taxes, insurance, and bond premiums. In addition, Kenney's revised proposed change order added a new demand – $183,390 for delay

damages – bringing the new proposed change order total, including additional charges for bond premiums and taxes and insurance on labor, to $396,833. Suffolk incorporated the $396,833 into its $2.7 million claim to DCAM.[10]

The $183,390 that Kenney added to its proposed change order for delay damages was ostensibly for unabsorbed home office overhead costs for the 47-week delay period from September 1998 through July 1999. In its explanation of the claim, Kenney stated that the $183,390 figure was derived using an industry standard formula, known as the Eichleay formula. The Eichleay formula allocates a portion of the contractor's general business and overhead costs to a particular project. The formula can then be applied to assess damages against the owner on that project under particular circumstances when a contractor can prove three essential elements: (1) the owner caused a delay in performing the contract; (2) the owner required the contractor to "stand by," remaining available to do the work at any time during the owner-caused delay; and (3) the contractor was unable due to its stand-by status to take on other projects that would absorb the contractor's home office overhead costs during the period of delay.[11]

However, the terms of Kenney's subcontract and the facts and circumstances of this case make Kenney's claim a dubious candidate for delay damages under the Eichleay formula. Under Suffolk's subcontract, Kenney expressly waived its right to seek money damages for delay, regardless of the cause of the delay.

Moreover, even if Kenney had not waived its right to delay damages, it is unlikely that Kenney could prove the elements required to prevail in a claim for Eichleay damages. Although the steam line work was delayed, primarily due to problems identified in Finding 5 and Finding 6, the notion that Kenney was on "stand-by" waiting to perform steam line work and therefore unable to take on other projects for the 47-week period between September 1998 and July 1999 is not supported by the facts. The Office

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[10] In submitting the claim, Suffolk once again mistakenly double-counted a credit owed DCAM for steam line work specified in the RFP (See Footnote 3 in Finding 7). The $396,833 change order proposed by Kenney had already been reduced by a credit of $116,098. Suffolk subtracted this amount again in calculating its total claim.

[11] See *Satellite Electric Co. v. John H. Dalton*, 105 F.3d 1418 (Fed. Cir.1997).

determined from records filed with DCAM that Kenney started work on eight other projects worth a total of $12,842,968 after September 1998 and before July 1999. In addition, project records show that Kenney was not "standing by" during most of the 47-week period. Project records show that during the months of September, October, November, and December 1998, before starting work on the steam line, Kenney personnel were still completing plumbing and other mechanical system work on the UMass project. Kenney personnel began work on the steam line on January 9, 1999 and substantially completed that work on April 17, 1999. Project records show that after April 17, 1999, Kenney personnel were on site for only a few days, either completing punchlist items or performing work necessary to correct the steam line design errors discussed in the previous Finding 6. These facts suggest that Kenney's claim for 47 weeks of unabsorbed home office overhead costs has no merit.

When asked whether Suffolk questioned Kenney's claim for Eichleay damages, a Suffolk official told the Office only that Suffolk "sponsored" the claim. Suffolk's decision to "sponsor" Kenney's Eichleay claim is troubling, particularly in light of the agreement Suffolk had made with Kenney to share the approved change order payment amount, discussed in the previous Finding 7.

Under the agreement executed on January 8, 1999, Kenney was entitled to the first $110,000 of Kenney's change order payment, Suffolk was entitled to the next $90,000, and any amount in excess of $200,000 would be divided evenly between them. A Suffolk official stated in an interview with the Office that this arrangement was devised simply to provide Suffolk with a credit for steam line work included in Kenney's subcontract. However, the Office determined that in practice, the change order splitting agreement would provide Suffolk with a greater share of the change order payment than it would have received under the subcontract.

Moreover, the open-ended nature of the change order splitting agreement, which gave Suffolk half of any payment in excess of $200,000, was problematic because it provided Suffolk with an incentive to maximize the costs claimed in Kenney's proposed change order. The Office calculated that if Kenney had claimed only its actual increased cost of

$213,443 for labor and materials and the total cost had been approved by DCAM, Suffolk would have received $96,722 under the change order splitting agreement. However, if DCAM had approved Kenney's inflated proposed change order for $396,833, Suffolk would have received $188,417. By "sponsoring" Kenney's dubious Eichleay claim, Suffolk potentially stood to increase its own compensation by $91,695.

12c. After the Office requested verification from Suffolk regarding its general conditions costs, Suffolk advised DCAM that the claim had overstated Suffolk's costs by $287,108.

In June 2000, approximately eight months after Suffolk submitted its $2.7 million claim, the Office requested information from Suffolk, including documentation of certain costs included in the general conditions portion of the claim. In an August 4, 2000 letter to DCAM, Suffolk stated that the $767,534 general conditions portion of the claim should have been reduced by $287,108 to correct inadvertent mistakes involving the inclusion of costs incurred prior to the claim period and the duplication of certain other costs in separate portions of the claim. Suffolk's August 4, 2000 letter to DCAM stated that the claim should be reduced to correct the following errors:

- Project manager labor costs in the amount of $100,000 included in the claim were actually incurred prior to the claim period. The letter stated that these costs had previously been transferred out of the project cost records as part of a management effort to improve the internal profit projection for the project but were inadvertently included in the claim after Suffolk and its affiliates converted their accounting software package.

- Winter conditions costs amounting to $75,753 had accidentally been included in both the direct steam line and general conditions portions of the claim.

- Legal costs totaling $17,676 were included in the claim. According to Suffolk's letter, these costs were not actually related to the claim.

- Travel costs included in the claim had been inadvertently overstated by $863.

- Labor, insurance and taxes in the claim had been mistakenly calculated at 36 percent of total labor costs, rather than 26.9 percent as provided by the contract. Correcting this error reduced the claim amount by $56,347.

- The 20 percent overhead and profit markup should be reduced by $49,069, based on reductions in the items above.

Suffolk's letter indicated that these reductions, which totaled $299,708, were partially offset by increases totaling $12,610 for expenses that had been understated in the claim.

Finding 13. DCAM's top management focused on resolving Suffolk's claim without litigation rather than conducting a rigorous analysis of the merits of the claim.

According to a DCAM official interviewed by the Office, DCAM contracted with a claims consultant, Arnold Engineering Company, Inc., (Arnold) to act as a neutral third party to assess the merits of Suffolk's claim. The official said that DCAM's top management viewed Arnold as more neutral in the matter than DCAM's own line staff, who reportedly advocated that DCAM adopt a hard line in dealing with Suffolk's claim.

DCAM officials told the Office that they chose Arnold without soliciting qualifications from other claims consultants because they had relied on Arnold to perform similar services on other projects. DCAM avoided the state procurement law that would require a competitive process to award a new contract by directing HKA, already under contract to DCAM, to execute a subcontract with Arnold. Although HKA did nothing more than act as a fiscal conduit to allow DCAM to pay Arnold for claims analysis services, HKA was paid $2,464 – 10 percent of Arnold's final fee of $24,646 – for its role.

Arnold's subcontract contained no written scope of services and did not specify a final work product. Thus, it is difficult to determine the scope or depth of the review and analysis Arnold was asked to provide. In an interview with the Office, Arnold's President said that his goal in negotiating with Suffolk had been to "come up with numbers that both the contractor and the state could feel comfortable with."

In November 1999, Arnold began reviewing Suffolk's $2.7 million claim. Invoices provided by Arnold indicated that its work included a review and analysis of Suffolk's supporting documents and of project records. Arnold's work also included meetings with DCAM and Suffolk officials.

At the conclusion of this review, Arnold submitted a report dated February 28, 2000 to DCAM entitled "Delay Claim Analysis and Recommended Settlement." In that report, Arnold made the following disclaimer:

> It should be understood that this analysis is prepared for settlement purposes and in no means is it detailed enough to be used as a total defense document for arbitration/litigation.

This disclaimer, as well as DCAM's overall approach to negotiations with Suffolk, suggest that DCAM's top management was more concerned with reaching an agreement with Suffolk that would avoid litigation than in carefully analyzing the legal merit of Suffolk's position or the validity of the costs claimed by Suffolk.

Arnold's report contained a brief project narrative, a schedule analysis, and an initial recommended settlement offer of $945,212. After this offer was rejected by Suffolk, Arnold met with Suffolk officials. Arnold subsequently revised its initial recommended settlement offer to $1,234,170. DCAM's top management then met with Suffolk's President and his top staff. Following this meeting, DCAM agreed to settle the claim by paying Suffolk $1.4 million. Table 3, which appears on page 82, contains the amount claimed by Suffolk, Arnold's settlement recommendations, and the final settlement amount for each category of damages.

After the Office advised DCAM of the Office's concerns regarding Suffolk's claim, the DCAM Commissioner delayed approval of the settlement. DCAM subsequently retained a law firm to review Arnold's report and recommendations. The law firm reportedly advised DCAM that a new analysis of the claim should be conducted.

13a. DCAM's claims consultant recommended a settlement offer that was not supported by its own analysis.

A major part of Arnold's analysis was devoted to reviewing project schedules and tracing critical path activities to determine the causes for delay. In summarizing the project records, Arnold attributed much of the project delay to Suffolk's actions in "performing value engineering extremely late in the steamline design process, taking long periods of time to actually performing the design, installation taking much longer than what was anticipated." Arnold's report conceded that some DCAM actions – "review of steamline documentation, revised pricing requested, arguments concerning direct burial versus concrete tunnel and other miscellaneous discussions" – may have contributed to delays.

Based on its assessment of the causes of project delays, Arnold recommended what it considered to be an equitable apportionment of Suffolk's claimed general conditions costs between DCAM and Suffolk. Arnold recommended that DCAM pay all of Suffolk's claimed general conditions costs for a four-week period and the majority of Suffolk's claimed costs for another 38-week period. In effect, Arnold's recommended settlement offer amounted to a concession that DCAM was primarily responsible for 42 weeks out of the 47 weeks of delay sought in Suffolk's claim. However, Arnold's own report narrative had attributed much of the delay to factors under Suffolk's control. Arnold's report provided no supporting evidence or rationale for its recommendation that DCAM accept primary responsibility for – and pay Suffolk $367,720 to cover overhead costs – for 42 weeks of project delay.

13b. DCAM's claims consultant did not closely examine most of Suffolk's claimed costs.

Arnold's report to DCAM in support of its settlement recommendation contained no evidence that Arnold subjected the numbers contained in Suffolk's claim to rigorous scrutiny.

For example, Arnold's report initially recommended that DCAM pay Suffolk $273,982 for increased direct steam line costs, including labor and materials. Arnold's support for this recommendation consisted of a one-page, handwritten list of items for which Arnold recommended additional compensation, with no explanation as to if or how Arnold had verified the underlying costs. After Suffolk rejected DCAM's initial $273,982 offer for this portion of the claim, Arnold provided DCAM with a follow-up analysis that questioned Suffolk's contention that the steam line pipe installation called for in the RFP would have required only 718 hours of labor and that the actual steam line pipe installation required 2,464 hours, a 343 percent increase. Arnold's President indicated in an interview with the Office that Suffolk was unable to provide a satisfactory rationale for the greater than three-fold increase in labor that Suffolk claimed was required due to delays or changes in the steam line. However, Arnold later recommended that DCAM increase its initial $273,982 offer for this portion of the claim to $685,000. Arnold provided no rationale for its recommendation to offer Suffolk $685,000.

Similarly, Arnold provided no analysis to justify its recommendation that DCAM pay Suffolk $367,720 out of Suffolk's claim of $767,534 for general conditions costs. The only supporting information consisted of a spreadsheet that reduced several of Suffolk's claimed overhead costs, with no explanation of the reasons for the reductions. Arnold's report provided no evidence that Arnold had verified Suffolk's actual general conditions costs or that Arnold had identified any of the overstated costs that Suffolk later reported to DCAM, as discussed in the previous subfinding 12c.

A third example concerns WAN's $435,000 claim for additional construction administration services. Arnold's initial recommended settlement offer simply reduced WAN's $435,000 claim by half, with no analysis or explanation supporting that recommendation. As discussed in Finding 12, most of these claimed construction administration services were not documented and could not be verified.

13c. DCAM's $1.4 million settlement offer accorded little weight to contract terms that governed Suffolk's right to damages.

The design-build contract that governed the rights and responsibilities of DCAM and Suffolk with respect to this project was written by DCAM and contained a number of provisions that were critical to protecting the Commonwealth's interests in this project. Arnold's report and settlement recommendation made no reference to these contract terms. DCAM officials told the Office that they relied on Arnold's recommendation in making the $1.4 million settlement offer. It appears that neither DCAM nor Arnold regarded the contract terms governing Suffolk's right to recover damages as important in negotiating a settlement offer. As the following discussion shows, these contract terms would substantially reduce the likelihood that Suffolk could recover all of the damages sought in its claim.

The contract between DCAM and Suffolk limited Suffolk's right to recover damages for delay.

A substantial portion of Suffolk's claim is predicated on its right to recover damages for delays caused by DCAM or UMass. However, the contract terms explicitly limit the circumstances under which delay damages may be applied and could have foreclosed Suffolk's ability to recover damages on that portion of its claim.

Suffolk failed to comply with a contractual requirement to document work performed under protest on the steam line.

DCAM had not approved Suffolk's proposed change order for steam line work when Kenney was installing the steam line piping. Under the terms of the contract, Suffolk was therefore required to maintain and submit to DCAM daily records of labor and materials provided in order to preserve its right to later seek an equitable adjustment for this work. Suffolk ignored this requirement and failed to submit any daily records documenting work performed by Kenney personnel.

The contract between DCAM and Suffolk called for Suffolk to pay liquidated damages for late completion.

The contract between Suffolk and DCAM required Suffolk to pay the Commonwealth $1,000 per day in liquidated damages if Suffolk failed to complete the project by the contract deadline of September 9, 1998.

In June 1999, a DCAM resident engineer recommended deducting $202,000 from payments to Suffolk for liquidated damages for the period from September 10, 1998 through March 31, 1999, when the steam line installation was complete. However, DCAM's top management did not adopt this recommendation and made a final payment to Suffolk in November 1999 without deducting liquidated damages.

A review of the project records supports the conclusion reached by DCAM's resident engineer, that Suffolk was responsible for most of the project delay and therefore liable for liquidated damages. Moreover, Arnold's schedule analysis attributed much of the project delay to Suffolk. However, DCAM's top management not only declined to deduct liquidated damages from Suffolk's contract payments, they apparently failed to consider Suffolk's potential liability for these damages in making the $1.4 million settlement offer.

Table 3.
Steps in the Negotiated Settlement of Suffolk's Claim

Description	Original Claim Request (10/5/99)	Initial Arnold Recommended Settlement (2/28/00)	Revised Offer by Suffolk (3/3/00)	Revised Recommenda-tion by Arnold (3/7/00)	Final Settlement Amount (3/9/00)
Direct Steam Line Costs	$1,224,622	$273,982	$954,110	$685,000	$828,330
Interest on Direct Steam Line Costs	$35,718	$0	$0	$0	$0
Extended General Conditions for Steam Line	$767,534	$367,720	$459,648	$367,720	$442,720
Other Impacts	$99,031	$50,200	$68,200	$50,200	$50,200
Griffin Electric Claim	$106,372	$15,328	$25,000	$25,000	$25,000
WAN Claim	$471,503	$217,539	$100,000	$100,000	$50,000
5% OH&P Markup on Griffin and WAN Claims	$28,894	$11,643	$6,250	$6,250	$3,750
Total	**$2,733,674**	**$945,212**[12]	**$1,613,208**	**$1,234,170**	**$1,400,000**

Source: Arnold Engineering

[12] The actual total of these numbers is $936,412.

Conclusion

The three major concerns of any construction project owner are schedule, quality, and cost. The Computer Science Center project failed to meet UMass's expectations on all three counts. UMass's primary objective was to complete the project on an accelerated schedule. According to the project feasibility study, using a design-build approach would take 18 months rather than the 27 months a traditional design-bid-build approach would require. Instead, as this report documents, the project dragged on for 37 months, exceeding the projected schedule by 19 months.

The Computer Science Center also fell short on quality in at least two significant respects. First, the steam line is directly buried rather than enclosed in a concrete tunnel in accordance with UMass's standards. According to the UMass Capital Projects Manager, the absence of a concrete tunnel will shorten the life expectancy of the steam line and burden UMass with higher maintenance costs. Second, Suffolk's failure to achieve a smooth, architectural finish for exposed foundation and retaining walls was remedied by applying a coating to fill in and disguise defects. This coating has already begun to show signs of wear and is expected to cost more than a smooth concrete finish to maintain over the life of the building.

The Computer Science Center was also plagued by cost overruns. The original $9.2 million contract was increased by $476,000 in DCAM-approved change orders over the course of the project, and disputes over additional costs led Suffolk to file a $2.7 million claim after the project was completed. In total, the approved change orders and the extra costs sought in Suffolk's claim would hike the original contract price by more than one-third.

The UMass Computer Science Center is a relatively simple building. The project encountered no unusual weather or site-related problems that could account for the lengthy delays or the excessive cost overruns. Contrary to Suffolk's claim, the problems contributing to the failure of this project were not caused by major design changes initiated by DCAM or by UMass after the project began. Moreover, DCAM and UMass

invested substantial effort in planning and providing oversight of the project. Suffolk and WAN are highly qualified and experienced firms. Indeed, the UMass Computer Science Center project had many of the key ingredients required for a successful construction project, including:

- a comprehensive feasibility study with a reliable cost estimate for the project,
- a comprehensive contract that delineated each party's responsibilities and established clear project management procedures,
- vigorous competition for the design-build contract,
- a capable and experienced general contractor with a strong track record,
- a design team headed by a highly qualified architectural firm,
- a qualified independent design firm providing design review and construction oversight, and
- conscientious DCAM field personnel skilled in contract administration and record-keeping procedures.

The findings in this report show that most delays and cost overruns were caused by factors under Suffolk's control. Specifically, most major problems encountered on the project were attributable to Suffolk's failure to ensure that design work was complete, accurate, and timely; Suffolk's continual efforts to reduce construction costs through design revisions; and Suffolk's failure to take timely steps to replace non-performing suppliers and subcontractors.

A number of Suffolk's decisions that had significant impacts on both the project schedule and the construction quality of the building appeared to be aimed at minimizing its costs. For example, Suffolk failed to obtain complete survey and site information or to submit a complete and accurate civil/site design early in the project. Suffolk also failed to take timely action to replace its non-performing subcontractors for concrete work and for fabrication and installation of the main atrium stairway. In addition, Suffolk continued to revise its steam line design, in part to lower construction

costs, for more than six months after being directed to proceed with direct burial of the steam line. All of these decisions delayed the project or compromised quality of the finished facility.

It is clear that this project did not demonstrate the benefits of improved teamwork and coordination among the participants that are ascribed to the design-build approach. Indeed the ongoing disputes on this project between the designer and the contractor contributed to delays, as did the acrimonious conflicts between the contractor and its subcontractors.

The failure of the Computer Science Center to meet UMass's needs and expectations offers important lessons for DCAM and other public construction owners regarding the risks of, and the importance of exercising effective control over, design-build projects. The conclusions summarized below may enable public owners to avoid similar problems in the future.

The design-build approach was not appropriate for the UMass Computer Science Center project.

The design-build approach streamlines construction, in part by giving the design-build contractor responsibility for and control over final design decisions. The primary advantage of this approach from the owner's viewpoint is that it can, if correctly managed, accelerate the schedule. The major disadvantage is that the owner must give up control over final design, increasing the risk that the completed building will not meet its needs or standards for quality.

The design-build approach is often used by owners and developers of commercial construction projects such as office or retail complexes, where speed of construction is of paramount importance. Commercial project owners and developers are typically satisfied with standardized design features and do not need continuing input into the development of the final project design. In addition, they generally plan to recoup their investment over a relatively short period of time and are therefore less concerned with long-term maintenance costs than are owners of public buildings.

By contrast, public buildings such as schools, courthouses, and town halls serve public purposes. Often the users of these buildings want input into the final design, an expectation reflected in DCAM's extensive design review and approval procedures for the UMass Computer Science Center. Moreover, public buildings should generally have a substantially longer design-life than commercial buildings because they will probably remain in use longer. For example, according to the UMass Capital Projects Manager, UMass considers the life expectancy for a new building on its campus to be 75 years, far longer than a typical commercial building. Public agencies therefore often have an interest in final design choices that affect long-term maintenance costs.

Some of the problems experienced by the Computer Science Center project can be attributed to the design-build approach, which opened the door to disputes over the project design requirements. For example, the RFP called for a concrete tunnel for the steam line but contained little design information. The lack of design specificity allowed Suffolk to argue that the tunnel was not required. The steam line tunnel dispute highlights the importance of developing adequate design parameters in an RFP for a design-build project to avoid a potentially costly disagreement over the RFP requirements.

Differing interpretations of the RFP design requirements for the atrium lobby stairway and handrail also contributed to delay. From the outset, Suffolk proposed lower cost alternatives to the open, stainless steel handrail design concept contained in the RFP, proposing first a gypsum board half-wall, and then a perforated metal panel handrail. After UMass had rejected Suffolk's proposed alternatives, DCAM learned that Suffolk planned to use channel steel stringers rather than the higher-quality tube steel UMass wanted for the main stairway. In the end, UMass got the higher quality, open stairway it had envisioned, but disputes over the design requirements resulted in project delays and a $75,000 increase in the contract price.

The Computer Science Center's cable tray system is another example of a problem that is more likely to occur on design-build projects, which tend to rely on performance specifications. Performance specifications describe equipment or systems in terms of

functional requirements rather than specific dimensions or other design requirements, and can be used to give the design-build contractor design discretion while assuring the owner that the project will perform as required. The RFP contained a performance specification that required the building's cable tray system to be accessible to allow the building's users to easily reconfigure the computer cabling. After Suffolk began to install cable trays in the Computer Science Center that allowed only 2½ inches of overhead clearance, UMass made it clear that it required 8 inches of clearance. The ensuing dispute between DCAM and Suffolk over what constituted an "accessible" cable tray system led to delays and added costs. This dispute highlights the limitations of performance specifications for buildings, where it is often difficult to describe required functions with adequate specificity.

Top DCAM management did not support efforts of DCAM project personnel to enforce contract requirements and maintain control over the project.

DCAM recognized that relying on a design-build contractor to develop the final project design increased the risk that project quality could be compromised. DCAM's contract characterized the contractual arrangement as a "special relationship," which it described as follows:

> In order to accomplish the purposes of the Agreement efficiently, the parties hereby declare that a special relationship of trust, confidence, and professionalism exists between the parties and will continue to exist throughout the duration of the Agreement.

In addition, DCAM developed a comprehensive set of contract requirements and project management procedures to ensure adequate control and oversight.

The contract required Suffolk to submit 100 percent complete plans and specifications, stamped with the designer's seal, for DCAM's review and approval prior to beginning the related construction work. The contract contained similar requirements for approval of submittals such as shop drawings and coordination drawings throughout the construction stage of the project. In addition, DCAM contracted with an independent design firm, HKA, to perform a comprehensive review of Suffolk's design submissions for completeness and accuracy.

Project records show that DCAM project personnel attempted to enforce design review and other contract requirements, including requirements for Suffolk to obtain approval for its proposed schedule and for a schedule of values. DCAM project personnel frequently reminded Suffolk of its schedule for submissions and documented Suffolk's failure to comply with the schedule. Despite these efforts on the part of DCAM project personnel, Suffolk failed to meet its own proposed schedule for submissions or to submit complete, revised design documents for approval as required by the contract. In many instances, DCAM management waived these contract requirements. For example, DCAM management gave "partial and conditional" approval to construction documents for the civil/site design, over the vehement objections of HKA, despite significant unresolved design problems. Similarly, DCAM management effectively waived the final approval requirement for the structural design by giving Suffolk permission to proceed with foundation work before the design was complete.

Given this lack of support from DCAM management, it is not surprising that DCAM project personnel were unable to maintain effective control over the project. Suffolk failed to provide timely shop drawings and other submittals throughout much of the project. For example, Suffolk did not submit required shop drawings for the atrium lobby stairway until November 1998. Then, after DCAM reviewed and returned the shop drawings, Suffolk failed to submit revised drawings reflecting DCAM's comments, until January 1999. Suffolk's pattern of ignoring DCAM's design review requirements contributed to construction delays and on numerous occasions led to the need to redo construction work.

Suffolk's failure to adhere to its proposed schedule suggests a lack of concern over the possibility that DCAM would enforce the $1,000 per day liquidated damages provision. At the conclusion of the project, the DCAM resident engineer recommended deducting $202,000 in liquidated damages from Suffolk's requisition. DCAM records contain no explanation for the decision made by DCAM management to pay Suffolk's last requisition in November 1999 without withholding any money for liquidated damages.

Top DCAM management failed to conduct a rigorous assessment of the merits of Suffolk $2.7 million claim.

Project records indicate that DCAM project personnel conducted an assessment of Suffolk's proposed change orders throughout the project, verifying the reasonableness of and seeking documentation for claimed extra costs. At the end of the project, DCAM project personnel had approved approximately $476,000 in change orders to Suffolk.

Many of the extra costs rejected by DCAM project personnel in proposed change orders were later incorporated into Suffolk's $2.7 million claim. In dealing with the claim, top DCAM management took an approach that differed dramatically from the careful assessment done by DCAM project personnel. As discussed in Finding 13 of this report, DCAM hired a claims consultant under an agreement that contained no written instructions or scope of work to analyze the claim. The work product produced by DCAM's claims consultant and DCAM's subsequent negotiations with Suffolk reflect a lack of any substantial assessment of either the costs included in or the legal merits of Suffolk's claim. The Office's review of Suffolk's claim found that it included major cost items that were not documented and could not be substantiated and that the contractual and legal basis for many elements of the claim is doubtful.

The lack of scrutiny of this claim suggests that the $1.4 million settlement that top DCAM management agreed to pay Suffolk represents a decision to seek a ready compromise rather than to ensure that taxpayers do not pay more than they should for this project. The public is ill-served by this kind of compromise, not only because it may result in paying too much for this project, but because it will convey the message that the Commonwealth does not carefully analyze construction claims and will pay a premium to resolve a dispute. This message is an invitation to inflated claims on future state construction projects. Moreover, contractors who succeed in getting questionable claims approved may believe that they can lowball future bids with impunity and recoup their costs through change orders. By not scrutinizing change orders and claims and by not enforcing the requirements of its own contracts, the Commonwealth undermines fair competition for its future construction contracts.

As discussed in Finding 13, DCAM decided not to execute the $1.4 million settlement agreement after learning of the Office's concerns. Instead, DCAM retained a law firm to assess the consultant's report and recommendations. The law firm has reportedly recommended conducting a new analysis of Suffolk's claim.

Appendix: Agency Response

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DAVID B. PERINI
COMMISSIONER

February 22, 2001

BY HAND

Robert A. Cerasoli
Inspector General
Office of the Inspector General
One Ashburton Place, 13'h Floor
Boston, MA 02108

Re: University of Massachusetts
Computer Science Center Project

Dear Inspector General Cerasoli:

Thank you for giving DCAM an opportunity to review and comment on your confidential draft report concerning the Computer Science Center Project at the University of Massachusetts. The report was extremely thorough, and the process of reviewing the draft was very constructive for me and my staff. Your report contains a number of valid concerns, and I can assure you that the findings will be considered very carefully as we proceed with the disposition of this particular matter, and as we proceed on future projects.

Sincerely,

David B. Perini
Commissioner

Cc: Robert McGinness, General Counsel