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CAPITOL VISITOR CENTER

Update on Status of Project's Schedule and Cost as of February 16, 2007

Statement of Terrell G. Dorn, Director
Physical Infrastructure Issues



Madam Chair and Members of the Subcommittee:

I appreciate the opportunity to be here today to assist the Subcommittee in monitoring progress on the Capitol Visitor Center (CVC) project. My remarks will focus on (1) the Architect of the Capitol's (AOC) construction progress since the last CVC hearing on November 15, 2006; and (2) the project's expected cost at completion and status of funding.¹

Today's remarks are based on our review of schedules and financial reports for the CVC project and related records maintained by AOC and its construction management contractor, Gilbane Building Company; our observations on the progress of work at the CVC construction site; and our discussions with the CVC team (AOC and its major CVC contractors), AOC's Chief Fire Marshal, and representatives from the U.S. Capitol Police.² We also reviewed AOC's construction management contractor's periodic schedule assessments, potential change order log, and weekly reports on the progress of interior wall and floor stone installation. In addition, we reviewed the contract modifications made to date and the estimates of cost increases provided by AOC and its construction management contractor.

At the last CVC hearing, we reported that our assessment of the project's schedule and expected cost at completion was somewhat constrained because the CVC team was still analyzing the impact on the project's schedule and cost of recently identified changes required for certain components of the fire protection and security systems. The impact of these changes on the project is not yet fully known. Therefore, we could not thoroughly assess the project's schedule or estimated cost at completion and are basing our views on the information available as of February 5, 2007, including AOC's December 2006 schedule. Our views

¹GAO, *Capitol Visitor Center: Update on Status of Project's Schedule and Cost As of November 15, 2006*, [GAO-07-129T](#) (Washington, D.C.: Nov. 15, 2006).

²AOC decided to implement the CVC construction project in two phases, or sequences. The sequence 1 contract, for excavation and structural work, was awarded to Centex Construction Company, and the sequence 2 contract, for mechanical, electrical, plumbing and interior finishing work, was awarded to Manhattan Construction Company. In addition, AOC, which has overall responsibility for managing the CVC project, has been receiving construction management services from Gilbane Building Company. These services include coordinating the activities of the major construction contractors, monitoring worker safety, and providing AOC with status information for reporting to Congress. See *Capitol Visitor Center: Priority Attention Needed to Manage Schedules and Contracts*, [GAO-05-714T](#) (Washington, D.C.: May 17, 2005).

could change as more information on the impact of these changes becomes available.

In Summary:

Since the November 15, 2006, CVC hearing, the CVC team has continued to move the project's construction forward, but because of delays primarily associated with the fire alarm system, AOC's December 2006 schedule shows that the CVC will be available for occupancy in December 2007,³ almost 2 months later than previously estimated, and further delays are possible. Over the past 3 months, the CVC team has made progress on the project's heating, ventilation, and air-conditioning (HVAC) system; interior floor stone and ceiling installation; and other interior and exterior construction work. However, problems with the project's most critical activity—the fire protection system—required AOC to extend the project's schedule by 2 months. In addition, problems with many other important activities, including work on the East Front and the House and Senate expansion spaces, have not yet affected the project's completion date, but could do so in the future. These problems, together with other indicators of construction progress that we have been tracking, suggest to us that the project is more likely to be available for occupancy in early 2008. Furthermore, the project continues to face risks and uncertainties that could affect its progress, especially risks associated with the final testing of its major building systems, which is not scheduled to take place until July 2007. Since the fall of 2006, AOC has been implementing an action plan designed to improve the CVC team's execution of the project and the project's schedule. It is too early to tell what impact this plan will have on delays, but the CVC team's efforts to date—including weekly schedule reviews and frequent site inspections—provide greater management control of the sequence 2 work. However, to complete, or come close to completing, the project in December 2007, AOC will need to take action to mitigate any risks that it has not yet addressed and continue to implement its CVC action plan aggressively, focusing particularly on those actions that are critical to completing the work on schedule. Accordingly, we are recommending that AOC (1) reassess the project's schedule risks, develop risk mitigation strategies, and determine a realistic completion date, and

³This date does not allow time for installing artifacts in the exhibit gallery or for addressing risks and uncertainties, and it may not provide enough time to prepare for operations. AOC's December 2006 schedule allowed until January 2008 for installing the artifacts. According to AOC, it is not yet clear how much time will be needed for operations preparations.

(2) continue to aggressively implement its November 2006 CVC action plan, incorporating work on the expansion spaces and other building areas. AOC generally agreed with our recommendations and said that accounting for risks in the project's schedule will probably push the project's completion date to early 2008.

As we reported at the November CVC hearing, we roughly estimate that the total cost of the entire CVC project at completion is likely to be about \$592 million without an allowance for risks and uncertainties and over \$600 million with such an allowance. We have not updated our estimate of the project's cost at completion with an allowance for risks and uncertainties. To date, about \$538 million has been provided for CVC construction. For fiscal year 2007, AOC has requested about \$26 million in additional appropriations for CVC construction, a portion of which it has already received, and for fiscal year 2008, it has requested another \$20 million in CVC construction appropriations to cover remaining costs. Based on the estimates we reported at the November hearing, we believe that, in total, AOC may need about \$15 million more than it has requested to date to complete the project, without provision for risks and uncertainties.

Construction Is Progressing, but Delays Have Occurred and a Later Completion Date Is Likely

According to AOC's construction management contractor, contractor billings indicated that the overall CVC project is 90 percent complete, compared with 88 percent reported complete at the November 15 CVC hearing. The great hall and orientation theaters are nearing completion, although certain items, such as custom light fixtures, will be late. Seven of the CVC's 23 air-handling units were operating full time as of January 25; about 12,100 square feet of interior floor stone and 370 pieces of wall stone have reportedly been installed since November; and work has progressed in the East Front. In addition, AOC's Chief Fire Marshal has essentially reached agreement with the CVC team on nearly all elements of the fire protection system.⁴

⁴Discussions are continuing on outstanding points on the fire alarm annunciator panels—panels that display the location of fire alarms—and special fire suppression systems for the exhibit gallery and the expansion space

Critical and Near-critical Activities Have Been Delayed

Despite the advances in construction since the November CVC hearing, the project's scheduled completion date has slipped by almost 2 months—from October 26 to December 21, 2007—primarily because of delays in the CVC project's critical path activity⁵—the fire alarm and smoke control system. According to AOC, these delays occurred because the fire alarm system cabling took longer than expected to obtain and is taking longer than expected to install. Additionally, it took longer than expected to get approval of shop drawings⁶ for the fire alarm annunciator panels. The sequence 2 contractor believes some of the lost time can be recovered.

Delays in many near-critical path activities have also occurred. Work on 11 such activities has fallen at least 4 weeks behind since the November hearing, according to AOC's construction management contractor. For example, according to the construction management contractor, the schedules for the East Front upper levels and the upper level orientation and security lobby slipped by about 7 weeks largely because of unforeseen conditions in the East Front and the need to add a conduit for wiring in the orientation lobby that was omitted through an oversight. According to the project's December 2006 schedule, work on the HVAC system has slipped about 3 weeks since the November hearing, reportedly because of delays in finishing certain East Front work.

Because of the delays in the fire alarm system work and in several near-critical path activities, AOC has extended the scheduled construction completion date for the House and Senate expansion spaces as well as the CVC. For the expansion spaces, the schedule has slipped by almost a month—from July 2, to July 27, 2007—according to the December 2006 schedule. The near-critical activity paths include millwork, bronze doors, and above-ceiling work. Of even greater concern, the dates shown in the December 2006 schedule for completing several near-critical activities were within 15 workdays of the critical path, meaning that additional delays of 3 to 16 workdays or more in these activities could delay the overall completion of the expansion spaces. Furthermore, the expansion space subcontractor has said that it has not determined yet whether scope

⁵The critical path is the single longest path of activities through a project's schedule. Each day of delay in a critical path activity could delay the completion of the entire project. Near-critical paths are the next longest paths through the project's schedule.

⁶Shop drawings are submittals required by the contract that provide detailed information on work that is to be done.

changes requested by the government will affect the scheduled construction completion date.

Finally, according to the construction management contractor's report on AOC's December 2006 schedule, the completion date for the Jefferson Building modifications has slipped by 7 weeks, because of unforeseen conditions on the basement floor and the contractor's inability to proceed with this and certain other work before receiving direction from the government. The contractor indicates that further delays are possible.

Barring further construction delays, the House and Senate expansion spaces will be completed before the CVC's construction, but both the CVC and the expansion spaces will be available for occupancy at the same time, because AOC is planning to test the fire protection and other major building systems in both facilities concurrently. In addition, the project's schedule includes another 39 calendar days for installing artifacts and documents in the CVC's exhibit gallery. More time may also be needed to prepare for CVC operations, but this is not yet clear.

Indicators of Construction Progress Point to Further Delays

The indicators of construction progress that we have been tracking continue to suggest that the project is not likely to be completed on December 21, 2007, as shown in the project's December 2006 schedule, unless the actions AOC is taking to improve the CVC team's schedule performance are effective in stopping slippages. As shown in figures 1 and 2, the sequence 2 contractor fell behind in completing schedule milestones, and the contractor's billings continue to indicate delays. More specifically,

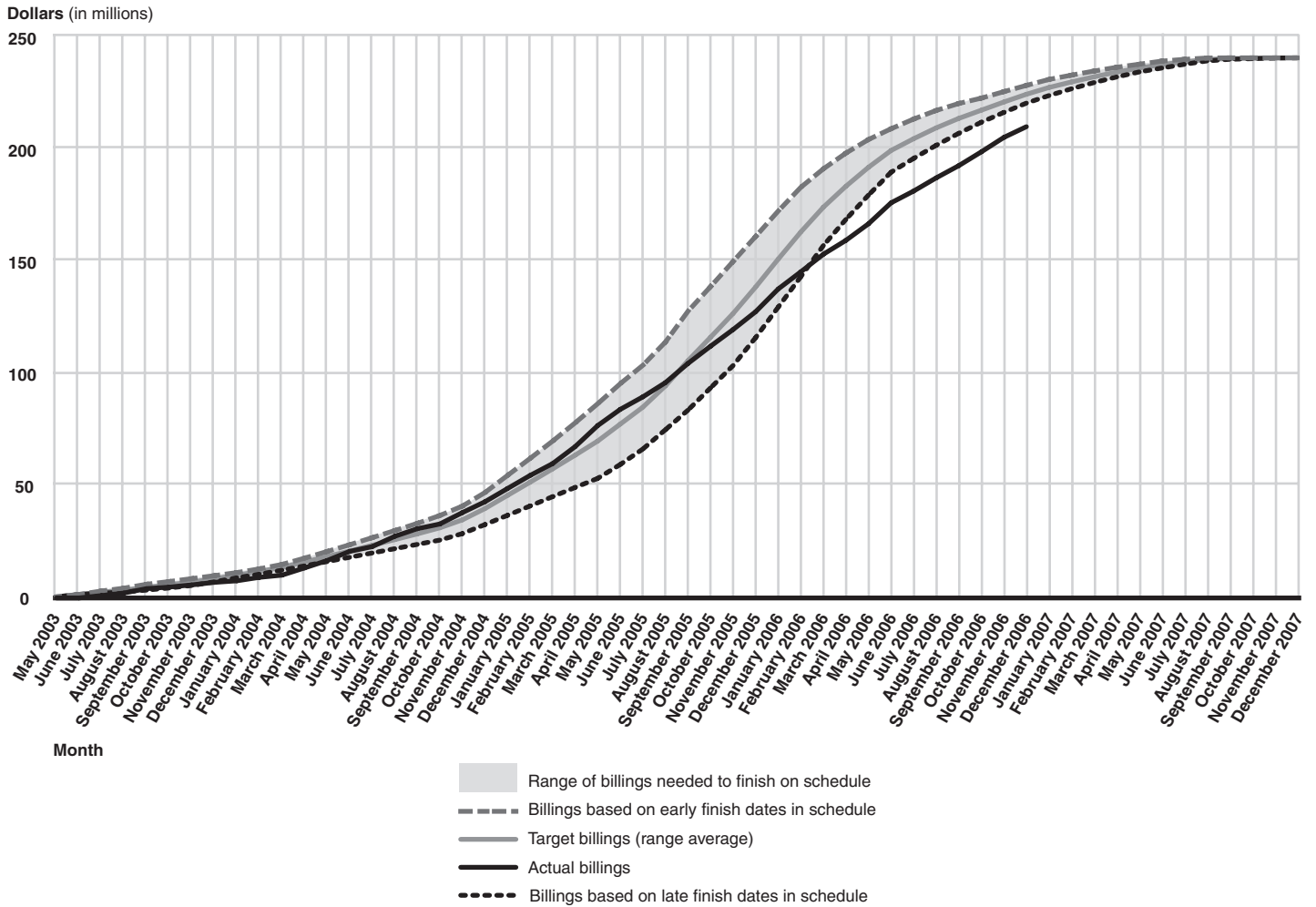
- as of January 25, 2007, the sequence 2 contractor had met 2 of 21 schedule milestones scheduled for completion by December 31, 2006, and completed 2 other milestones late (see fig. 1) and
- the sequence 2 contractor's monthly billings through December 2006 continue to indicate that construction work is about 2 months behind the scheduled completion date (see fig. 2).

Table 1: Sequence 2 Contractor's Progress in Meeting Selected Milestones Scheduled for Completion by-December 31, 2006

Activity	Location	Scheduled completion	Actual completion
Stone stairs	Great Hall	11/17/2006	11/17/2006
Wood paneling and doors	Orientation Theater	11/17/2006	
Wood doors & frames	Food Service	11/20/2006	
Install Hoods	Food Service	11/20/2006	11/27/2006
Wall stone Area #2	East Front Principal	11/27/2006	
Upholstered wall system	Visitor Auditorium	11/28/2006	
Finish paint	West Lobby & Assembly	11/29/2006	
Wood panels	West Lobby & Assembly	11/29/2006	
Install Glass Wall North End	Exhibit Gallery	11/30/2006	
AHU 10/11/22 Mech. Ready	Service level	12/01/2006	11/28/2006
Procure fire alarm panels	Various locations	12/04/2006	1/22/2007
Plaster ceiling	East Front Basement	12/12/2006	
Stone stairs	East Front Principal	12/18/2006	
Ceiling stone	East Front Principal	12/18/2006	
Wall stone Area #1	East Front Gallery	12/18/2006	
Wood doors and frames	West Lobby & Assembly	12/20/2006	
Hang drywall	East Front Attic	12/21/2006	
Flooring	Orientation Theater	12/26/2006	
Plaster ceilings	East Front Ground	12/27/2006	
Flooring	Visitor Auditorium	12/27/2006	
Fabric ceiling panels	Orientation Lobby	12/28/2006	

Source: AOC's September 2006 CVC sequence 2 construction schedule for the scheduled completion dates and AOC and its construction management contractor for the actual completion dates as of January 25, 2007.

Figure 2: Total Billings by the Sequence 2 Contractor for the Entire CVC Project Compared with the Billings Needed to Finish Construction Work on Schedule



Source: AOC's construction management contractor.

Notes:

The early and late lines on this figure reflect the cumulative billings that would be required to complete the project through contract modification number 154 (\$240.1 million total contact value) by the early and late finish dates shown in the sequence 2 contractor's schedule.

The actual line reflects the sequence 2 contractor's actual monthly billings.

Although bills are typically submitted for payment after work is completed, it is often likely that construction work will be completed on schedule when the actual billing line falls between the early and the late lines in the figure. Even with the lag in billings, this figure indicates that the amount of work being completed and billed each month is not sufficient to keep the project on schedule.

Other indicators of construction progress that we have been tracking, including the number of proposed change orders and the pace of floor and wall stone installation, also point to further delays. The number of proposed change orders has continued to grow during sequence 2 work, even at this relatively late stage in the project. Proposed change orders that result in contract modifications for new work or rework could adversely affect the schedule, as well as the costs, of the project.

In addition, floor stone installation has slowed considerably because materials, such as escalator parts, are being stored in areas where floor stone needs to be laid. Moreover, no wall stone could be installed on the upper two levels of the East Front for many weeks because site conditions had to be corrected. Wall stone installation started on the main level the week of January 22. AOC expects floor stone installation to pick up soon.

Project Continues to Face Risks and Uncertainties

Problems in completing the installation, integration, operation, and testing of complex, major building systems, including the fire alarm, security, and HVAC systems, remain the most significant risk facing the project's schedule. Technical problems may not be evident until these systems undergo testing and commissioning.⁷ For the HVAC system commissioning is not scheduled to be completed until July 2007, and in the interim, much work remains. As of January 25, 7 of the CVC's 23 air-handling units were providing conditioned air to their designated spaces full time. The remaining 16 units were reportedly ready to operate pending the installation of initial control programming, the preparation and cleaning of spaces for the units, and in some cases, other work. All 23 units still require air flow testing and balancing, control-related work, connection to the fire alarm system, punch-list work, and commissioning.⁸ While the CVC team expects the commissioning of the entire HVAC system to be completed in July, the achievability of this date is uncertain. Risks include an insufficient number of technicians with the skills and training needed to install the system, technical problems that could arise given the complexity of the system, problems coordinating the work of

⁷Final acceptance testing is the last test of a system's operation, conducted to ensure that the system meets all contract specifications and relevant fire and life safety code requirements and operates as intended.

⁸Commissioning is a systematic process to ensure, by verification and documentation, that all of a facility's systems perform interactively as designed and intended to meet the owner's operational needs.

subcontractors, damage to equipment from excessive dirt⁹ or from moisture accumulating in nonoperational units, and delays in readying the spaces for the air-handling units.

While work on the fire alarm system has advanced, it still requires substantial acceptance testing, as well as testing to ensure that it and the other major building systems operate together as intended. In addition, the project's schedule remains vulnerable to other risks and uncertainties, including design or scope changes, late identification or slow resolution of problems, and insufficient manpower.

AOC Has Begun to Implement Its Action Plan

Since the fall of 2006, AOC has been implementing elements of its November 2006 action plan to enhance the CVC team's performance in meeting schedule dates. For example, AOC has been selectively accelerating critical work; focusing greater team attention on identifying and quickly resolving problems, including conducting frequent site inspections; and changing the criteria for the contractor's award fee to reward adherence to the project's schedule. In addition, AOC has been holding weekly CVC team meetings that focus on achieving the sequence 2 schedule; however, until recently, these meetings have not generally addressed the schedules for the House and Senate expansion spaces and for major building systems. While the pace of sequence 2 work may not currently depend on progress in these other areas, the completion of the CVC project will ultimately require the completion and integrated operation of all areas, and delays in completing the expansion space and major systems work could delay the CVC's completion and opening to the public.

It is too soon to tell whether the actions identified in AOC's November 2006 action plan will be effective in curtailing additional schedule slippages. Furthermore, continuing concerns associated with the CVC's HVAC system, if not quickly addressed, could adversely affect the project's schedule. However, the greater management attention resulting from AOC's implementation of the plan has the potential to keep scheduled work on track, and aggressively carrying out the planned actions is essential to prevent further delays.

⁹Although 7 units were operating full time, the spaces being served by only 2 units were reported to be completely ready and clean as of January 25.

Recommendations

The Architect of the Capitol should

1. Promptly reassess the risks associated with, and the likelihood of, meeting, the project's schedule, especially with respect to the installation, successful operation and integration, and testing of major building systems; coordinate all work associated with the HVAC system; take appropriate action to mitigate any risks that have not been sufficiently addressed; and provide Congress with a realistic completion date; and
2. Continue to aggressively implement the November 2006 CVC action plan, including focus on the near-critical activities that can further delay the completion of the expansion spaces and the steps that can be taken to ensure that the pace of work is sufficient to meet the schedule. Also include work on the House and Senate expansion spaces, major building systems, and the Jefferson Building in weekly schedule review sessions.

AOC generally agreed with our recommendations and commented that accounting for risks in the schedule, especially those risks associated with improving system integration, will probably push the project's completion date to early 2008 and its opening date to spring 2008.

Cost Estimate Remains Unchanged, but Additional Funds Have Been Provided and More Are Likely to Be Needed

Our estimate of the project's cost at completion remains the same as we reported at the November 15 CVC hearing—\$592 million without provision for risks and uncertainties and over \$600 million with such provision. As we reported at the November hearing, the \$592 million estimate is rough, and we have not updated the \$600 estimate to reflect our assessment of the cost impact of risks and uncertainties.

To date about \$538.4 million has been provided for CVC construction, including about \$7.4 million in fiscal year 2007 funds provided under a continuing resolution.¹⁰ AOC received approval to obligate this \$7.4 million in December 2006. AOC's total request for fiscal year 2007 (including the

¹⁰AOC has been operating under a continuing resolution (CR) funded until February 15, 2007, See Public Laws 109-289, 109-369, and 109-383. The CR allows AOC's projects to continue at a rate for operations not exceeding the current rate or the rate permitted by the action of the House of Representatives, whichever is lower. Accordingly, the \$7.4 million requested was available under the CR.

\$7.4 million) is \$25.6 million.¹¹ AOC has also requested \$20 million in fiscal year 2008 CVC construction appropriations to cover remaining costs. We estimate that AOC may need about \$15 million more than AOC has estimated to complete the project, without provision for risks and uncertainties.

Madam Chair, this completes my prepared statement. I would be pleased to answer any questions that you or Members of the Subcommittee may have.

Contacts and Acknowledgments

For further information about this testimony, please contact Terrell Dorn at (202) 512-6923. Other key contributors to this testimony include Shirley Abel, John Craig, Maria Edelstein, Elizabeth Eisenstadt, Jeanette Franzel, Jackie Hamilton, Kelly Slade and Bernard Ungar.

¹¹In addition, AOC's fiscal year 2007 budget request included \$950,000 in AOC general administration appropriations for contractual support to complete acceptance testing of the CVC's fire protection system on schedule.

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