

Office of Internal Oversight Services

INTERNAL AUDIT DIVISION

AUDIT REPORT

Capital Master Plan project scheduling

While the CMP project schedule covered the entire project scope and included sufficient detail to reflect the project's execution plan, additional measures are needed to improve project scheduling

11 June 2010

Assignment No. AC2009/514/04

United Nations  Nations Unies

INTEROFFICE MEMORANDUM

MEMORANDUM INTERIEUR

OFFICE OF INTERNAL OVERSIGHT SERVICES · BUREAU DES SERVICES DE CONTRÔLE INTERNE
INTERNAL AUDIT DIVISION · DIVISION DE L'AUDIT INTERNE

TO: Ms. Angela Kane, Under-Secretary-General
A: for Management

DATE: 11 June 2010

Mr. Michael Adlerstein, Assistant Secretary-General and
Executive Director, Capital Master Plan

REFERENCE: IAD: 10- **00487**

FROM: Fatoumata Ndiaye, Director
DE: Internal Audit Division, OIOS

Fatoumata

SUBJECT: **Assignment No. AC2009/514/04 - Audit of the Capital Master Plan project scheduling**
OBJET:

1. I am pleased to present the report on the above-mentioned audit.
2. In order for us to close the recommendations, we request that you provide us with the additional information as discussed in the text of the report and also summarized in Annex 1.
3. Please note that OIOS will report on the progress made to implement its recommendations, particularly those designated as high risk (i.e., recommendations 2 and 3), in its annual report to the General Assembly and semi-annual report to the Secretary-General.

cc: Mr. Swatantra Goolsarran, Executive Secretary, UN Board of Auditors
Ms. Susanne Frueh, Executive Secretary, Joint Inspection Unit
Mr. Moses Bamuwamye, Chief, Oversight Support Unit, Department of Management
Mr. Byung-Kun Min, Special Assistant to the USG-OIOS
Mr. Gurpur Kumar, Officer-in-Charge, New York Audit Service, OIOS

INTERNAL AUDIT DIVISION

FUNCTION

“The Office shall, in accordance with the relevant provisions of the Financial Regulations and Rules of the United Nations examine, review and appraise the use of financial resources of the United Nations in order to guarantee the implementation of programmes and legislative mandates, ascertain compliance of programme managers with the financial and administrative regulations and rules, as well as with the approved recommendations of external oversight bodies, undertake management audits, reviews and surveys to improve the structure of the Organization and its responsiveness to the requirements of programmes and legislative mandates, and monitor the effectiveness of the systems of internal control of the Organization” (General Assembly Resolution 48/218 B).

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EXECUTIVE SUMMARY

Audit of the Capital Master Plan project scheduling

The Office of Internal Oversight Services (OIOS) conducted an audit of the Capital Master Plan (CMP) project scheduling. The overall objective of the audit was to assess the effectiveness of CMP programme planning. The audit was conducted in accordance with the International Standards for the Professional Practice of Internal Auditing.

Accurate and effective project scheduling and implementation measures are critically important for complex projects such as CMP because delays result in increases in time-dependent costs such as the leasing of swing space, project administration, design and consulting fees, and inflation. In OIOS' opinion, the Office of CMP is applying effective controls over project scheduling. The schedule covers the entire project scope and includes sufficient detail to reflect the project's execution plan.

However, OIOS is of the opinion that the following issues should be addressed to further improve project scheduling:

- (a) The Office of CMP does not maintain a summary to assist in monitoring the construction manager's contractual obligations to complete contracts within the specified time frames.
- (b) The Office of CMP has estimated project delay costs based on a 2008 calculation that needs updating.
- (c) The Office of CMP has taken necessary actions to keep to the schedule. However, decisions are not based on formally prepared cost-benefit analyses.

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I. INTRODUCTION

1. The Office of Internal Oversight Services (OIOS) conducted an audit of the Capital Master Plan (CMP) project scheduling. The audit was conducted in accordance with the International Standards for the Professional Practice of Internal Auditing.
2. Accurate and effective project scheduling and implementation measures are critically important for complex projects such as CMP because delays result in increases in time-dependent costs such as the lease of swing space, project administration, design and consulting fees, and inflation. The construction manager is responsible for preparing a construction schedule in accordance with each construction management agreement with guaranteed maximum price (GMP) contract. This schedule is reviewed by the Office of CMP and the consultant programme manager, who is responsible for preparing and updating the overall CMP programme schedule. The programme schedule includes the construction schedule, move schedule and Facilities Management Services (FMS) project schedules. Failure to meet the milestones in any of the schedules incorporated in the overall programme schedule may cause a delay in the completion of the CMP.
3. The Secretary-General's seventh annual progress report dated 16 September 2009 on the implementation of the Capital Master Plan (A/64/346) projected that the Secretariat building will be fully reoccupied in mid-2012, and that the entire project will be completed in late 2013.
4. Comments made by the Office of CMP are shown in *italics*.

II. AUDIT OBJECTIVES

5. The main objectives of the audit were to:
 - (a) Determine whether the organization and processes relating to project scheduling have been appropriate and effective;
 - (b) Assess whether the scheduling plan is realistic and complete;
 - (c) Determine the level of confidence that planned outcomes have been achieved and will be achieved in the future;
 - (d) Determine whether effective and timely information is given to project managers and stakeholders, including senior management; and
 - (e) Assess whether appropriate action is taken in the event of elements of the programme that are subject to slippages or are not being achieved.
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III. AUDIT SCOPE AND METHODOLOGY

6. OIOS reviewed CMP schedules using as criteria the Practice Standard for Scheduling¹ issued by the Project Management Institute. OIOS reviewed GMP contracts, notices to proceed, certificates of substantial completion, minutes of weekly coordination meetings, construction manager's monthly executive reports and the consultant programme manager's monthly status reports. OIOS also interviewed personnel of the Office of CMP, the construction manager and the consultant programme manager.

IV. AUDIT FINDINGS AND RECOMMENDATIONS

A. Organization and processes for scheduling

The construction manager

7. According to the project manual and the coordination agreement between the United Nations and the construction manager, the construction manager is responsible for developing and updating schedules for each GMP contract (GMP contract schedules) and a construction master schedule that consolidates all GMP contract schedules. The construction manager reviews and updates the construction master schedule and GMP contract schedules each month in accordance with Section 3.3 of the Coordination Agreement and Section 6.1 of the GMP contract between the United Nations and the construction manager. The construction manager employs schedule technicians for individual projects, and a systems and control manager to develop and maintain the construction master schedule in Primavera scheduling software.

Consultant programme manager

8. The consultant programme manager is responsible for developing and updating the programme schedule that incorporates construction master schedule, relocation schedule and FMS project schedules that may affect the overall CMP programme schedule (e.g., refitting of DC1 and DC2 buildings that can affect moving staff out of the Secretariat building). The consultant programme manager reviews the construction master schedule and consolidates inputs. The consultant programme manager employs a scheduler to develop and maintain the programme schedule.

The Office of CMP

9. The Office of CMP provides input to the construction schedules, coordinates inputs with the UN departments and reviews and approves the programme schedule.

¹ Practice Standard for Scheduling; 2007; Project Management Institute; Published by Project Management Institute, Inc.

Coordination

10. Programme coordination is achieved through various meetings, including weekly coordination meetings attended by the Executive Director, Director of Construction and principal officers from the Office of CMP, the construction manager and the consultant programme manager. There are also project managers' meetings, relocation meetings attended by FMS and the Office of Information and Communications Technology, and bi-weekly cross-contract coordination meetings attended by the design consultants. Daily issues affecting schedules are addressed by the project managers from the Office of CMP, consultant programme manager and the Director of Construction. OIOS reviewed minutes of the coordination meetings and attended monthly review meetings, and confirmed that scheduling issues are consistently placed on the agenda and discussed during the meetings. OIOS also reviewed the CMP monthly status reports prepared by the consultant programme manager and the construction manager's monthly executive report. The CMP monthly status reports are issued to senior management and project managers of CMP and copied to the Under-Secretary-General for Management, the Assistant Secretary-General, Controller, the Office of Programme Planning, Budget and Accounts and the Under-Secretary-General, the Office of Internal Oversight Services. As a result of its fieldwork, OIOS concludes that the organization, processes, and coordination mechanisms employed by the Office of CMP provide for the effective scheduling of the CMP.

B. Guaranteed Maximum Price contract schedules conform to the Practice Standard for Scheduling

Completeness of the construction master schedule

11. OIOS reviewed the construction master schedule as of 31 December 2009 for completeness, and also determined whether the individual GMP contract schedules' substantial completion dates are the same as those reflected in the construction master schedule. OIOS reviewed subproject schedules for Contract B Package 2 (pre-purchased equipment), North Lawn Conference Building (NLCB) Power Vault, Dag Hammarskjold Library, Delegates' Dining Room, East River Walkway, Temporary Security Council, United Nations Federal Credit Union Building/11th Floor, and hoist at the Secretariat Building.

12. OIOS observed that the construction master schedule includes all major projects, including those for which the GMP contract had not yet been signed. Small variations of several days were noted between the construction master schedule and the subproject completion dates. The construction manager explained that this is due to the fact that the construction master schedule is compiled manually as a separate schedule. Differences are corrected during the next monthly update.

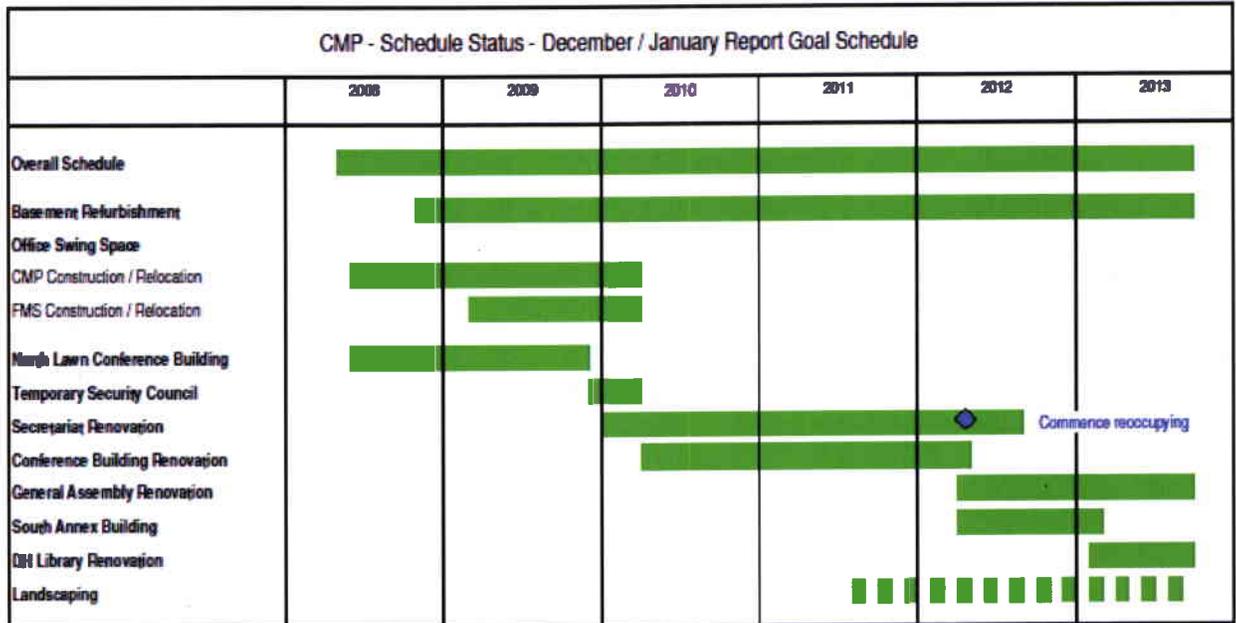
13. OIOS noted that the GMP contract for the permanent Conference Building, for which the construction was scheduled to start in April 2010, had not been signed at the time of the audit (April 2010) and had been sent for re-

bidding. The Director of Construction explained that this was because additional value engineering efforts were required to bring the value of the GMP contract within the budget. The work will proceed under the task order recommended for approval by the Headquarters Committee on Contracts on 24 March 2010. A task order is a means by which work can proceed if it has not been appropriate or possible to put in place a GMP contract before work is scheduled to start. The construction manager informed OIOS that the GMP contract for the Conference Building will be split into two packages to keep up with the schedule. OIOS expressed a concern that going forward with the task order rather than the signed GMP contract may result in higher costs. Furthermore, splitting the GMP contract into packages could lead to a higher number of change orders based on the experience with the NLCB renovation. The construction manager assured OIOS that all trade contracts under the task order will be competitively bid and that the process is no different to the GMP bidding. However, the construction manager indicated that splitting the work into packages will likely result in a higher volume and total value of change orders. The Office of CMP estimates that the GMP contract and contract amendment for package 2 of the Conference Building will be signed by August 2010. OIOS will keep under review the procurement of trade contracts by means of task orders for the Conference Building.

14. OIOS was not able to assess whether the construction master schedule estimates for completion are realistic since many of the GMP contracts have not yet been signed. For example, GMP contracts for the South Basement, campus-wide systems, Conference Building, General Assembly, South Annex and Library have not been signed. The Office of CMP and the consultant programme manager were confident that the CMP project will be finished in late 2013, as reported by the Secretary-General in the seventh annual progress report on the implementation of the Capital Master Plan. The construction manager also believed that the timeframe for completion is realistic, but emphasized that if certain decisions are not made on time by the Office of CMP and other stakeholders (i.e. restacking of the Secretariat), keeping up with the schedule will require the payment of acceleration costs (overtime schedule). The Office of CMP informed OIOS that the restacking plan for the Secretariat has been finalized after consultations with each Head of Department and Office. At the time of this report, an interoffice memorandum signed by the Under-Secretary-General for Management was awaiting approval by the Chef de Cabinet for distribution to all Heads of Departments and Offices.

15. The consultant programme manager reported the schedule as of January 2010 (see Table 1). OIOS' review concluded that it is consistent with the construction schedule and the baseline reported in the Secretary-General's seventh annual progress report on the implementation of the Capital Master Plan.

Table 1: CMP programme schedule status as of January 2010



16. OIOS reviewed two subproject schedules (Contract B Package 2 and construction hoists) against practices prescribed by the Practice Standard for Scheduling issued by the Project Management Institute. In OIOS' opinion, the construction schedules under review generally conformed with the good practices for scheduling. The following components were among those tested by OIOS:

- Baseline timescales had been established in accordance with the timing for completion as laid down in the GMP contracts. The construction master schedule uses the baselines for completion as reported by the Secretary-General in the seventh annual progress report on the implementation of the Capital Master Plan;
- Logic - activities were linked in accordance with the activity sequence, and the interdependencies of the different activities were shown;
- Reporting - schedules were regularly updated and reported on a monthly basis;
- Numerous support activities were included in the schedule, such as contract negotiations, bid openings, submittals and approvals of technical documentation, fabrication and delivery of key materials, testing and commissioning.

17. OIOS noted that the construction manager does not use a schedule risk analysis process. Schedule risk analysis can determine the likelihood of finishing

the project as scheduled, which activities are the most likely to delay the project, and what actions can be taken to control risks in the schedule. Without schedule risk analysis, a schedule can not provide reliable predictions of dates and critical path if activity durations are not known with a high degree of certainty, and activity relationships are not clearly defined. The construction manager stated that it is not contractually required to employ a schedule risk analysis process for scheduling.

18. OIOS also noted that the construction schedules did not take resource availability into account. A resource-loaded schedule helps to ensure alignment between cost estimates and schedules, and enables the evaluation of peak labour requirements. The construction manager explained that resource-loaded schedules are rarely used in New York City as there are no shortages of labour or other resources. Furthermore, the preparation of a resource loaded schedule is not required by the contract. OIOS is of the opinion that implementing schedule risk analysis and resource-loaded schedule at this stage might not be practical, however, it could be used in other projects that will be undertaken by the United Nations in the future.

Recommendation 1

(1) The Office of CMP should review the need for schedule risk analysis and resource loaded schedules in its lessons learned database for consideration in other future construction projects to be undertaken by the United Nations.

19. *The Office of CMP accepted recommendation 1 and stated that it will be implemented by December 2010.* Recommendation 1 remains open pending submission by the Office of CMP of the lessons learned database.

C. Monitoring the construction manager's adherence to contractual completion timelines

20. OIOS reviewed the construction manager's compliance with GMP contract conditions requiring projects to be completed within a specified number of calendar days starting from the notice to proceed issued by the Office of CMP. Once the project is determined to be substantially complete, the Office of CMP issues the certificate of substantial completion signed by the design consultants. Table 2 shows an analysis of the construction manager's compliance for all substantially completed projects.

Table 2: Compliance of the construction manager with the contractual completion days for all substantially completed projects

| <i>Project name</i> | <i>Notice to proceed</i> | <i>Completion date per GMP</i> | <i>Certificate of Substantial completion</i> |
|---------------------|--------------------------|--------------------------------|--|
| NLCB GMP 1 | 18 July 2008 | 275 days 19 April 2009 | 24 Dec. 2009 |

| | | | |
|--------------------|---------------------------|----------------------------|---|
| NLCB Amendment 1 | 8 August 2008 | 275 days 9 May 2009 | 24 Dec. 2009 |
| NLCB Amendment 2 | 21 Nov. 2008 | 280 days 27 August 2009 | 24 Dec. 2009 |
| NLCB Amendment 3 | 12 Dec. 2008 | 355 days 1 Dec. 2009 | 24 Dec. 2009 |
| NLCB Amendment 4 | 2 April 2009 | 274 days 31 Dec. 2009 | 24 Dec. 2009 In compliance |
| UNFCU | 9 Dec 2008 Floors 8-10 | 183 days 10 June 2009 | Floors 8-10 21 Aug. 2009 Floor 11 – ongoing |
| 305 E 46 Street | 21 Nov 2008 | 250 days 28 July 2009 | 8 July 2009 In compliance |
| 380 Madison Avenue | 20 May 2009 | 180 days 15 Nov 2009 | 4 Oct. 2009 In compliance |

21. As can be seen from the above table, the construction manager was in compliance with the GMP contract requirements for completion, except for the NLCB and UNFCU. The Office of CMP explained that the differences between the contractual completion dates and the certificate of substantial completion dates for the NLCB were because the GMP contract was split into packages to accelerate the schedule, and separate notices to proceed were issued for each package. However, only one certificate of substantial completion was signed for the whole NLCB project. The discrepancy for the UNFCU was due to a delay in signing off the certificate of substantial completion by the Office of CMP. The construction manager did request the issuance of the certificate of substantial completion for UNFCU on 5 June 2009 and this was certified by the design consultant on 10 June 2009.

22. The Office of CMP does not maintain a summary of issued notices to proceed, contractual completion requirements and any change orders that resulted in extensions to completion times. OIOS considers that the maintenance of such a summary would aid the monitoring of the construction manager's compliance with the contractual dates. Furthermore, the summary should also include any delays caused by omissions of the Office of CMP, architects and engineers, or unforeseen circumstances beyond the control of the construction manager. The delays should be properly documented in cases where liquidated damages may be payable or disputes may arise between the United Nations and the construction manager, as provided by Article 9 of the GMP contract. At the time of the audit, there had not been any instances where the Office of CMP had sought to impose liquidated damages on the construction manager, as it was in compliance with its contractual obligations regarding completion dates.

Recommendation 2

(2) The Office of CMP should maintain for each GMP contract a summary recording the notice to proceed date, the contractual completion date and any extensions granted to

the construction manager or delays outside the construction manager's control. Responsibility for any delays should be assigned and documented in order to support any cases where disputes arise relating to the imposition of liquidated damages.

23. *The Office of CMP accepted recommendation 2 and stated that it will be implemented by December 2010. Recommendation 2 remains open pending confirmation by the Office of CMP that the record summarizing construction manager's adherence to contractual completion times is prepared.*

D. Actions taken to mitigate schedule slippages

24. The General Assembly, in its resolution 64/228, expressed its concern that "the completion date for CMP has slipped from mid-2013 to late 2013, as a consequence of the delay in the construction of the temporary NLCB".

25. OIOS' review showed that the Office of CMP took necessary action to maintain the schedule through splitting designs into packages in the case of NLCB and authorizing acceleration costs for swing spaces. However, OIOS is concerned that each of these decisions was not accompanied with a cost-benefit analysis. In 2008, the consultant programme manager estimated that the cost of delay was \$14 million per month. OIOS was not able to confirm this figure, as the detailed background information for the estimation was not presented. At the time of the audit (April 2010) there were \$38 million worth of approved change orders for NLCB. The Office of CMP and the construction manager informed OIOS that to wait for 100 per cent complete designs would have caused the delay costing far more than \$38 million. However, OIOS considers that a cost-benefit analysis should have been documented to support the decision for acceleration before it was made.

26. OIOS is of the opinion that the calculation of the cost of delays should be regularly reviewed and revised. The Office of CMP also needs to document the cost-benefit analysis for decisions resulting in acceleration, and track the cost of acceleration to demonstrate to stakeholders the cost of delays versus the cost of acceleration.

27. OIOS review also showed that the data on the cost of acceleration was not readily available and would require the review of individual change orders (over 200 for the NLCB project). The Office of CMP should maintain a summary of acceleration costs for each project and related reasons for overtime schedule.

Recommendations 3 to 5

The Office of CMP should:

(3) Base its decisions for acceleration on documented cost-benefit analyses;

(4) Regularly review and revise its calculation of the cost of delays, and maintain supporting documentation for the calculations; and

(5) Track the actual acceleration costs to enable analysis of the cost of delays versus cost of acceleration.

28. *The Office of CMP accepted recommendations 3 to 5 and stated that the above recommendations will be implemented by December 2010. Recommendation 3 remains open pending subsequent review by OIOS of change orders for acceleration with the underlying cost-benefit analysis. Recommendation 4 remains open pending OIOS review of the revised calculation of cost of delay and supporting documentation for the calculation. Recommendation 5 remains open pending OIOS review of the table summarizing acceleration costs.*

V. ACKNOWLEDGEMENT

29. We wish to express our appreciation to the Management and staff of Office of CMP, the construction manager and the consultant programme manager for the assistance and cooperation extended to the auditors during this assignment.

STATUS OF AUDIT RECOMMENDATIONS

| Recom. no. | Recommendation | Risk category | Risk rating | C/O ¹ | Actions needed to close recommendation | Implementation date ² |
|------------|---|---------------|-------------|------------------|--|----------------------------------|
| 1 | The Office of CMP should review the need for schedule risk analysis and resource loaded schedules in its lessons learned database for consideration in other future construction projects to be undertaken by the United Nations. | Operational | Medium | O | Submission by the Office of CMP of the lessons learned database confirming inclusion of the schedule risk analysis and resource loaded schedules for consideration in future projects. | December 2010 |
| 2 | The Office of CMP should maintain for each GMP contract a summary recording the notice to proceed date, the contractual completion date and any extensions granted to the construction manager or delays outside the construction manager's control. Responsibility for any delays should be assigned and documented in order to support any cases where disputes arise relating to the imposition of liquidated damages. | Compliance | High | O | Confirmation by the Office of CMP that the record summarizing construction manager's adherence to contractual completion times is prepared. | December 2010 |
| 3 | The Office of CMP should base its decisions for acceleration on documented cost-benefit analyses. | Financial | High | O | Subsequent review by OIOS of change orders for acceleration with the underlying cost-benefit analysis. | December 2010 |
| 4 | The Office of CMP should regularly review and revise its calculation of the cost of delays, and maintain supporting documentation for the calculations. | Financial | Medium | O | OIOS review of the revised calculation of cost of delay and supporting documentation for the calculation. | December 2010 |
| 5 | The Office of CMP should track the actual acceleration costs to enable analysis of the cost of delays versus cost of acceleration. | Financial | Medium | O | OIOS review of the table prepared by the Office of CMP summarizing acceleration costs. | December 2010 |

1. C = closed, O = open

2. Date provided by the Office of CMP in response to recommendations.