Department of Veterans Affairs

Office of Inspector General

AUDIT OF ENERGY CONSTRUCTION PROJECT AT DEPARTMENT OF VETERANS AFFAIRS MEDICAL CENTER ANN ARBOR, MICHIGAN

Reducing the project scope will enable better use of funds.

Report No. 8R5-D02-133
Date: August 12, 1998

Office of Inspector General
Washington DC 20420

DEPARTMENT OF VETERANS AFFAIRS
Office of Inspector General
Washington DC 20420

Memorandum to the Director, Department of Veterans Affairs Medical Center, Ann Arbor, Michigan (506)

Audit of Energy Construction Project

1. The purpose of the audit was to determine if the construction project was necessary or whether there were alternatives that would satisfy the needs of the medical center in a more cost-effective manner. We performed the audit as part of a national audit of Minor Construction and Nonrecurring Maintenance (NRM) projects. This NRM project was included in 68 projects we statistically selected for review from a national universe of 1,106 Minor Construction and NRM projects.

2. According to the project plans, 20 energy-saving measures identified in a Department of Energy audit would be implemented. One of these measures involved installing occupancy sensors throughout the medical center and another involved installing a variable air volume system to improve the efficiency of the heating, ventilating, and air conditioning system in research rooms.

3. Our audit found that installing occupancy sensors throughout the medical center and installing the variable air volume system in research rooms that already had fume hoods were not cost-effective. The cost to install occupancy sensors would not be recouped in energy savings. Also, encouraging staff to turn the lights off is a less costly alternative that could achieve much of the energy savings. The cost to install the variable air volume system in research rooms with fume hoods would also not be recouped in energy savings. We concluded that the estimated cost of $238,269 to complete both measures could be better used for other purposes. We discussed our findings with medical center officials and Veterans Integrated Service Network officials, and they agreed with our conclusions. As a result, we recommended that you cancel these portions of the project. You concurred with the recommendation and provided acceptable implementation plans. We consider all audit issues resolved and will follow up on the implementation plans until they are completed.

For the Assistant Inspector General for Auditing

(Original Signed By)

WILLIAM D. MILLER
Director, Kansas City Audit Operations Division

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RESULTS AND RECOMMENDATION

Reducing the Scope of the Energy Construction Project Will Enable Better Use of Funds

The energy construction project included plans to install occupancy sensors throughout the medical center and plans to install a variable air volume (VAV), dual duct system in research rooms. These plans were designed to implement energy saving measures. However, an error in a consultant's savings calculations mistakenly resulted in a positive net present value (PV) saving for installing the occupancy sensors. In addition, a measure to convert the heating, ventilation, and air conditioning (HVAC) system in all research rooms included converting the HVAC system in research rooms that already had fume hoods. While this measure in total had a positive net PV saving, the portion related to rooms with fume hoods was independent of the rest of the measure and did not have a positive net PV saving. By canceling these portions of the project, facility officials can redistribute $238,269 for better use.

The Energy Project Consisted of Twenty "Mini-projects" (Measures)

A Department of Energy (DOE) study identified 20 measures for VA Medical Center (VAMC) Ann Arbor staff to save money through the more efficient use of electricity, water, and other fuels. For 17 measures, the study identified costs totaling $1,056,620. For the other 3 measures, the study did not identify costs. However, Facilities Management staff estimated the cost for one of these three measures to be $65,533.

VAMC Ann Arbor staff submitted a Nonrecurring Maintenance (NRM) proposal to implement the 20 measures. We reviewed six measures that totaled over 90 percent of the total project cost as shown below.

Cost	Description
$ 472,806	Replace lighting
142,066	Install occupancy sensors
193,634	Improve HVAC System in Bldg. 22
79,373	Conduct B22 and 28 tie-in with central chiller
58,075	Install variable speed drives on air handling units
65,533	Install energy efficient motors
$ 1,011,487	

Installing Occupancy Sensors Was Not Cost-Effective

This measure involved installing approximately 998 wall-mounted sensors and 100 ceiling-mounted sensors throughout the medical center. The estimated cost was $142,066, and DOE's net PV saving (net of the installation cost) was calculated at $77,153.

In reviewing the justification for this project we identified three concerns. First, the net saving calculations were inaccurate. These calculations were composed of several parts. One part of the calculation determined the reduction in kilowatt-hours per year (kWh/yr.) as follows:

	Existing kWh/yr. usage
–	Estimated kWh/yr. after the sensors are installed
	Reduction in kWh/yr.

We found that the existing kWh/yr. figure was overstated which, in turn, overstated the reduction in kWh/yr. As a result, annual savings were overstated by $5,312 as shown below.

Reduction in kWh/yr. (original)	296,957
Reduction in kWh/yr. (revised)	105,880
Reduction in kWh/yr. (difference)	191,077
Cost per kWh/yr.	$.0278
Reduction in annual kWh savings	$5,312

Another part of the calculations determined the reduction of kilowatt (kW) usage. An error in these calculations resulted in the kW reduction being overstated, and, therefore, the estimated dollar saving was overstated as shown below.

Annual kW reduction (original)	429
Annual kW reduction (revised)	287
Annual kW reduction (difference)	142
Cost per kW	$16.90
Annual kW savings	$2,400

The consultant who performed the DOE study agreed that these figures were not accurate. His revised calculations show a net PV saving of a negative $27,234.

Second, estimating the reduction in the number of hours of lighting use is subjective and imprecise. In some rooms, the DOE study assumed that the lights were on 24 hours per day, 365 days per year, and that with the sensors there would be 16 hours less usage per

day, every day of the year. In our view, it is unlikely that lights are left on constantly throughout the entire year.

Third, we believe that there is a less costly alternative to this project. The importance of turning lights off could be communicated to the staff in staff meetings. Also, in some areas, signs could be posted as reminders. This could realize much of the savings that would be achieved by installing sensors, but at much less cost.

Facility staff had already purchased and installed 40 sensors at a cost of $3,600. In addition, management believes that approximately 60 more are needed ($5,400) for areas such as closets, where the likelihood of lights being left on and going unnoticed is greater. Canceling the remainder of the sensors would save $133,066 ($142,066 - $3,600 - $5,400).

Converting Rooms With Fume Hoods to a VAV System Was Not Cost-Effective

Another measure involved converting the HVAC system in Building 22 (the Research Building). The intent of this measure was to reduce the airflow (and, therefore, energy consumption) in rooms during nonworking hours. This would be accomplished in two phases. As shown below, Phase I results in a positive net saving; however, Phase II does not.

Project Cost	Net Savings	Project Description
$ 88,431	$ 67,406	Phase I – Convert rooms without fume hoods to VAV dual duct
$105,203	$ (23,685)	Phase II – Convert rooms with fume hoods to VAV dual duct
$ 193,634	$ 43,721	Total Measure

The DOE Report stated that Phase I could be accomplished without continuing on with Phase II. In our view, since Phase II is not cost-effective and since Phase I is not reliant on Phase II, the second phase of the project should not be implemented. Canceling Phase II of the measure would save $105,203.

Recommendation

We recommend that the Medical Center Director:

a. Cancel the portions of the construction project that do not provide positive net PV savings, specifically the portions to install occupancy sensors throughout the medical center and to convert rooms with fume hoods to VAV systems.

b. Ensure that a more detailed analysis is accomplished to verify quantities, installation costs, and the savings potential for each measure prior to implementation.

The associated monetary benefits for the Recommendation are shown in Appendix III on page 7.

Medical Center Director Comments

Upon reviewing the Audit Report on our list of energy savings projects as identified in the Energy Audit, the facility concurs with the findings. We also agree with the estimated dollar impact for the findings and with the findings stated in the Audit of Energy Construction Project (Project No. 8R5-041). Of the 20 energy savings projects identified in the subject Energy Audit of March 1997, the facility has already implemented four of the measures and has projects under way to complete two of the other measures identified. The measures that have been completed, or are currently underway, have been chosen based on a combination of ease of completion, cost of implementation versus cost return, and overall benefit to the facility.

The project to interlink the fume hoods in Building 22 (Phase II) with the VAV boxes will be canceled. The facility will also review our plans to change out the existing dual duct HVAC system to a VAV system based on cost return and any anticipated reduction in maintenance costs.

As recommended, the facility will not be installing the number of occupancy sensors identified in the Energy Audit, but instead will be installing sensors on an as need determines basis. The facility's approach to this specific energy savings initiative has always been a conservative one given the "automation" concerns of staff. Training and communications reminders will be pursued.

Office of Inspector General Comments

The medical center director concurred with the recommendation and provided acceptable implementation plans. We consider all audit issues resolved and will follow up on the implementation plans.

OBJECTIVES, SCOPE AND METHODOLOGY

Objectives

The objective of this audit was to evaluate the effectiveness of controls at the Veterans Integrated Service Network (VISN) and VAMC levels to ensure that projects are justified and that construction funds are used to meet agency goals. Specifically, we conducted this on-site review to determine if the project was justified and if alternatives had been considered that would provide the required services more cost-effectively.

Scope and Methodology

This audit was performed as part of a national audit of Minor Construction and NRM projects. This NRM project was included in 68 projects statistically selected for review from a national universe of 1,106 Minor Construction and NRM projects. To meet the audit objective, we reviewed supporting documentation and analyses at the VISN and VAMC levels, interviewed VAMC staff and management, and assessed current procedures for project approval.

We did not use automated VA data to review the justification for this project. Therefore, we did not assess the reliability of any automated data during our on-site review.

The audit was made in accordance with generally accepted government auditing standards and included such tests of the procedures and records as were deemed appropriate under the circumstances. Internal controls pertaining to the areas reviewed were analyzed and evaluated. The audit included program results, economy and efficiency, and financial and compliance elements.

BACKGROUND

VAMC Ann Arbor, Michigan

The medical center services veterans in 17 counties located in Southern Michigan and Northwestern Ohio. During Fiscal Year (FY) 1997, VAMC Ann Arbor had 145 operating beds, with an average daily census of 110; 5,329 admissions; and 182,836 outpatient visits (which includes the Toledo, Ohio outpatient clinic). The 58-bed Nursing Home Care Unit had 244 admissions, 245 discharges, and an average daily census of 50 during FY 1997. The Medical Center is affiliated with University of Michigan Medical School.

During FY 1997, VAMC Ann Arbor spent approximately $948,000 on construction projects. This total was comprised of $851,000 for NRM projects and $97,000 for station-level projects. In addition, a major construction project costing $171 million was underway to expand the medical center. Key components of this expansion include construction of a three-story research building, an energy center, a seven-story clinical addition, parking structures, and renovation of the existing main hospital building.

MONETARY BENEFITS IN ACCORDANCE WITH IG ACT AMENDMENTS

Report Title: Audit of Energy Construction Project at VA Medical Center, Ann Arbor, Michigan

Project Number: 8R5-041

Recommendation Number	Category/Explanation of Dollar Impact	Better Use of Funds	Questioned Costs
1	Better Use of Funds. Amount VA can use elsewhere by canceling the portions of the project to install occupancy sensors throughout the medical center and to convert rooms with fume hoods to VAV systems.	$238,269	$ -0-
		$238,269	$ -0-

MEMORANDUM FROM THE MEDICAL CENTER DIRECTOR

Department of
Veterans Affairs

Memorandum

Date: Aug 7, 1998

From: Director, VAMC Ann Arbor, MI (506/51)

Subj: Audit of Energy Construction Project
To: Assistant Inspector General for Auditing (52), Kansas City, MO
Thru: Associate Director for Operations, VAMC Ann Arbor (506/50)

1. Upon reviewing the Audit Report on our list of energy savings projects as identified in the Energy Audit, the facility concurs with the findings. We also agree with the estimated dollar impact for the findings and with the findings stated in the Audit of Energy Construction Project (Project No. 8R5-041). Of the 20 energy savings projects identified in the subject Energy Audit of March 1997, the facility has already implemented four of the measures and has projects under way to complete two of the other measures identified. The measures that have been completed, or are currently underway, have been chosen based on a combination of ease of completion, cost of implementation versus cost return, and overall benefit to the facility.

2. The project to interlink the fume hoods in Building 22 (Phase II) with the VAV boxes will be canceled. The facility will also review our plans to change out the existing dual duct HVAC system to a VAV system based on cost return and any anticipated reduction in maintenance costs.

3. As recommended, the facility will not be installing the number of occupancy sensors identified in the Energy Audit, but instead will be installing sensors on an as need determines basis. The facility's approach to this specific energy savings initiative has always been a conservative one given the "automation" concerns of staff. Training and communications reminders will be pursued.

4. We appreciate the efforts made by this review team and their subsequent recommendations. As a facility, we are interested in lowering our overall operational costs and welcome oversight of this nature on any of our projects. If you should have any questions please contact Lowell Hanson, Facilities Management Officer, at (743) 761-5489.

(Original signed by Paul D. Scheel for

JAMES W. ROSEBOROUGH)

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