

## UC RIVERSIDE: AUDIT & ADVISORY SERVICES

June 29, 2012

To: Mike Miller, Associate Vice Chancellor, Physical Plant and Transportation

Re: Limited Review of Deferred and Preventative Maintenance

Ref: Audit R2012-09

We have completed a limited review of the current status of Deferred Maintenance (DM) projects and the completion of Preventative Maintenance (PM) work performed for non-auxiliary buildings/infrastructure. DM and PM related discussions were also held with management from selected self-supporting (auxiliary) units as part of this review. This limited review was performed in accordance with the UC Riverside Audit Plan. Our report is attached for your review.

Review procedures pertaining to DM projects and PM work for non-auxiliary structures were primarily limited to formal interviews and phone discussions conducted with you, the Director of Plant Administration and several Facilities and Maintenance trade supervisors. We also met informally with directors and managerial employees from select self-supporting units for the purpose of gathering information pertaining to the completion of DM projects and PM work in auxiliary related campus buildings/infrastructure.

We will perform audit follow-up procedures in the future to review the status of management action. This follow-up may take the form of a discussion or perhaps additional fieldwork, as we deem necessary. Audit R2012-09 will remain open until we have evaluated the actions taken.

We appreciate the cooperation and assistance provided by your staff and other campus personnel. Should you have any questions concerning the report, please do not hesitate to contact me.

Michael R. Jenson  
Director

xc: Audit Committee  
Director of Plant Administration Artman  
Assistant Director of Plant Services Terry

UNIVERSITY OF CALIFORNIA AT RIVERSIDE  
AUDIT & ADVISORY SERVICES  
MEMBER OF ASSOCIATION OF COLLEGE & UNIVERSITY AUDITORS

AUDIT REPORT R2012-09  
FACILITIES AND MAINTENANCE  
LIMITED REVIEW OF DEFERRED AND PREVENTATIVE MAINTENANCE

JUNE 2012

Approved by:

---

Rodolfo Jeturian  
Assistant Director

---

Richard W. Melton  
Principal Auditor

---

Michael R. Jenson  
Director

**UC RIVERSIDE  
LIMITED REVIEW OF  
DEFERRED AND PREVENTATIVE MAINTENANCE  
AUDIT REPORT R2012-09  
JUNE 2012**

**I. MANAGEMENT SUMMARY**

Based upon the results of work performed within the scope of this review, it is our opinion that except for self-supporting campus units, funds have not been provided for a number of years to address non-auxiliary buildings and infrastructure Deferred Maintenance (DM) projects. As a result of our observations, we recommend that discussions with appropriate campus administrators and responsible UCOP personnel be held to address the immediate repair and renovation needs for non-auxiliary campus structures.

Although recent budget cuts have affected funding and available employee resources for Preventative Maintenance (PM) work, the Facilities and Maintenance trade groups have been able to complete a significant percentage of the PM work orders currently being generated from the automated work order database (Facilities Administration and Management Information System - FAMIS). Based on a FAMIS PM related work order report, the various trade areas have made good faith efforts to maintain non-auxiliary buildings and infrastructure in satisfactory operating condition for those system work orders currently in the database.

However, pertinent information relating to certain building infrastructure has not been input into the automated work order system. As a result, PM work for certain interconnected structural elements that provide the framework for supporting an entire building is in some cases not being performed by Facilities Maintenance personnel. To improve controls relating to PM work processes, we have recommended that as time permits and additional resources become available, all building, related equipment and other infrastructure details should be entered into FAMIS so that work orders can be generated and the related PM work performed.

The FAMIS maintains a database of financial and operating details associated with PM work orders including the status of work orders, PM hours by craft trade and other related information. Other recommendations relating to FAMIS have also been made in this report.

Facilities and Maintenance management and staff have indicated a strong desire to improve controls and implement the recommendations identified in this review.

## **II. INTRODUCTION**

### **A. PURPOSE**

The primary objective of this review was to provide an overall assessment of the status of current DM projects and the completion of PM work performed by Facilities and Maintenance trade crafts for non-auxiliary buildings, equipment and related systems infrastructure. This review also included expressed opinions on observations that directly pertained to DM and PM for selected campus auxiliaries.

### **B. BACKGROUND**

As part of the Fiscal Year (FY) 2011-12 Audit Plan, the original purpose of this planned review was to perform an audit of the DM prioritization and completion processes. After the entrance meeting held with the Associate Vice Chancellor, Physical Plant and Transportation (AVCPPT) and the Director of Plant Administration, it was evident that funding from UCOP and other sources for the completion of DM projects on the UCR campus had not been provided since 2003, as a result, initiation of DM work projects have basically ceased since then.

Based on the preliminary information gathered, Audit & Advisory Services (A&AS) decided that the scope of this review should include PM work being performed by the Facilities and Maintenance craft trades for non-auxiliary funded buildings. In addition, the review scope was expanded to gather information as to the status of DM projects and PM work being performed for self-supporting campus unit buildings and infrastructure.

### **C. SCOPE**

An entrance meeting with the AVCPPT and the Director of Plant Administration was initially held to gather information relating to the status of DM projects and funding for state funded buildings and infrastructure. Also, we met with an Architects and Engineers Project Manager and held a phone meeting with the Director of Risk Management to gather additional DM related information.

Telephone discussions were also held with several Facilities and Maintenance trade supervisors and the Assistant Director of Facilities and Maintenance to obtain information related to PM work being accomplished within and outside non-auxiliary structures. In addition, we held phone interviews with several auxiliary unit administrators to obtain information related to DM projects and PM work within certain selected self-supporting buildings/infrastructure.

As we requested, summary data spreadsheets relating to PM work orders were downloaded from FAMIS and sent to us by a Facilities Analyst for our review. Also, information from a DM project database (Facilities Infrastructure Renewal Model) and other related DM documents were provided to us by an Office of Architects & Engineers Project Manager to complete this review.

#### D. **INTERNAL CONTROLS AND COMPLIANCE**

As part of this limited review, certain internal controls were examined. Internal control is a process designed to provide reasonable, but not absolute, assurance regarding the achievement of objectives in the following categories:

- effectiveness and efficiency of operations
- reliability of financial reporting
- compliance with applicable laws

This review was primarily performed in March through April 2012. Accordingly, this evaluation of internal controls is based on our knowledge as of that time and should be read with that understanding.

### III. **OBSERVATIONS, COMMENTS, AND RECOMMENDATIONS**

#### A. **Deferred Maintenance (DM)**

In general terms, DM is the postponing of maintenance or replacement of equipment and related systems in order to meet budget funding levels or realign available budget monies. Based on documents we reviewed and discussions held, UCOP last provided funds to UCR for non-auxiliary DM projects in 2003.

Based on information gathered, previous to this time period, UCOP provided funding on an annual basis, between \$1.5 to \$5 million to address DM needs. Most funds awarded during those years were used to repair building roofs and elevators. The AVCPPT stated that currently, building roof and certain mechanical systems repairs continue to be an issue on campus. He explained that certain campus building roofs are at or near the end of their estimated useful life, which typically is 42 years. Furthermore, while building mechanical systems have an estimated useful life of 30 years, some that remain in operation are now over 50 years old.

As a result of DM funds not being available for a number of years, the estimated total funding required to complete the current listing of building/infrastructure projects exceeds \$130 million, based on a report we reviewed. Although specific DM related funding has not been provided recently, this estimate would be even higher if not for the fact that some DM projects were completed as a result of State funded renovations to certain buildings. For example, the major renovation of the Geology building, costing approximately \$10 million, eliminated the listing of DM projects for that particular structure.

The various interviewees believe that the failure to perform needed repairs to campus non-auxiliary buildings/infrastructure will lead to asset deterioration and ultimately asset impairment. Furthermore, the risks of continuing to defer these projects will in time lead to higher repair costs, asset failures and possibly health and safety implications. The AVCPPT stated that to continue not addressing the campus DM issues, "UCR will someday have a catastrophic event".

Pertaining to selected auxiliary units on campus, we interviewed the Assistant Vice Chancellor – Housing Services Administration, the Director of Transportation and Parking Services, and the University Extension CFAO. Based on those phone discussions, in general sufficient funds were being generated in those particular self-supporting units so that a significant portion of their DM projects are being completed on a timely basis.

## RECOMMENDATIONS

The comments and opinions expressed above should be discussed with responsible campus administrators and UCOP personnel to determine a future course of action related to DM projects that would be in the best interests of the campus as a whole.

According to an electronic message (email) we reviewed, UCOP Risk Management may have certain funds available for those campuses desiring to pursue facility condition assessments in order to identify building/infrastructure system condition and fitness for continued service. We recommend that this possibility be further investigated.

#### MANAGEMENT RESPONSE

We concur with the recommendations above, and will continue to communicate the seriousness of the lack of DM funding and its potential impacts to both campus management and UCOP personnel. This issue is consistently a main topic of discussion for all Physical Plant and Facilities administrators throughout the UC System at our twice yearly *Partnership for Performance* meetings, which are attended by UCOP Facilities Management personnel as well. As a result, potential funding sources like the one identified above in UCOP Risk Management are discussed and proposed, and we will continue to pursue these options as they arise and as sources of funding become available.

#### **B. Preventative Maintenance (PM)**

PM involves the servicing by Facilities and Maintenance trade personnel for the purpose of maintaining equipment and facilities in satisfactory operating condition by providing for systematic inspection, detection and correction of incipient failures either before they occur or before they develop into major defects.

According to the Facilities website, Facilities Maintenance and Recharge Services have two primary responsibilities: performing maintenance and repair (PM, DM, trouble calls, etc.) on the State funded facilities, utilities, and infrastructure and performing alterations requested by customers on a recharge basis. There are craftsmen working in a number of trades within Facilities Maintenance.

This limited review included phone interviews with supervisors from the Plumbing, HVAC, Electrical, and Hardware Lock and Fire/Security Alarms to gather information relating to PM work being performed by these particular trade areas. We also interviewed the Assistant Director of Plant Services, to whom these supervisors report. Related data pertaining to PM work performed by the various Facilities Maintenance trade groups was provided for our review from FAMIS. Phone interviews with administrators from selected Auxiliary Services units were also conducted to inquire about PM work performed for self-supported buildings and infrastructure.

The various interviewees stated that the staff available to perform PM

work in some trade groups has been reduced to numbers similar to staffing of twenty years ago. This level of staffing is further complicated given the fact that the campus has had significant growth resulting in more buildings being constructed that require PM work. In addition, given the recent years' budget cuts, the department now uses existing staff to perform additional recharge work to increase overall departmental funding, which in turn has decreased available time to perform PM work. As certain trade supervisors indicated, a sufficient amount of our time is now being spent "putting out fires" by only having the time to "fix something when it breaks".

To further complicate this matter, the AVCPPT stated that the composite average of operations and maintenance funding to maintain non-auxiliary buildings is currently \$6.53 per square foot of building space, a figure that has increased by \$0.36 over the last ten years and therefore cannot properly cover repair needs of the older buildings on campus. Management stated that the actual maintenance component of this figure has actually decreased from \$4.17/sq. ft. in FY 2000-01 to \$3.98/sq. ft. in FY 2010-11, while purchased utility expenditures increased \$0.55/sq. ft. during this same period, from \$2.00/sq. ft. to \$2.55/sq. ft.

The same auxiliary administrators previously identified in III.A were interviewed as to PM work being accomplished by their maintenance personnel. Based on those discussions, we found in general that sufficient funds are budgeted into billing rates to properly maintain auxiliary funded buildings and infrastructure.

## RECOMMENDATIONS

Based on interviews held and information gathered, it is our opinion that increased funding for non-auxiliary buildings/infrastructure PM work is an urgent need. We recommend that the information and facts detailed above be discussed with responsible campus administrators to determine feasible solutions to funding needs necessary to properly maintain non-auxiliary facilities and equipment in a satisfactory operating condition.

## MANAGEMENT RESPONSE

We concur with the recommendation to discuss these issues with campus administrators to determine feasible solutions to maintenance funding issues. At the same time, however, we understand the seriousness of the campus, UC system, and State of California budget situation, and will continue to adopt strategies that allow us to most effectively support the academic mission of the university and maintain the useful life of its physical assets to the best of our ability with the resources provided.

**C. FAMIS**

The Web version of FAMIS is known commonly as the Physical Plant Work Order system. Aside from the tracking of customer-requested work orders, FAMIS permits the establishment by the Physical Plant Department of the PM work orders. These work orders facilitate the scheduling of routine, recurring maintenance on a wide variety of building infrastructure and equipment across the campus.

The system database maintains details associated with the PM work orders including the status of a work order (i.e. closed, missed, open), PM hours by craft trade and other pertinent information. The intent of the PM work orders is to reduce the probability of unscheduled repairs at potentially large costs, and to promote safety of UCR personnel.

Based on a FAMIS report we reviewed covering a three month period (April through June) in 2011, approximately 74% of the PM work orders currently being generated by the system were completed during that same time period. Given the recent budget cuts and reductions in personnel, this seems to be an impressive percentage of completion. However, certain trade supervisors indicated that for various reasons, key elements of some building infrastructure have not input into FAMIS. As a result, PM work orders are not being generated and the related work in many cases is not being performed.

As an example, the Plumbing Supervisor indicated that certain equipment and infrastructure such as back flow prevention, water pressure regulators, monitoring of storm drains and sewers and pump systems for water testing of equipment are too complicated to enter into FAMIS. This supervisor indicated that a spreadsheet of the PM work being performed in these areas is currently being maintained manually.

The HVAC Supervisor indicated that the current work orders in FAMIS are not comprehensive and that there is possibly unknown HVAC related equipment where no PM work is currently being performed. He further stated that “it is a long and ongoing process to identify all campus HVAC equipment and to input related information into FAMIS”.

An Electrical Supervisor indicated that the only PM work order currently in FAMIS pertains to the testing and inspecting of emergency generators. This supervisor further stated that a complete inventory of all PM electrical work needs to be performed and that this process has now begun. He further added that there are approximately 2,500-3,000 electrical components of PM work that is not in the FAMIS work order database. As a result, PM work is not being performed in total for certain campus transformers, high voltage splices, circuit breakers, transfer

switches and emergency lights.

A Supervisor in the Hardware Lock and Fire/Security Alarms trade area indicated that entry door locks to campus buildings are not in FAMIS, therefore work orders for the related hardware are currently not being generated. In addition, this same trade supervisor stated that there are several small buildings (barns and agricultural areas) where the fire alarms have not been entered in FAMIS.

Aside from the need for a comprehensive inventory of building related infrastructure identified above, the trade supervisors also indicated that certain control improvements relating to the FAMIS should be considered. Currently, supervisors have the ability to close a work order in the system even though the related PM work was not performed. As a result, FAMIS hard copy reports do not show the work orders as being missed or not completed. Also, supervisors indicated the need to highlight those work orders that are not completed two consecutive times after issuance so that particular attention can be given to get the related PM work performed. In general, trade supervisors felt that system improvements should be made as to the service history of the internal work orders and that, overall the system requires better reporting capabilities.

#### RECOMMENDATION

As resources and effort become available, we recommend that a comprehensive survey of building infrastructure elements be performed so that work orders can be generated from FAMIS for all PM required work.

We further recommend that details relating to system programming changes in FAMIS be discussed with trade supervisors to determine their needs for increasing work order controls and obtaining improved information and associated data from the system.

#### MANAGEMENT RESPONSE

We concur with the recommendations above and will attempt to complete them as time permits over the next 12-18 months, pending shifts in staffing levels and available FTE. During this time, the supervisors of the respective shops will validate existing PM data and input additional orders as required based on the inventory of campus equipment. Concurrently, the division's process analyst will work with shop supervisors to determine changes needed in FAMIS to provide them with the information they need to effectively manage the PM process, and then work with C&C programmers on making these changes to the existing PM module.