



UCSB Audit and Advisory Services

Internal Audit Report

**Deferred Maintenance**

April 30, 2018

**Performed by:**

Antonio Mañas-Melendez, Acting Associate Director  
Irene Camargo, Senior Auditor

**Approved by:**

Kimberly Ray, Interim Audit Director

Report No. 08-18-0005

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University of California, Santa Barbara

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AUDIT AND ADVISORY SERVICES  
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April 30, 2018

To: **Distribution**

Re: **Deferred Maintenance  
Audit Report No. 08-18-0005**

As part of the 2017-18 annual audit services plan, Audit and Advisory Services has completed an audit of deferred maintenance. Enclosed is the report detailing the results of our work.

The primary purpose of this review was to determine whether campus deferred maintenance program provides reasonable assurance that campus maintenance needs of buildings and equipment are identified, prioritized, quantified, and reported for funding. The scope of our audit included controls, practices, and procedures over deferred maintenance projects during fiscal year 2016-17.

We found that the campus has a deferred maintenance program in place for buildings and equipment that identifies, prioritizes, quantifies, and reports the main campus maintenance needs for funding. We also found deferred maintenance projects are properly earmarked in the year funds were allocated. However, the result of our work highlighted a need to fully implement the Integrated Capital Asset Management Program (ICAMP) initiative in order to align campus deferred maintenance practices with industry standards in the following areas: implementing physical condition inspections; documenting the prioritization process of deferred maintenance projects; and formalizing a sustainable and funded long term deferred maintenance plan. We also found opportunities to improve cost estimating and project cost tracking.

Detailed observations and management corrective actions are included in the following sections of the report. The management corrective actions provided indicate that each audit observation was given thoughtful consideration and positive measures have been taken or planned in order to implement the management corrective actions.

We greatly appreciate the assistance on this project provided by Design, Facilities & Safety Services personnel. If you have any questions, please contact me.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Kimberly Ray".

Kimberly Ray  
Interim Audit Director  
Audit and Advisory Services

Enclosure

Deferred Maintenance

April 30, 2018

Page 2

Distribution:

Design, Facilities, & Safety Services

Renée Bahl, Associate Vice Chancellor

David McHale, Director, Facilities Management

Kerry Bierman, CFO/Director, Business & Financial Planning

cc: Chancellor Henry Yang

Interim Vice Chancellor Administrative Services Joel Michaelsen

UCSB Audit Committee

Senior Vice President and Chief Compliance and Audit Officer Alexander Bustamante

## PURPOSE

The primary purpose of this review was to determine whether campus deferred maintenance program provides reasonable assurance that campus maintenance needs of buildings and equipment are identified, prioritized, quantified, and reported for funding. This audit is part of the fiscal year 2017-18 audit services plan.

## SCOPE, OBJECTIVES, AND METHODOLOGY

The scope of our audit included controls, practices, and procedures over the deferred maintenance projects during fiscal year 2016-17.

The objective of our review was to determine whether the campus deferred maintenance program follows University of California (UC) policies and industry standards best practices regarding the following areas:

- Identification of deferred maintenance through physical inspections.
- Prioritization of deferred maintenance projects.
- Sustainable funding strategy for campus deferred maintenance needs.
- Reporting and metrics.

To accomplish our objectives, we:

- Researched and reviewed relevant UC and University of California Santa Barbara (UCSB) audits and advisory work related to deferred maintenance, including:
  - UC San Diego, *Deferred Maintenance- School of Medicine Faculties Audit*, 2015.
  - UC Berkley, *Capital Renewal*, 2015.
- Researched and reviewed UC and UCSB policies, best practices, and other guidance concerning higher education deferred maintenance, including:
  - *UC Facilities Manual, Volume 6: Operations & Maintenance*, Chapter 1.
  - *UC Facilities Manual, Volume 6: Deferred Maintenance Program*, Chapter 2.
  - *UC Facilities Manual, Volume 3: Code and Regulatory Compliance*, Chapter 4.
  - UC Santa Barbara, Design, Facilities & Safety Services, *Preventative Maintenance*, 2017.
  - *APPA Capital Renewal and Deferred Maintenance*, 2015, an industry standard guidance.
  - *UCSB - APPA Facilities Management Evaluation Program*, 2015.
  - *UC ICAMP<sup>1</sup> Concept and Implementation*, January 2013, UC guidance for ICAMP project.
- Gained an understanding of deferred maintenance processes through interviews with key Facilities Management personnel.
- Performed a risk analysis that considered financial and business processes including identification and prioritization of projects, funding, data retention, and fraud risks.

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<sup>1</sup> Integrated Capital Asset Management Program.

- Determined whether deferred maintenance projects were appropriately earmarked in the year funds were allocated.
- Evaluated campus deferred maintenance practices for consistency with industry standards best practices, as per guidelines established by *APPA Facilities Management Evaluation Program* (APPA). Table 2 summarizes APPA best practices.
- Determine whether tracking and reporting deferred maintenance project costs are accurate and timely updated.

This audit was conducted in conformance with the *International Standards for the Professional Practice of Internal Auditing*.

## **BACKGROUND**

### *Deferred Maintenance*<sup>2</sup>

The vast expansion of higher education in the 20<sup>th</sup> century and a relentless pace of new construction left a legacy of unmet capital needs for renewal and replacements. The burdensome problems of major maintenance and capital renewal/replacement have troubled higher education since the 1970s.

The term deferred maintenance emerged in the early 1970s as college and university administrators began to recognize the serious nature of plant problems on their campuses. Deferred maintenance was defined as major maintenance or capital projects that had gone unfunded in previous budget cycles. Deferred maintenance became a universally adopted part of the vocabulary of higher education as maintenance that was not performed when it should have been or was scheduled to be and which, therefore, was put off or delayed for a future period. The following describes major capital project challenges in higher education:

- Poor designs for institutional durability.
- Cost cutting that rapidly produced space with inferior construction techniques and materials.
- Soaring utility costs.
- Inflation-induced reductions in operations and maintenance budgets.
- Inadequate funding for capital renewal and major maintenance.
- Increased government regulations, resulting in reallocation of resources.

Currently, there is more attention being paid to the problem of inadequate capital renewal assessment and funding. Despite enhanced attention to capital renewal, the central problem of backlogs of deferred maintenance lingers as a substantial liability for many institutions. The fact of the matter is that information on the magnitude of the problem varies widely from institution to institution. And there is still a great gap between the awareness of funding needs and the actual funding of corrective work for deferred maintenance backlogs and the life cycle renewal.

### *UCSB Facilities Management*<sup>3</sup>

Facilities Management is an organization within Design, Facilities & Safety Services (DFSS) that is primarily charged with providing campus operations and maintenance services to the University. Its focus is on the state supported, general funded buildings and infrastructure. Facilities Management has approximately 260 full time employees serving a general funded physical plant facility of 159 buildings, with an average building age of 46 years. The campus is

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<sup>2</sup> Source: APPA: *Capital Renewal and Deferred Maintenance*, 2015.

<sup>3</sup> Source: APPA: *UCSB Facilities Management Evaluation Program*, 2015.

UCSB Audit and Advisory Services  
Deferred Maintenance

comprised of 4.1 million gross square feet.

The campus deferred maintenance annual funding for fiscal year 2016-17 for campus supported facilities were reported as \$3.5 million in deferred maintenance projects including: fire alarm system upgrades in Robertson Gym, Physical Sciences Building South and Marine Science Building pump house; Phelps Hall elevator replacement; Physical Sciences Building North and Campbell Hall chiller replacement; Isla Vista Theater air conditioning installation; Mesa Road repairs; and sidewalk and bicycle path improvements. See Table 1.

<b>Table 1</b>		<b>Deferred Maintenance Projects for FY 2016-17</b>	
<b>Categories</b>		<b>State and Campus Funding</b>	
<b>Deferred Maintenance Project Costs</b>			
Building Structure Repairs/Replacement		\$163,218	
Classroom/Interior Renewal		0	
Elevator Repairs/Replacement		1,533,000	
Fire/Safety/Access Controls		500,000	
Mechanical/Electrical/Plumbing Replacement		2,573,750	
Road/Walkway Repairs		325,000	
Special Projects		183,500	
<b>Total Deferred Maintenance Project Costs</b>			
<b>2016-17 FY Balance</b>		<b>\$5,278,468</b>	

Source: DFSS Business and Financial Planning.

UCSB deferred maintenance funding falls into several project categories funded by the state and the campus:

- Building structure repairs/replacement.
- Classroom/interior renewal.
- Elevator repairs/maintenance.
- Fire/safety/access controls.
- Mechanical/electrical/plumbing replacement.
- Road/walkway repair.
- Special projects.

UC Facilities Manual recommends deferred maintenance projects should be of size and complexity to allow a lien on the project within 12 months from the date funds are appropriated.

UCSB Audit and Advisory Services  
Deferred Maintenance

Table 2	Deferred Maintenance Best Practices
Category	Description
<b>Physical Condition Inspections</b>	An annual audit of physical conditions to note current problems and priorities should be a basic practice of facilities management. Familiarity with conditions enables the facilities manager to become aware of the most pressing needs. Lack of knowledge of conditions prevents anticipating major problems and avoiding budget surprises for overall campus fiscal management.
<b>Prioritization</b>	The process of prioritizing among competing capital needs must be one of objective analysis moderated by informed personal judgments. The relatively more objective portion of the exercise balances the essentiality of the facility to the institution's mission with the urgency of the project usually based on relative qualitative deficiencies, but possibly including critical maintenance backlog issues that need immediate attention.
<b>Budget &amp; Sustainability</b>	<p>Appropriate total annual budget allocation for routine maintenance and capital renewal is in the range of two to four percent of the aggregate current replacement value (CRV), the amount to replace those facilities (excluding major infrastructure, e.g., utility distribution lines, central utility plants, etc.). When a backlog of deferred maintenance has been allowed to accumulate, spending must exceed this minimum level until the backlog has been eliminated.</p> <p>A budget model for operating budget operations &amp; maintenance and capital renewal looks like this:</p> <p>(a) Operations &amp; maintenance = 0.5 to 1.5% CRV  <b>(b) Life cycle renewal = 1.5 to 2.5% CRV<sup>1</sup></b>  (c) Recurring annual budget guideline = (a) + (b) = 2.0 to 4.0% CRV</p> <p>Note: Deferred maintenance backlog and functional improvements are excluded from this model.</p>
<b>Long Term Plan</b>	A five-year capital budget plan provides a level of confidence for senior administrators and Facilities Management staff by regularly reviewing overall campus capital requirements. Capital requirements are established in long-range budget base planning, offering flexibility for emergencies or special situations, that cannot be anticipated. The Facilities Management Director has an operational framework for maintenance management to direct staff, materials, and contractors of appropriate priorities.
<b>Capital Plan Coordination</b>	Capital renewal and replacement and deferred maintenance programs require clear guidelines and procedures for setting priorities among potential projects. The balance of competition for scarce resources can be satisfied by the funding source's determination of critical needs categories of projects and priority criteria. Setting priorities requires consistent treatment of deficiencies and functional improvement funding requests. Typically, categorizing involves collecting data, estimating project requests, and then summarizing project requests for a five- or six-year budgeting cycle.
<b>Cost Estimate</b>	An effective capital renewal and deferred maintenance reduction program requires reliable estimates of funding requirements and thorough planning. A successful program should provide estimates in long-term capital renewal/deferred maintenance planning needs and near-term programs to reduce deferred maintenance backlogs to acceptable levels.
<b>Reporting Metrics</b>	<p>The use of a comprehensive assessment methodology for micro-level estimates includes a change from the universally accepted measure of facilities condition: the facility condition index (FCI), defined as the estimated cost to correct condition and code compliance deficiencies, divided by the current replacement value of the building.</p> <p>In a comprehensive model, an updated facilities condition assessment would include condition, but also functionality. Building on the concept of the FCI, a new metric, intended to capture both condition and functionality needs, is introduced as quality and incorporates the facilities quality index, or FQI.</p> <p>FCI = \$ to Correct Condition and Code Deficiencies / \$ Current Replacement Value  FQI = (\$ to Correct Condition and Code Deficiencies + Functionality Improvements) / \$ Current Replacement Value</p>

Source: Auditor analysis and APPA: *Capital Renewal and Deferred Maintenance*, industry standard guidance, 2015.

1: Equivalent to campus deferred maintenance program.

*Preventative Maintenance Program<sup>4</sup>*

The Preventive Maintenance team of UCSB Facilities Management performs periodic, scheduled maintenance on building equipment. The main work that is scheduled to be performed on campus buildings includes the following inspections and replacements, as necessary, of: drive belts on the air intake and air exhaust fans, heating, ventilation, air conditioning system air intake filters, heating boilers, air conditioning chilling systems, high-pressure water cleaning of the air conditioning cooling towers, oil and filter changes, repairs as needed of the emergency generators, and equipment cooling water systems, central vacuum pumps, or air compressors that are used in research work.

*DFSS Business and Financial Planning<sup>5</sup>*

Business and Financial Planning provides financial support to all Design, Facilities, and Safety Services units for capital, operating, deferred maintenance, work order projects, and UCSB utilities including sustainability and solar projects.

*University of California ICAMP Concept and Initiative<sup>6</sup>*

The University of California currently owns or operates approximately five thousand buildings with an area of approximately 129 million square feet, along with the associated utility infrastructure and maintained grounds. Basic information about university space and occupancy is currently tracked in the corporate EFA (Equipment, Infrastructure and Assets) database.

Given the age and current condition of University facilities, there is a critical need at the campus and systemwide level to make sound capital renewal decisions based upon accurate information that identifies, prioritizes and quantifies facility renewal needs. The Integrated Capital Asset Management Program (ICAMP), was conceptually introduced by Facilities and Risk Management in 2007, and has recently acquired funding to proceed with program development and implementation. At the core of ICAMP is the University's corporate need to effectively and efficiently acquire condition and risk information about the property assets of the University. Campuses currently track this information in a variety of ways and a variety of depth. None of these systems communicate with one another.

The University of California Office of the President (UCOP) lead ICAMP initiative has been divided into two distinct phases. Currently, the first phase of the project has been funded and concentrates on primarily 100% of state supported assets. Phase 2 has been scoped and would cover inspecting the remaining assets on campus. However, funding for this portion of the project has not been secured at this time.

The departments' preventative maintenance program routinely (twice per year for all major research buildings and once per year for all general buildings) inspects and provides scheduled maintenance for all major building systems such as: heating, ventilation and air conditioning (HVAC), electrical, elevators, boilers, compressors, emergency generators, and roofs. However, the Deferred Maintenance program has not been able to fully assess buildings from top to bottom. Deficiencies identified through this process are evaluated by trade superintendents and management and are added to the campus master deferred maintenance list and are prioritized based upon current condition, as well as evaluating the amount of potential impact to campus operations.

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<sup>4</sup> Source: Design, Facilities & Safety Services website for Preventative Maintenance.

<sup>5</sup> Source: Design, Facilities & Safety Services website.

<sup>6</sup> Source: University of California Office of the President website and DFSS.

*APPA Leadership in Educational Facilities Organization*<sup>7</sup>

APPA is an international association dedicated to the development of leadership and professional management applicable to educational facilities professionals in the planning, design, construction, and operation of the facilities required for quality teaching, research, and public service.

APPA conducted a complete evaluation of the UCSB Facilities Management department in April, 2015. The evaluation provided an examination of the Facilities Management organization to assist the University in their overall management of staff and deferred maintenance projects. This evaluation concluded that UC Santa Barbara buildings and grounds are intensely utilized, and the average age of campus buildings has increased to the point where many of the building components and systems have reached or exceeded their useful life expectancy. This is an important factor when considering the wear and tear on campus buildings and the demands for maintaining building appearances, custodial service levels, grounds and landscape maintenance, and utilities/energy sustainability requirements. Facilities Management has not received adequate funding to address the backlog of capital renewal and deferred maintenance nor an amount of annual funding to stop the accumulation. Annual increases in accumulated deferred maintenance exceed annual budget allocations.<sup>8</sup>

**SUMMARY OPINION**

We found that the campus has a deferred maintenance program in place for buildings and equipment that identifies, prioritizes, quantifies, and reports the main campus maintenance needs for funding. We also found deferred maintenance projects are properly earmarked in the year funds were allocated. However, the result of our work highlighted a need to fully implement the ICAMP initiative in order to align campus deferred maintenance practices with industry standards in the following areas: implementing physical condition inspections; documenting the prioritization process of deferred maintenance projects; and formalizing a sustainable and funded long term deferred maintenance plan. We also found opportunities to improve cost estimating and project cost tracking.

Audit observations and management corrective actions are detailed in the remainder of the audit report.

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<sup>7</sup> Source: APPA: *Capital Renewal and Deferred Maintenance*, industry standard guidance, 2015.

<sup>8</sup> Source: FY 2016-17 Administrative Services Division Annual Financial Report.

**DETAILED OBSERVATIONS AND MANAGEMENT CORRECTIVE ACTIONS**

**A. Deferred Maintenance**

We found that the campus has a deferred maintenance program in place for buildings and equipment that identifies, prioritizes, quantifies, and reports main campus maintenance needs for funding. However, our review highlighted opportunities to align campus deferred maintenance practices with industry standards. Table 3 summarizes our findings.

*Physical Condition Inspections*

We found that Facilities Management is starting physical condition inspections in a five year cycle through the ICAMP initiative. However, before February 2018, Facilities Management did not perform comprehensive physical condition inspections of campus buildings and equipment on a regular basis, with the exception of the Preventative Maintenance Program and roof inspections prior to the rainy season. We were informed that the department does not have enough personnel resources to inspect the entire campus. Physical condition assessments have been performed through information provided in management and supervisor meetings, reports from maintenance staff, and trouble calls from the campus community.

*Prioritization*

DFSS management meets on a regular basis to identify, prioritize, and monitor deferred maintenance projects. There is a collaborative effort to assess current projects and identify future assignments. However, the collective project evaluations are not documented. This prioritization is based on identified information because of limited physical condition inspections. DFSS management informed us available funding limits the efficiency of the prioritization process because campus priorities rapidly change to address breakdown maintenance/system failures to keep the campus operational.

*Budget & Sustainability*

We found annual increases in accumulated deferred maintenance exceed campus budget allocations based on APPA industry standards. The UCSB deferred maintenance budget for fiscal year 2016-17 was \$3.5 million<sup>9</sup>. There is a gap between funding needs and the actual funding of corrective work for deferred maintenance backlogs and the life cycle renewal. Facilities Management is operating as a reactionary facility with limited resources available, limiting their ability to provide a sustainable and preventative deferred maintenance program. See Table 2.

*Long Term Plan*

Facilities Management works closely with Finance and Resource Management<sup>10</sup> (FARM) to prioritize and update projects annually. At this time there is no long term deferred maintenance plan five years. Institutions without long-range strategies to assess facilities capacity, condition, and adequacy could fail to reduce deferred maintenance backlogs or adequately support long-term capital renewal.

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<sup>9</sup> Source: DFSS Business and Financial Planning. This amount does not include state funds.

<sup>10</sup> FARM: Assists the campus in maximizing the utilization of its existing physical facilities and acquiring the physical resources.

UCSB Audit and Advisory Services  
Deferred Maintenance

*Capital Plan Coordination*

We found there to be a good working relationship between Facilities Management and Finance and Resource Management to coordinate strategies, prioritize projects, and provide guidelines for state and campus funding. Funding is accessed based on functionality requirements of building projects critical to the academic priorities and missions of the campus.

*Cost Estimate*

Cost estimates are based on prior projects and professional expertise of Facilities Management personnel. The proximity of the campus to the coast and the lack of physical inspections to track the status of campus building and equipment makes it a challenging task to effectively evaluate the current building or equipment condition and determine a more accurate timeline for replacement and cost estimation. Facilities Management expects to obtain more accurate cost estimates with the UC systemwide initiative, ICAMP.

*Metrics*

Facilities Management does not use a comprehensive assessment methodology to measure the condition and cost estimates for buildings and equipment. The UC systemwide initiative, ICAMP, will help campuses in their capital reporting and provide a comprehensive condition and cost assessment at the campus level and collectively systemwide.

<b>Table 3</b>		<b>Compliance with APPA Best Practices</b>
<b>Criteria</b>	<b>Rating</b>	<b>Comments</b>
Physical Condition Inspections	Partial	Facilities Management does not perform comprehensive physical condition inspections of buildings and equipment with the exception of roof inspections and the Preventative Maintenance Program.
Prioritization	Partial	Management meets on a regular basis to identify, prioritize, and monitor deferred maintenance projects. However, the prioritization process is limited to known/available information and changes/adjustments are not formally documented.
Budget & Sustainability	Partial	Facilities Management is operating as a reactionary facility with limited resources available to manage or sustain capital renewal or the backlog of deferred maintenance projects. DFSS informed us funding allocations are not always defined nor transferred at the beginning of the fiscal year.
Long Term Plan	✘	Deferred maintenance projects are funded annually.
Capital Plan Coordination	✓	Facilities Management has adequate capital planning coordination with Finance and Resource Management.
Cost Estimate	Partial	Estimates are based upon prior projects and professional expertise and experience. Costs are only validated when the project is bid. ICAMP will improve cost estimates.
Metrics	✘	A comprehensive condition and cost assessment is not utilized.

Source: Auditor analysis.

✓: Full compliance with APPA best practices.

Partial: Meets some of the APPA requirements or there are compensatory controls.

✘: Not in compliance or very limited alignment with APPA best practices.

## B. Deferred Maintenance Reporting

DFSS Business and Financial Planning uses several reports to track deferred maintenance projects. We found opportunities to improve the fiscal summary report<sup>11</sup> used by Business & Financial Planning to track deferred maintenance project costs during the fiscal year. Our testing of 20 deferred maintenance projects, included in the report, for fiscal year 2016-17, highlighted that:

- Open projects on the fiscal summary report reflect approved project cost estimates and not actual year-to-date project expenses. Project costs are only updated after the project is closed. There were 16 of the 20 projects still active at the end of the fiscal year.
- The cost of one closed project, reported on the fiscal summary report, was not consistent with the general ledger. Fiscal year 2015-16 project costs were brought forward and included in the fiscal year 2016-17 project cost totals.

We recommend that Facilities Management evaluate the opportunity to align business processes with industry standard best practices by defining a plan for the following actions:

- Continue working with the implementation of the ICAMP program to perform and document physical condition inspections of campus buildings and equipment to obtain more accurate metrics and cost estimates.
- Document the decision making process to prioritize deferred maintenance projects during collective project evaluations.
- Formalize a long term plan for deferred maintenance.
- Update the fiscal summary report to include actual project costs and to reflect year-to-date totals consistent with the general ledger.

### Management Corrective Actions

Design, Facilities and Safety Services agrees to work to improve business processes and develop a plan to address the items below. As our campus is located in a marine environment, our buildings undergo serious weather and corrosion stresses which can shorten the useful life of equipment and structures. Additionally, a considerable portion of our buildings are at least 50 years old which signifies the need for comprehensive building renewals or replacements, and not simply deferred maintenance.

ICAMP: We will continue to implement ICAMP with the funding allocated from the University of California, Office of the President. The current funding should provide our campus with documentation of the physical condition of state-owned buildings. The ICAMP assessment for state-owned buildings should be complete in approximately Spring of 2020.

Prioritization and long-term plan: DFSS currently identifies projects that jeopardize health, safety, systems failures as the highest priority. UCSB's capital replacement value (CRV) is approximately \$4.1B for non-auxiliary buildings. According to best practices identified in this audit, an adequate annual investment for deferred maintenance is 1.5% to 2.5% of the CRV,

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<sup>11</sup> This report includes a summary of deferred maintenance financial data for the fiscal year.

UCSB Audit and Advisory Services  
Deferred Maintenance

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which represents at least \$60M annually. Currently, funding from the Campus allocation is \$3.5M annually, or 0.08% of the CRV. In addition, this year the State allocated an additional \$3.8M in funding, which increases the deferred maintenance investment to 0.18% of the CRV. With this level of funding, it is difficult to address anything beyond system failures and safety issues so it is important to understand that a long-term plan will always be trumped by unexpected system failures. However, we will prioritize projects that could be funded over multiple years and document why they are priorities by July 31, 2018. To further assist in our efforts, it would be beneficial to know the level of future year funding allocations to better plan multi-year maintenance priorities.

Internal financial reporting: We will add a column in our internal reporting to management to include year-to-date actual costs by July 31, 2018.

*Audit and Advisory Services will follow up on the status of this management action plan by July 31, 2018.*