

**UNIVERSITY OF CALIFORNIA, SAN FRANCISCO
AUDIT AND ADVISORY SERVICES**

**Facilities Maintenance
Project #19-054**

January 2019

EXECUTIVE SUMMARY

I. BACKGROUND

As a planned audit for Fiscal Year 2019, Audit and Advisory Services (A&AS) conducted a review of facilities maintenance by Medical Center Facilities Management (MCFM) to determine the adequacy of internal controls and processes in place related to facilities maintenance and monitoring.

MCFM provides preventative maintenance (PM) and corrective maintenance (CM) for UCSF Health buildings and assets on a recharge basis. MCFM carried out its responsibilities with a budget of \$59.26 million in Fiscal Year 2018 (FY18). Additionally, MCFM receives recharge fees that generate revenue for work performed. Facilities maintenance operations are one of the most significant expenses related to buildings and assets and include the following primary interconnected maintenance activities:

- Planned/preventative maintenance (PM) – Maintenance works that are scheduled, routine and recurring maintenance to prevent breakdowns and mitigate deterioration
- Corrective/repair maintenance (CM) – Maintenance works that are required to correct both emergency and non-emergency deficiencies

In February 2015, MCFM started implementing a Computerized Maintenance Management System (CMMS), Maximo, to track planned and completed work orders (WO) for required PM and requested CMs. The implementation was completed in January 2017, and MCFM is currently optimizing the Maximo deployment for facilities maintenance operations and exploring Maximo functionality that hasn't been used yet in order to pursue improvement opportunities. Work orders for PM and CM in Maximo are generated and assigned to MCFM staff. Planned/actual labor hours and materials purchased (if any) are also tracked in each work order.

For FY18, the following work orders were created for PM and CM in Maximo:

Type of Work Orders	# of Parent ¹ Work Orders	# of Child Work Orders
Planned/preventive Maintenance (PM) (Total # of Work Orders = 60,534)	38,191	22,343
Corrective/repair Maintenance (CM) (Total # of Work Orders = 10,071)	9,412	659

Work orders for PM and CM created in Maximo are assigned to MCFM resources that include UCSF trade/craft employees and contracted stationary engineers from Able Engineering Services with a wide range of skills needed to provide facilities maintenance services to hospitals and clinics.

Achieving balanced PM and CM is critical for an effective and efficient facilities maintenance operations. A successful facilities maintenance program can help UCSF Health provide better services and safer facility environment to customers and patients.

¹ Many of the “parent” work orders resulted in associated “child” work orders for individual tasks.

II. AUDIT PURPOSE AND SCOPE

The purpose of this review was to determine the adequacy of internal controls and processes in place related to facilities maintenance and monitoring, specifically in the following areas:

- Planned/preventative maintenance (PM)
- Corrective/repair maintenance (CM)
- Asset management for preventive maintenance
- Customer management
- Facilities staff/resource management such as professional licenses and certifications; workload planning and monitoring
- Management monitoring (e.g. backlogs, analysis for effective long-term plans/budgets)

The scope of the review covered transactions and activities for the period of July 2017 to June 2018.

Procedures performed as part of the review included interviews with MCFM management and walkthroughs to understand facilities maintenance processes; review of contractual documents, sample testing work orders in Maximo, and customer complaints in ServiceNow. For more detailed steps, please refer to Appendix A.

Work performed was limited to the specific activities and procedures described above. As such, this report is not intended to, nor can it be relied upon to provide an assessment of compliance beyond those areas specifically reviewed. Fieldwork was completed in November 2018.

III. SUMMARY

Based on work performed, MCFM's facilities maintenance control procedures are generally conducive to accomplishing its business objectives. They are focused on continuous improvement and are innovating new building information systems and reports to increase transparency and productivity to enhance facilities maintenance operations.

Opportunities for improvement exist in the areas of communication with other departments, vendor and resource management, and documentation and training on operational procedures. The specific observations from this review are listed below.

1. Preventive maintenance was not performed for some assets as information in Maximo was not properly updated.
2. Certification and/or qualification required for performing maintenance jobs are not clearly identified, documented, or considered for allocating and assigning qualified resources.
3. Work orders are not always created/closed properly or timely.
4. There is no process to ensure that customer complaints are adequately addressed.
5. Written operational procedures for facilities maintenance are not sufficient.

Additionally, during the course of this review, a potential opportunity for improvement was noted for the capturing of more accurate start and finish times for projects to better monitor resource utilization and improve budgeting accuracy.

IV. OBSERVATIONS AND MANAGEMENT CORRECTIVE ACTIONS

No.	Observation	Risk/Effect	Recommendation	Management Corrective Action																									
1	<p><i>Preventive maintenance was not performed for some assets as information in Maximo was not properly updated.</i></p> <p>Review of work orders in Maximo for a judgmental sample of 20 beds (being used in patient settings)/freezers (as listed in AwarePoint²) identified the following assets did not have appropriate records of preventive maintenance (PM) due to the following situations in Maximo:</p> <table border="1"> <thead> <tr> <th>Asset Type</th> <th># of Assets</th> <th>Asset Information In Maximo</th> <th>Frequency of PM required</th> <th>Last PM Record</th> </tr> </thead> <tbody> <tr> <td>Bed</td> <td>2</td> <td>Categorized as "Unable to locate (UTL)" in Maximo</td> <td>Annual</td> <td>None performed</td> </tr> <tr> <td></td> <td>2</td> <td>Not Found in Maximo</td> <td>Annual</td> <td>None performed</td> </tr> <tr> <td></td> <td>1</td> <td>Categorized as "Not Ready" in Maximo</td> <td>Annual</td> <td>None performed</td> </tr> <tr> <td>Freezer</td> <td>4</td> <td>Not Found in Maximo</td> <td>Quarterly</td> <td>None performed</td> </tr> </tbody> </table> <p>Further discussion with MCFM management identified the following:</p> <ul style="list-style-type: none"> • MCFM is not always notified of purchase, changes, and/or movement in assets that should have preventive maintenance, resulting in obsolete or missing asset information in Maximo. • MCFM management recognizes the need for the following: 	Asset Type	# of Assets	Asset Information In Maximo	Frequency of PM required	Last PM Record	Bed	2	Categorized as "Unable to locate (UTL)" in Maximo	Annual	None performed		2	Not Found in Maximo	Annual	None performed		1	Categorized as "Not Ready" in Maximo	Annual	None performed	Freezer	4	Not Found in Maximo	Quarterly	None performed	<p>Failure to maintain accurate information increases risks that assets are used for operations or patient care without adequate preventive or corrective maintenance.</p>	<p>a) There should be sufficient Service Level Agreements (SLAs), defining client departments' responsibility to notify MCFM when assets are added, removed, and/or changed/moved. This can be a single master document tailored to individual partners.</p> <p>b) There should be a defined process that MCFM is always notified when new assets that should have preventive maintenance are purchased.</p> <p>c) A process to periodically confirm accuracy</p>	<p>a) Sufficient Service Level Agreements (SLAs) will be established.</p> <p>Target Completion Date: July 1, 2019 Responsible Party: MCFM management</p> <p>b) A process will be established and implemented by Purchasing, Receiving, MCFM, and Clinical Engineering to ensure that the proper department is always notified when new assets that should have preventive maintenance are purchased.</p> <p>Target Completion Date: July 31, 2019 Responsible Party: Purchasing in conjunction with MCFM management, Receiving, and Clinical Engineering</p> <p>c) A process to periodically confirm accuracy of asset information (in Maximo) with</p>
Asset Type	# of Assets	Asset Information In Maximo	Frequency of PM required	Last PM Record																									
Bed	2	Categorized as "Unable to locate (UTL)" in Maximo	Annual	None performed																									
	2	Not Found in Maximo	Annual	None performed																									
	1	Categorized as "Not Ready" in Maximo	Annual	None performed																									
Freezer	4	Not Found in Maximo	Quarterly	None performed																									

² A location tracking system mainly used for medical equipment

No.	Observation	Risk/Effect	Recommendation	Management Corrective Action
	<ul style="list-style-type: none"> ○ Service Level Agreement (SLA) with client departments (including Materials Management and Emergency Department (ED)) to define their responsibility to immediately notify MCFM when assets are added, removed, and/or changed/moved. ○ Defined procedures that MCFM is always notified when new assets that require preventive maintenance are purchased. 		<p>of asset information (in Maximo) with client departments should be developed and implemented.</p> <p>d) Policies should be updated to clarify asset management responsibilities.</p>	<p>client departments will be developed and implemented.</p> <p>Target Completion Date: May 1, 2019 Responsible Party: MCFM management</p> <p>d) UCSF Health Environment of Care (EOC) Policy will be updated to define responsibilities for properly managing assets requiring PM by MCFM.</p> <p>Target Completion Date: December 1, 2019 Responsible Party: MCFM management</p>
2	<p><i>Certification and/or qualification required for performing maintenance jobs are not clearly identified, documented, or considered for allocating and assigning qualified resources.</i></p> <p>We selected a sample of 20 work orders in Maximo and requested the following information to MCFM management:</p> <ol style="list-style-type: none"> 1. Certification and/or qualification required for performing maintenance jobs specified in the selected work orders (if required). 2. A copy of certification and/or qualification for MCFM resources who performed the maintenance job(s) if any certification and/or qualification was required. <p>However, we were unable to obtain the above information from MCFM management.</p>	<p>Failure to clearly identify required certification and/or qualification increases risks that maintenance jobs are performed by unqualified or unskilled personnel,</p>	<p>a) Maintenance jobs that require any regulatory certification and/or qualification should be clearly identified and documented.</p> <p>b) Status/validity of required certification and/or</p>	<p>a) Maintenance jobs that require any certification and/or qualification will be clearly identified and documented. Target Completion Date: December 1, 2019 Responsible Party: MCFM management</p> <p>b) Status/validity of required professional certification and/or qualification for MCFM resources will be tracked and monitored.</p>

No.	Observation	Risk/Effect	Recommendation	Management Corrective Action
	<p>Further discussion with MCFM management identified the following:</p> <ul style="list-style-type: none"> Types of maintenance jobs that require any certification and/or qualification are not clearly identified and documented. There are Fire Pump certifications for MCFM resources that will expire on 12/31/2018; however, MCFM management is having a difficulty in certifying (and/or renewing an existing certification for) the MCFM resources responsible for performing maintenance jobs for fire related assets due to unclear authority of various units/departments involved³. The status/validity of certification and/or qualification that MCFM resources have for performing maintenance jobs and accessing patient care areas is not tracked and monitored⁴. This is due to contracted engineers from Able Engineering Services not being categorized as employees by UCSF Human Resources (HR), preventing MCFM management's abilities to ensure compliance⁵. Assignment of work orders that was not always based on qualification of resources. 	<p>creating potential liability and/or erroneous operations.</p>	<p>qualification for MCFM resources should be tracked and monitored.</p> <p>c) Procedures should be developed and implemented to assign qualified resources for performing maintenance jobs.</p>	<p>Target Completion Date: July 1, 2019 Responsible Party: MCFM management</p> <p>c) Procedures to assign qualified resources for performing maintenance jobs will be developed and implemented.</p> <p>Target Completion Date: April 1, 2019 Responsible Party: MCFM management</p>
<p>3</p>	<p><i>Work orders are not always created/closed properly or timely.</i></p> <p>We reviewed a sample of 40 PM work orders from 1,758 PM work orders (4.6% of total (38,191)) that were not closed within one month or had no owner assigned⁶ and identified the following key causes:</p>	<p>Failure to properly complete and document work orders for maintenance operations</p>	<p>a) There should be clearly defined operational procedures and user manuals for properly using Maximo.</p>	<p>a) Operational procedures and user manual (for Maximo) to ensure facilities maintenance operations are properly completed and documented will be developed and implemented.</p>

³ Including the Office of the State Fire Marshal (OSFM), UCSF Fire Marshals (Campus and MC) and Office of Environment, Health and Safety (EH&S).

⁴ While HR compliance requirements were out of scope for this review (e.g. flu shots, safety, Cyber-Security and Sexual Harassment training, etc.), these may also be affected and excluded from tracking and monitoring.

⁵ A historic population of contracted engineers from Able Engineering Services was entered into Huntington Business System (HBS); however, this population has not been updated as people have left and new people have joined.

⁶ "# of Closed/Completed WOs that took more than 1 month to close" = 1,283, "# of WOs not Closed/Completed" = 188, and "# of Closed/Completed WOs without Owner assigned" = 287

No.	Observation	Risk/Effect	Recommendation	Management Corrective Action
	<ul style="list-style-type: none"> • User errors⁷ – 24 work orders (60%) • Shortage of resources to perform jobs – 11 work orders (28%) • Inability for electricians to get access – 2 work orders (5%) <p>Additionally, not all work orders had “Planned Labor Hours” entered.</p> <p>We also selected a sample of 40 CM work orders from 1,780 CM work orders (18.9% of total (9,412)) that were not closed within one month or had no owner assigned⁸ and requested information to assess causes; however, MCFM management was unable to provide the requested information.</p> <p>Further discussion with MCFM management identified the following:</p> <ul style="list-style-type: none"> • Compliance reports for outstanding work orders are provided to Chief Engineers and a manager of crafts on a weekly and monthly basis; however, it appears that the reports are not being used effectively to identify and correct errors in work orders as work orders were not always created/closed properly or timely. • Many legacy work orders were carried over from a previous system (“FM track”) to Maximo, resulting in incomplete work orders in Maximo that are considered as non-critical due to shortage of MCFM resources. MCFM management recognizes the need for re-evaluation of existing work orders in Maximo. • Missing “Planned Labor Hours” was due to assigned personnel who did not follow proper workflows and processes in completing work orders in Maximo. 	<p>increases risks that facilities and assets are not properly maintained or repaired.</p> <p>The lack of accurate “Planned Labor Hours” for work orders precludes MCFM management’s ability from using the data for planning resource, utilization, and budgeting.</p>	<ul style="list-style-type: none"> b) User training for operational procedures and proper use of Maximo should be provided to MCFM resources. c) Legacy work orders in Maximo should be re-evaluated. d) Feasibility in Maximo to identify work orders without accurate information (e.g. “Owner”, “Planned Labor Hours”) should be assessed. If feasible, it should be configured in Maximo; so that inaccurate information can be corrected. 	<p>Target Completion Date: October 31, 2019 Responsible Party: MCFM management</p> <ul style="list-style-type: none"> b) User training for operational procedures and proper use of Maximo will be provided. <p>Target Completion Date: September 1, 2019 Responsible Party: MCFM management</p> <ul style="list-style-type: none"> c) Legacy work orders in Maximo will be re-evaluated. <p>Target Completion Date: March 1, 2019 Responsible Party: MCFM management</p> <ul style="list-style-type: none"> d) Feasibility in Maximo to identify work orders without accurate information (e.g. “Owner”, “Planned Labor Hours”) will be assessed. If feasible, it will be configured in Maximo; so that inaccurate information can be corrected.

⁷ Based on responses obtained from MCFM management, user errors may be due to duplicated work orders created, no owner assigned, wrong person/group assigned, ambiguous descriptions, and/or failure to change status.

⁸ “# of Closed/Completed WOs that took more than 1 month to close” = 1,149, “# of WOs not Closed/Completed” = 105, and “# of Closed/Completed WOs w/o Owner assigned” = 526

No.	Observation	Risk/Effect	Recommendation	Management Corrective Action
				<p>Target Completion Date: May 1, 2019 Responsible Party: MCFM management</p>
<p>4</p>	<p><i>There is no process to ensure that customer complaints are adequately addressed.</i></p> <p>Customers who requested corrective/repair maintenance works through ServiceNow have an opportunity to submit their feedback or complaints through the ServiceNow Customer Satisfaction Survey after work orders were closed, which is then received by Medical Center Support Services (MCSS).</p> <p>Further discussion with MCFM management identified the following:</p> <ul style="list-style-type: none"> • MCFM management was not sent all of the complaints/comments submitted (for corrective/repair maintenances provided by MCFM) through ServiceNow Customer Satisfaction Survey from MCSS. • Assigned MCFM personnel are required to perform a walkthrough with customers/requesters for obtaining an agreement (for works completed) for some cases; however, the process/requirement has not been clearly defined. • MCFM management is aware of the need for improvement opportunities to address customer complaints/comments and has a plan to collaborate with MCSS for developing and implementing more effective and efficient processes. 	<p>Failure to address customers' complaints/comments precludes MCFM management's abilities from identifying insufficient or incomplete maintenance works performed by MCFM or improving existing processes.</p>	<p>a) A process to adequately address customer complaints should be developed and implemented.</p> <p>b) Operational procedures need to state when assigned personnel should obtain an agreement from customers/requesters.</p>	<p>a) A process to adequately address customer complaints will be developed and implemented.</p> <p>Target Completion Date: August 1, 2019 Responsible Party: MCFM management</p> <p>b) Internal MCFM policy will clearly state when assigned personnel should obtain an agreement from customers/requesters.</p> <p>Target Completion Date: April 1, 2019 Responsible Party: MCFM management</p>
<p>5</p>	<p><i>Written operational procedures for facilities maintenance are not sufficient.</i></p> <p>MCFM team has developed several operational procedures, including "MCFM Departmental Policy for Preventative Maintenance" and "Class Definitions for Maximo". However, clearly defined processes</p>	<p>The lack of operational procedures that clearly define processes and</p>	<p>There should be written operational procedures that clearly define processes and responsibilities</p>	<p>Written operational procedures that clearly define processes and responsibilities related to facilities maintenance operations will be developed and implemented.</p>

No.	Observation	Risk/Effect	Recommendation	Management Corrective Action
	<p>and responsibilities have not been fully developed for the following areas of facilities maintenance operations:</p> <ul style="list-style-type: none"> • Corrective/repair maintenance (CM) • Customer complaint handling • Resource management, including: <ul style="list-style-type: none"> ○ Maintaining professional licenses/certifications required ○ Allocation of qualified resources ○ Labor hours tracking, resource assignment/utilization management • Asset information management in Maximo <p>As identified in the previous observations, there were cases where maintenance operations performed or use of Maximo by MCFM personnel were incorrect or not performed as expected by MCFM management.</p>	<p>responsibilities increases risks that processes are not performed or inconsistently/mistakenly carried out.</p>	<p>related to facilities maintenance operations.</p>	<p>Target Completion Date: October 31, 2019 Responsible Party: MCFM management</p>

V. OPPORTUNITIES FOR IMPROVEMENTS

No.	Observation	Risk/Effect	Recommendation
1	<p><i>Use of accurate “Actual Start Date/Time” and “Actual Finish Date/Time” information can be valuable for managing and monitoring MCFM facilities maintenance operations.</i></p> <p>Our review of a sample of 20 work orders in Maximo identified “Actual Start Date/Time” and “Actual Finish Date/Time” are the same for 19 work orders (95%).</p> <p>Further discussion with MCFM management identified the following:</p> <ul style="list-style-type: none"> • MCFM management is aware of the issue. • Potential causes for the issue may include the following: <ul style="list-style-type: none"> ○ Jobs were performed by assigned personnel prior to obtaining proper approvals. ○ System issues in Maximo 	<p>The lack of accurate information may preclude MCFM management’s abilities to monitor resource, utilization, and budgeting.</p>	<p>We recommend to reconfigure Maximo to capture correct “Actual Start Date/Time” and “Actual Finish Date/Time”; so that it can be used for monitoring/reporting compliance, completion rate for work orders, resource budget, and/or labor hours.</p>

No.	Observation	Risk/Effect	Recommendation
	<ul style="list-style-type: none"> • The issues causes misleading information to be retained; however, it does not impact facilities maintenance operations as “Actual Start Date/Time” and “Actual Finish Date/Time” are not currently used for monitoring resource hours or completion of work orders. • MCFM management recognizes that there are potential opportunities to use the information for monitoring/reporting compliance, completion rate for work orders, resource budget, and/or labor hours if the issues can be fixed in the future. 		

APPENDIX A

To conduct our review the following procedures were performed for the areas in scope:

- Interviewed MCFM management and reviewed documented procedures to gain an understanding of the facilities maintenance operations;
- Reviewed samples of work orders in Maximo to validate work orders were completed in an appropriate and timely manner by MCFM personnel who are qualified for performing jobs specified in work orders;
- Reviewed assets and work orders in Maximo for samples of assets being used (as listed in AwarePoint) to validate appropriate maintenance services were provided for the assets; and,
- Assessed and determined that the adequacy of internal controls and processes in place related to facilities maintenance operations and monitoring.