EAST CAROLINA UNIVERSITY

Utilities Infrastructure Condition Assessment

Main Campus Cooling Generation CCP#1
Asset MCCP1

Inspected April 6, 2022

ISES CORPORATION

Table of Contents

Section 1

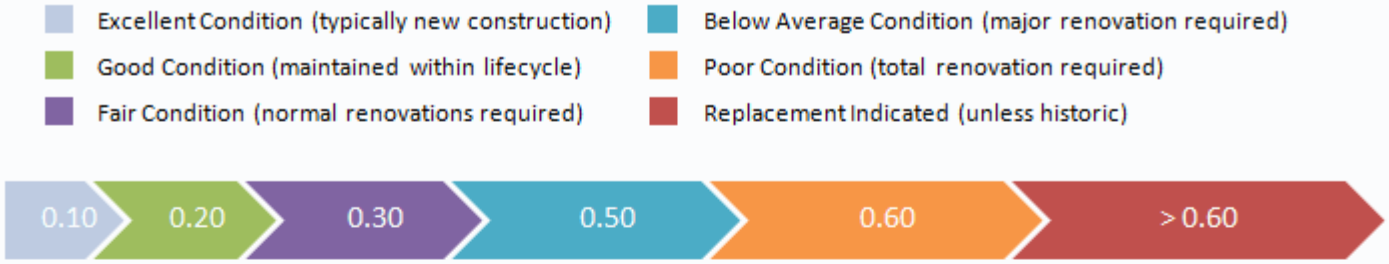
ASSET EXECUTIVE SUMMARY

All costs shown as Present Value

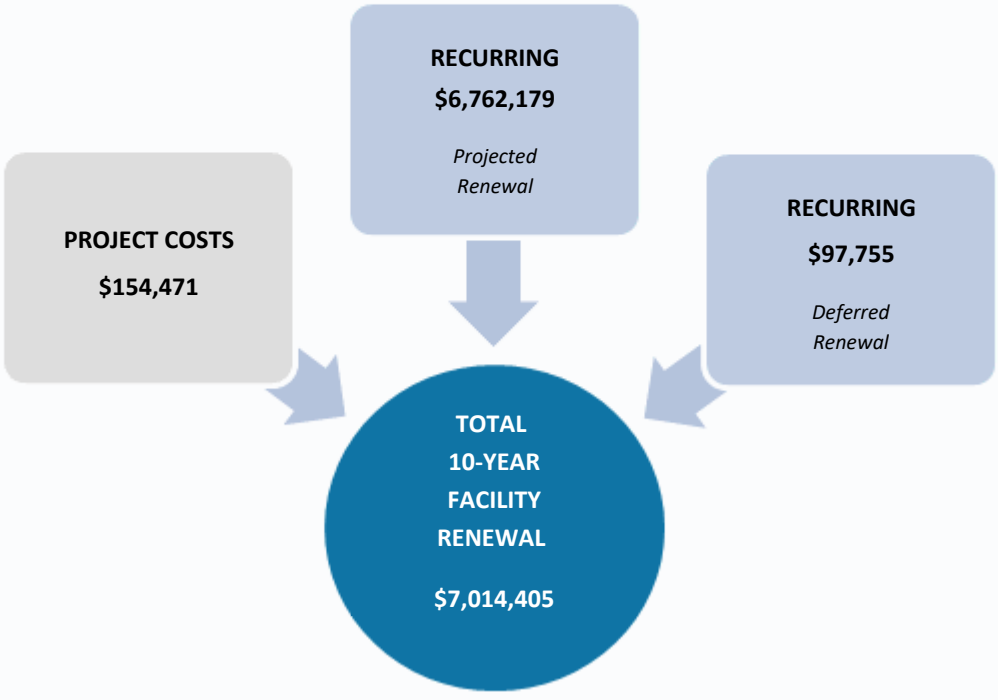
ASSET CODE	MCCP1	**CURRENT REPLACEMENT VALUE**	$24,950,000
ASSET NAME	MAIN CAMPUS COOLING GENERATION CCP#1	**FACILITY CONDITION NEEDS INDEX**	0.28
ASSET USE	Infrastructure	**FACILITY CONDITION INDEX**	0.00
YEAR BUILT	2001	**10-YEAR $/SF**	N/A
GSF	N/A		
INSPECTION DATE	04/06/2022		

FCNI Scale

The FCNI for this asset is **0.28**



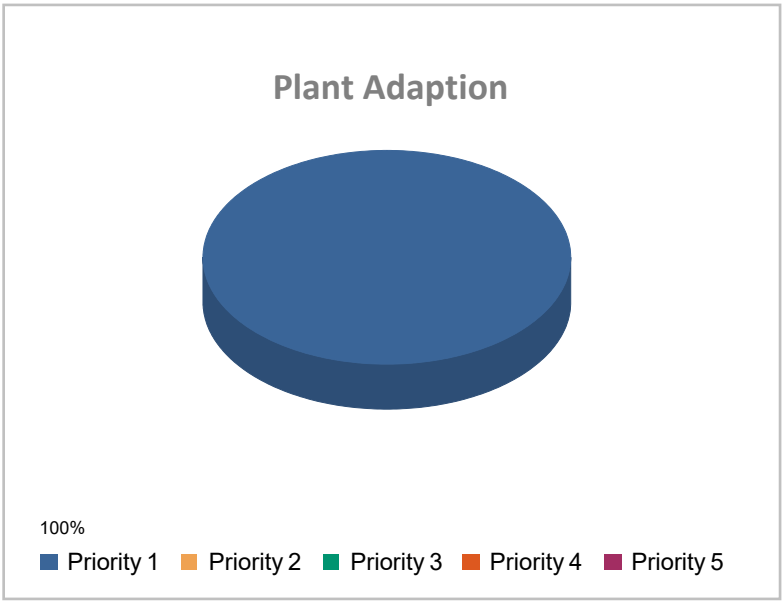
Total Facility Renewal Costs



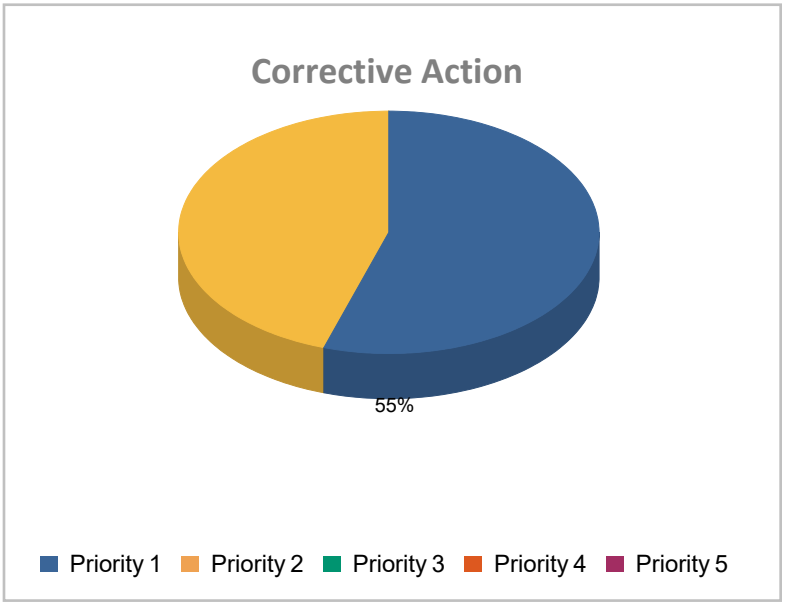
Project Costs

Project Cost by Priority

PLANT ADAPTION	
Priority 1	**$29,326**
Priority 2	**$0**
Priority 3	**$0**
Priority 4	**$0**
Priority 5	**$0**

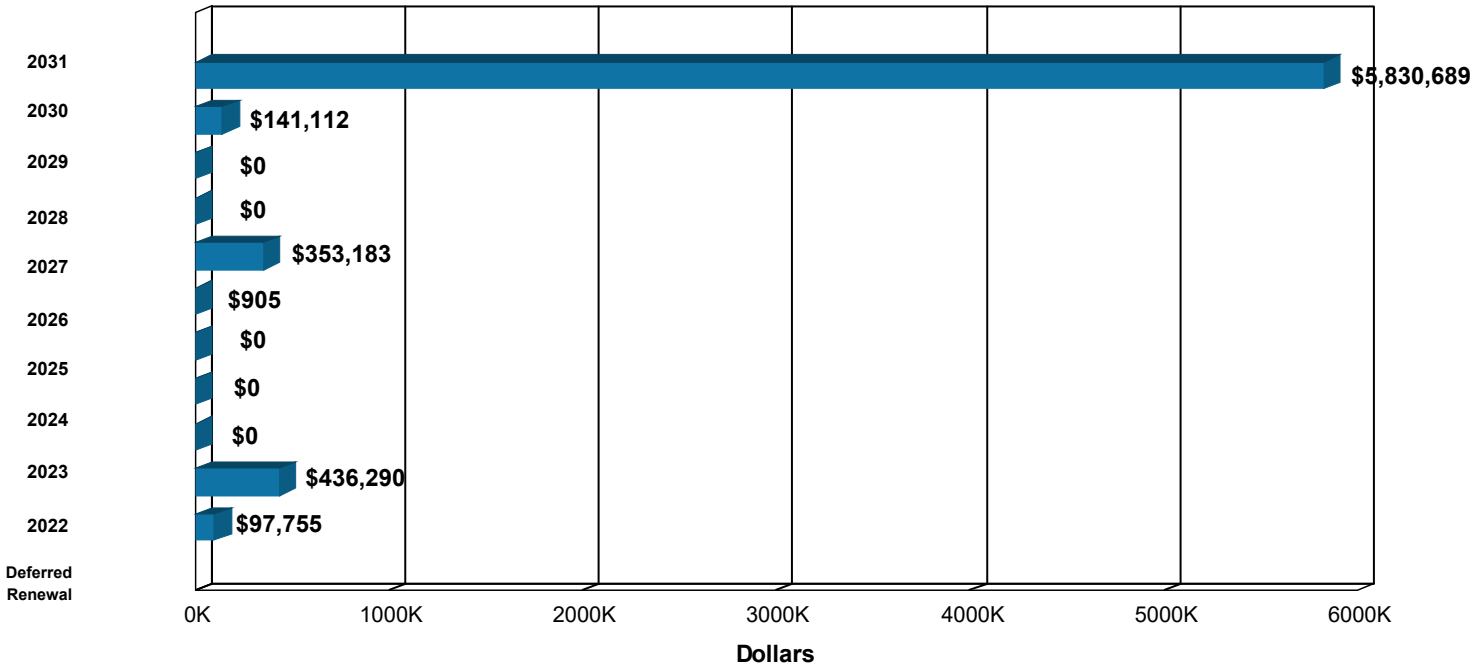


CORRECTIVE ACTION	
Priority 1	**$68,897**
Priority 2	**$56,249**
Priority 3	**$0**
Priority 4	**$0**
Priority 5	**$0**

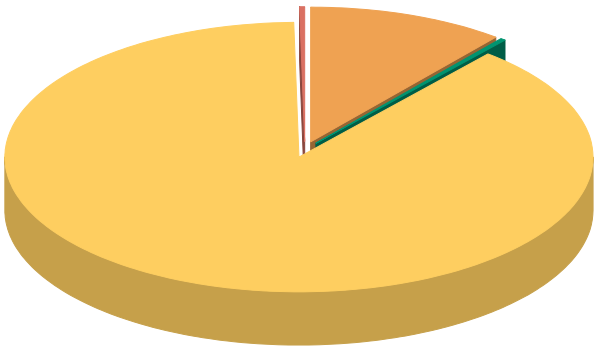


Recurring Costs

Component Replacement Cost by Year



Facilities Renewal Cost by System



Accessibility	$0	0%
Electrical	$755,266	11%
Exterior	$16,477	0%
Fire/Life Safety	$0	0%
Health	$0	0%
HVAC	$6,230,732	89%
Interiors	$0	0%
Plumbing	$11,931	0%
Site	$0	0.0%
Vert. Trans.	$0	0%
Security	$0	0.0%
TOTAL	**$7,014,405**	

ASSET SUMMARY

The East Carolina University Main Campus is served by a central chilled water system. The following is a detailed assessment of the chilled water plant identified as CCP#1 which is in the basement mechanical space of the Science and Technology Building (S&T). Also included in this report assessment is the associated cooling tower building constructed to the east of S&T. This plant provides chilled water to approximately nine facilities. The plant and tower facility were constructed between years 2000 and 2002 and have adequate physical space for future generational capacity.

Image 1: 1,470 water-cooled chiller CH-3

This plant is equipped with four, water-cooled centrifugal chillers that were manufactured by Trane and installed in 2002. These chillers, identified as CH-1, CH-2, CH-3, and CH-4, are rated for 1,470 nominal tons each. The chillers are charged with 2,950 pounds of type R-123 refrigerant. This equipment is subject to regular maintenance including teardown, tube cleaning, etc. through a contract with Brady/Trane. The physical inspection revealed no glaring deficiencies and the interviews confirmed that this equipment is currently in proper operating condition. While the statistical life of a water-cooled chiller is approximately 30 years, the efficiency of these machines begins to greatly reduce after 20 to 25 years. It is recommended that these chillers be considered for renewal near the end of this planning assessment.

The chillers are served by an associated motor starter. Currently these starts are rated for 4.16 kV and will reach the end of their statistical life in the next ten years. Interviews revealed that all of the 4.16 kV electrical service to this plant is being discontinued and the new starters will be connected to the 480/277-volt service power. Additionally, each chiller is connected to a local Trane control system updated in 2015. The local control system is interconnected with the energy management system consisting of equipment manufactured by Trane and Environmental Controls, Inc. While the control

systems are currently serviceable, they will require renewal in the next ten years due to technological obsolescence. The refrigerant monitoring system should be renewed at this time as well.

The cooling water generated at this plant is distributed through the central campus system by four, base-mounted, variable speed, electric chilled water pumps in mechanical room C101. These pumps, identified as CHP-1, CHP-2, CHP-3, and CHP-4 were manufactured by ITT/Bell & Gossett in 2002. They are rated for 3,000 gallons-per-minute and equipped with a 150-horsepower motor. There was no physical evidence of premature deterioration of the pumps and the equipment has been well maintained. There are currently no recommendations for the replacement of these pumps. As these pumps age, it is recommended that a more extensive teardown and rebuild be performed to ensure the efficient operation of the equipment. It is recommended that a service contract be executed for this maintenance.

Image 2: Chilled water pump CHP-1

The variable speed drives that serve these four pumps have reached the end of their reliable service life and the displays are largely illegible. It is recommended that these drives be updated.

Image 3: Deficient variable speed drive display

Additional equipment inspected include the local distribution systems, including pipe, valves, and automation. The insulation in the piping is in good condition. The valves appear to be in proper operating condition, but it is recommended that the seals and valve packing be replaced as needed.

This plant is equipped with a steel chilled water expansion tank with a 422-gallon capacity that was installed in 2002. There is also a plate-and-frame heat exchanger rated for 3,000 gallons-per-minute also installed in 2022. The expansion tank will reach the end of its service life in the next ten years and is recommended for renewal. The free cooling heat exchanger is in excellent condition with no recommendations.

Located in room C101 is the MIOX chemical treatment system and associated water treatment pump. This area is also equipped with a water softening system that was all installed in 2010. These systems and equipment will reach the end of their reliable service life in the next ten years and are recommended for renewal. It is also recommended that the closed loop water treatment system be updated with digital automation for the chemical dispersion into the system.

Image 4: Cooling Tower Building

The Cooling Tower Building to the east of Science & Technology is a concrete constructed facility with a brick masonry exterior facade. This facility consists of a tower basin, lower-level pump room, mezzanine level control area, and roof fan section. There are no interior finishes. This facility was constructed in 2002. There are two exterior access doors with panic hardware. The roof is largely concrete framework for the tower system but there is a small section of single ply, adhered, painted roof. The only recommendation is that single-ply roof will require renewal in the next ten years due to age and condition. It is also recommended that the damaged lightning protection system on the roof be repaired immediately.

This facility is equipped with six cooling tower assemblies that generate approximately 1,250 tons of condenser water each. The towers, fans, and basin were installed in 2002. The fan blades and surrounds were re-epoxied in the last couple of years providing life extension to the system. There are no recommendations for the renewal of the cooling towers. It is recommended however that five of the six variable speed drives that serve the tower fans be replaced due to age and condition.

Image 5: Cooling Tower cells 1-4 with new epoxy exterior finish

These towers are connected to the Trane control and energy management system. This control network was updated in 2015 but will require renewal near the end of this planning assessment due to age and technical obsolescence.

The motors that serve the tower fans are in proper operating condition and should remain reliable for the next ten years. However, as this equipment is exposed on the roof deck to variable weather patterns and temperature fluctuations, it is recommended that a spare motor be purchased and stored on-site in the event of a failure.

The physical inspection revealed sections of damaged infill that is recommended for replacement.

The condenser water generated at these towers is distributed to the S&T chiller plant through a system of piping that is in proper working condition. It may be necessary to replace the some of the seals and packing valves as needed.

Four condenser water pumps in room 100 of the Cooling Tower Building were installed in 2002. These vertically mounted, variable speed electric pumps were manufactured by Floway Pumps and have a rated capacity of 1,190 gall-per-minute and 150 feet of total dynamic head. They are equipped with 250 horsepower motors. These pumps are in fair condition and will require major maintenance including complete teardown and rebuild. Minor scale and corrosion were observed in the framework that will require repair. There are no other recommendations for these pumps. It is recommended that the variable speed drives be replaced due to age.

The condenser water system is also served by three well pumps and one filter pump. All four pumps are served by variable speed drives. Due to age and condition, it is recommended that all four pumps and associated drives be replace din the next ten years.

This electrical distribution in this building consists of two 1,200-amp switchboards and secondary distribution system made up of small branch transformers, wiring, and panelboards. There are no recommendations for this secondary system.

Interior lighting is provided by surface mounted fixtures with T8 lamps. The exterior lighting is single bulb type, surface-mounted fixtures on the roof. It is recommended that the interior and exterior lighting systems be updated due to age.

The main pump room on level one is equipped with one fan and two, small electric unit heaters. This equipment is also recommended for renewal due to diminishing lifecycle. The mezzanine control room is served by two water-source heat pumps identified as AHU-1 and AHU-2. This equipment is also recommended for renewal due to age.

Note: The renewal needs outlined in this report were identified from the visual inspection and staff interviews. Our professional architectural and engineering inspectors examined the accessible equipment and various components to determine what repairs or modifications may be necessary to restore the systems and asset to an acceptable condition, or to a level defined by the Client. The estimated costs represent correction of existing deficiencies and anticipated lifecycle failures within a ten-year period. These recommendations are to bring the system to modern standards. The total costs include variable project delivery costs as determined by the Owner and do not represent the cost of a complete renovation. Soft costs are not represented in this report, nor are costs that could not be identified or determined from the visual inspection and available information.

INSPECTION TEAM DATA

Report Development

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Project Manager

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Date of Inspection

April 6, 2022

Inspection Team Personnel

NAME	POSITION	SPECIALTY
Rob Camperlino	Facility Assessor	Mechanical, Electrical, Plumbing, Energy, Fire/Life Safety, Health
Carl Mason, PE, BSCP, M.ASCE	Senior Project Engineer	Mechanical, Electrical, Plumbing, Energy, Fire/Life Safety, Health

Client Contact

NAME	POSITION
Griffin L. Avin, CEFP	Director of Facilities Services, Health Services Campus

DEFINITIONS

The following information is a clarification of the Utilities Infrastructure Condition Assessment report using example definitions.

Overview

Recurring and Nonrecurring Renewal Costs

Renewal costs are divided into two main categories – recurring and nonrecurring. Recurring costs are cyclical and consist primarily of major repairs to or replacement/rebuilding of systems and components. The tool for projecting the recurring renewal costs is the Renewable Component Inventory, which is explained in detail below. Nonrecurring costs typically consist of modifications or repairs necessary to comply with code requirements or to address isolated, nonrecurring deficiencies that could negatively affect the systems and components within. For these nonrecurring costs, projects have been developed and include estimated material and labor costs.

Material and Labor Cost Factors and Additional Markups

The project costs are adjusted from the national averages to reflect conditions in Greenville using the R. S. Means City Cost Index for material and labor cost factors. The percentage adjustment of the national average is shown in the table below. Also included in the renewal costs are the construction markup (general contractor profit and overhead, construction management, permitting, accounting, site security, insurance, bonds, sales tax, institutional fees, site utilities, refuse fees, and insurance) and professional fees (architect or engineer design fees and in-house design costs).

GLOBAL MARKUP	%
Local Labor Index	71.7
Local Materials Index	100.7
Construction Markup	20.0
Professional Fees	16.0

Recurring Costs

Renewable Component Inventory and Cost Projections

The Renewable Component Inventory (starting on page 4.1.1) is based on industry standard lifecycle expectancies applied to an inventory of major systems and components. Each indicated component has the following associated information:

CATEGORY	DESCRIPTION
Component Code	A four-digit code assigned by AMS to the component
Component Description	Description of the individual component
Identifier	Identifying information can be entered as necessary
Customer ID	Customer-provided equipment ID number
Location	The location of each component can be entered if applicable.
Quantity	The quantity of the listed component
Units	The unit of measure associated with the quantity
Complexity Factor	Adjusts the component replacement costs when it is anticipated that the actual cost will deviate from the average for that component
Total Cost	The unit cost multiplied by quantity, in today's dollars (note that this is a one-time renewal/replacement cost)
Install Date	This is the year that the component was or is estimated to have been installed. When this data is not available, the default is the year the asset was constructed.
Useful Life	Average life expectancy of the component
Useful Life Adjustment	An optional adjustment that lengthens or reduces the first lifecycle of the component
Replacement Year	Expresses when the next replacement should occur and is the sum of the install date, useful life, and any useful life adjustment

The component listing forms the basis of the Recurring Costs by Year report, which provides a year-by-year list of projected recurring renewal costs (in future year dollars) over the next ten years. Each individual component is assigned a replacement year based on lifecycles. For items already past the end of their lifecycle, the replacement year is shown as Deferred Renewal.

For a longer term perspective, the Recurring Component Expenditure Projections Graph presents recurring renewal cost projections over a 50-year period (starting from the date the report is run) based on each individual item's renewal cost and life span. Some components might require renewal several times within the 50-year model, while others might not occur at all. The vertical bars on the graph represent the accumulated total costs for each individual year. The average annual cost per gross square foot ($/GSF) is shown at the bottom of the graph. In this calculation, costs are not escalated. This figure can be utilized to assess the adequacy of existing capital renewal and repair budgets.

Recurring Cost Classifications

- ### Deferred Renewal
  Recurring repairs, generated by the Renewable Component Inventory, that are past due for completion but have not yet been accomplished as part of normal maintenance or capital repair efforts. Further deferral of such renewal could impair the proper functioning of the system. Costs estimated for Deferred Renewal projects should include compliance with applicable codes, even if such compliance requires expenditures beyond those essential to effect the needed repairs.

- Projected Renewal
  Recurring renewal efforts, generated by the Renewable Component Inventory, that will be due within the scope of the assessment. These are regular or normal maintenance, repair, or renovation efforts that should be planned in the near future.

Nonrecurring Costs

As previously mentioned, modifications or repairs necessary to comply with code requirements and those that address isolated, nonrecurring deficiencies that could negatively affect the systems and components within are not included in the Renewable Component Inventory. For each such deficiency identified during the facility inspection, a project with an estimated cost to rectify said deficiency is recommended. These projects each have a unique identifier and are categorized by system type, priority, and classification, which are defined below. The costs in these projects are also indexed to local conditions and markups applied as the situation dictates.

Project Number

Each project has a unique number consisting of three elements, the asset identification number, system code, and a sequential number assigned by the FCA software. For example, the third fire/life safety project identified for asset 0001 would have a project number of 0001FS03 (0001 for the asset number, FS for fire/life safety, and 03 being the next sequential number for a fire/life safety project).

Project Classifications

- Plant Adaption
  Nonrecurring expenditures, stored in the Projects module, required to adapt the physical plant to the evolving needs of the institution and to changing codes or standards. These are expenditures beyond normal maintenance. Examples include compliance with changing and improvements occasioned by the adoption of modern technology.

- Corrective Action
  Nonrecurring expenditures, stored in the Projects module, for repairs needed to correct random and unpredictable deficiencies. Such projects are not related to aligning a building with codes or standards. Deficiencies classified as Corrective Action could have an effect on building aesthetics, safety, or usability.

Priority Classes

Recurring renewal needs do not receive individual prioritization, as the entire data set of needs in this category is year-based. Each separate component has a distinct need year, rendering further prioritization unnecessary. Each nonrecurring renewal project, however, has a priority assigned to

indicate the criticality of the recommended work. The prioritization utilized for this subset of the data is as follows.

- Priority 1 – High

  Items in this category include:

  a. correcting a cited safety hazard
  b. stopping accelerated deterioration
  c. returning a facility to normal operation

- Priority 2 – Medium

  Items in this category include:

  a. repairs to prevent further deterioration
  b. improvements to facility approach/entry and access to goods and services (DOJ ADA title III, priorities 1 and 2)
  c. correction of potential safety hazards

- Priority 3 – Low

  Items in this category include:

  a. improving access to restrooms and other amenities (DOJ ADA title III, priorities 3 and 4)
  b. bringing a facility into compliance with current building codes as grandfather clauses expire
  c. increasing usability following an occupancy or use change
  d. actions that are recommended but not required by code

Project Subclass

Subclass ratings are assigned to accessibility upgrade activities based on the four Department of Justice priority rankings recommended by the Title III regulations for planning readily achievable barrier removal projects. These ratings are:

- DOJ1 Accessible approach and entrance
- DOJ2 Access to goods and services
- DOJ3 Access to restrooms
- DOJ4 Any other necessary measures

Category Codes

CATEGORY CODE	SYSTEM DESCRIPTION
AC1A – AC4B	ACCESSIBILITY
EL1A – EL8A	ELECTRICAL
ES1A – ES6E	EXTERIOR STRUCTURE
FS1A – FS6A	FIRE/LIFE SAFETY
HE1A – HE7A	HEALTH
HV1A – HV8B	HVAC
IS1A – IS6D	INTERIOR FINISHES/SYSTEMS
PL1A – PL5A	PLUMBING
SI1A – SI4A	SITE
VT1A – VT7A	VERTICAL TRANSPORTATION

Example: **Category Code = EL5A**	
EL	System Description
5	Component Description
A	Element Description

Priority Sequence

A Priority Sequence number is automatically assigned to each project to rank the projects in order of relative criticality and show the recommended execution order. This number is calculated based on the Priority Class and identified system of each project.

Example			
Priority Class	**Category Code**	**Project Number**	**Priority Sequence**
1	HV2C	0001HV04	01
1	PL1D	0001PL02	02
2	IS1E	0001IS06	03
2	EL4C	0001EL03	04

Photographs

A code shown on the Photo Log identifies the asset number, photo sequence, and a letter designation for architect (a) or engineer (e).

Example: **Photo Number: 0001006e**	
0001	Asset Number
006	Photo Sequence
e	Engineering Photo

Section 2

RENEWAL NEEDS MATRIX

All dollars shown as Present Value

CATEGORY	NONRECURRING PROJECT NEEDS			RECURRING COMPONENT REPLACEMENT NEEDS											
	Immediate	Critical	Noncritical	Deferred Renewal	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	TOTAL
ACCESSIBILITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
EXTERIOR	0	0	0	0	0	0	0	0	0	16,477	0	0	0	0	$16,477
INTERIOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
PLUMBING	0	0	0	0	0	0	0	0	0	0	0	0	11,931	0	$11,931
HVAC	94,875	56,249	0	1,803	45,645	0	0	0	905	81,147	0	0	129,181	5,820,927	$6,230,732
FIRE/LIFE SAFETY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
ELECTRICAL	3,347	0	0	95,952	390,645	0	0	0	0	255,560	0	0	0	9,762	$755,266
SITE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
VERT. TRANS.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
HEALTH/EQUIP.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
SUBTOTAL	$98,222	$56,249	$0	$97,755	$436,290	$0	$0	$0	$905	$353,183	$0	$0	$141,112	$5,830,689	$7,014,405
TOTAL NONRECURRING PROJECT NEEDS			$154,471	TOTAL RECURRING COMPONENT REPLACEMENT NEEDS										$6,859,934	

CURRENT REPLACEMENT VALUE	$24,950,000
FACILITY CONDITION NEEDS INDEX	0.28
FACILITY CONDITION INDEX	0.00

GSF	TOTAL 10-YEAR FACILITY RENEWAL NEEDS	10-YEAR NEEDS/SF
N/A	$7,014,405	N/A

RENEWAL NEEDS BY SYSTEM

All costs shown as Present Value

CATEGORY	NONRECURRING PROJECT COSTS	RECURRING COMPONENT REPLACEMENT COSTS	TOTAL 10-YEAR FACILITY RENEWAL COSTS
ACCESSIBILITY	$0	$0	$0
EXTERIOR	$0	$16,477	$16,477
INTERIOR	$0	$0	$0
PLUMBING	$0	$11,931	$11,931
HVAC	$151,124	$6,079,608	$6,230,732
FIRE/LIFE SAFETY	$0	$0	$0
ELECTRICAL	$3,347	$751,918	$755,266
SITE	$0	$0	$0
VERT. TRANS	$0	$0	$0
HEALTH	$0	$0	$0
TOTALS	**$154,471**	**$6,859,934**	**$7,014,405**

FACILITIES RENEWAL PLAN

RECURRING COMPONENT REPLACEMENT COSTS

All costs shown as Present Value

ASSET CODE COMP CODE	COMPONENT	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	REPLACEMENT YEAR	REPLACEMENT COST
MCCP1 HU52	UNIT HEATER, ELECTRIC	UH-1		CCP1 COOLING TOWER ROOM 100	D3020	Deferred Renewal	901
MCCP1 HU52	UNIT HEATER, ELECTRIC	UH-2		CCP1 COOLING TOWER ROOM 100	D3020	Deferred Renewal	901
MCCP1 VF02	VARIABLE FREQUENCY DRIVE (5-7.5 HP)	WELL PUMP 1 VFD		CCP1 COOLING TOWER MEZZANINE	D5010	Deferred Renewal	3,496
MCCP1 VF02	VARIABLE FREQUENCY DRIVE (5-7.5 HP)	WELL PUMP 3 VFD		CCP1 COOLING TOWER MEZZANINE	D5010	Deferred Renewal	3,496
MCCP1 VF02	VARIABLE FREQUENCY DRIVE (5-7.5 HP)	WELL PUMP 2 VFD		CCP1 COOLING TOWER MEZZANINE	D5010	Deferred Renewal	3,496
MCCP1 VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-3 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	Deferred Renewal	16,223
MCCP1 VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-5 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	Deferred Renewal	16,223
MCCP1 VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-6 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	Deferred Renewal	16,223
MCCP1 VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-1 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	Deferred Renewal	16,223
MCCP1 VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-2 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	Deferred Renewal	16,223

FACILITIES RENEWAL PLAN

RECURRING COMPONENT REPLACEMENT COSTS

All costs shown as Present Value

ASSET CODE COMP CODE	COMPONENT	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	REPLACEMENT YEAR	REPLACEMENT COST
MCCP1 LE07	LIGHTING - EXTERIOR, WALL FLOOD (SV, MH, ID, LED)	ROOF LIGHTING		CCP1 COOLING TOWER BLDG. ROOF	D5020	Deferred Renewal	4,351
MCCP1 AH44	HEAT PUMP, WATER-SOURCE	AHU-1		CCP1 COOLING TOWER MEZZANINE	D3040	2022	21,395
MCCP1 AH44	HEAT PUMP, WATER-SOURCE	AHU-2		CCP1 COOLING TOWER MEZZANINE	D3040	2022	21,395
MCCP1 FN21	FAN - INLINE CENTRIFUGAL AIRFOIL, SUPPLY, 2.5" SP (<=30 HP)	PUMP ROOM FAN		CCP1 COOLING TOWER ROOM 100	D3040	2022	2,855
MCCP1 VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-4 VFD		SCIENCE & TECH. ROOM C101	D5010	2022	42,620
MCCP1 VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-3 VFD		SCIENCE & TECH. ROOM C101	D5010	2022	42,620
MCCP1 VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-2 VFD		SCIENCE & TECH. ROOM C101	D5010	2022	42,620
MCCP1 VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-1 VFD		SCIENCE & TECH. ROOM C101	D5010	2022	42,620
MCCP1 VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-3		CCP1 COOLING TOWER MEZZANINE	D5010	2022	67,199
MCCP1 VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-2		CCP1 COOLING TOWER MEZZANINE	D5010	2022	67,199
MCCP1 VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-1		CCP1 COOLING TOWER MEZZANINE	D5010	2022	67,199

FACILITIES RENEWAL PLAN

RECURRING COMPONENT REPLACEMENT COSTS

All costs shown as Present Value

ASSET CODE COMP CODE	COMPONENT	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	REPLACEMENT YEAR	REPLACEMENT COST
MCCP1 LI20	LIGHTING SYSTEM, INTERIOR - SHOPS / TRADES, DRY LABORATORY	SURFACE WITH T8 LAMPS		CCP1 COOLING TOWER BUILDING	D5020	2022	18,567
MCCP1 PH01	PUMP - ELECTRIC (<=10 HP)	WATER TREATMENT PUMP		SCIENCE & TECH. ROOM C101	D3040	2026	905
MCCP1 RR03	ROOF - 1-PLY, ADHERED (EPDM, PIB, CSPE, PVC)	CENTER ROOF		CCP1 COOLING TOWER BLDG. ROOF	B3010	2027	16,477
MCCP1 TK33	EXPANSION TANK, DIAPHRAGM (250-550 GAL)	CHW EXPANSION TANK		SCIENCE & TECH. ROOM C101	D3030	2027	30,305
MCCP1 PH01	PUMP - ELECTRIC (<=10 HP)	WELL PUMP 1		CCP1 COOLING TOWER MEZZANINE	D3040	2027	9,054
MCCP1 PH01	PUMP - ELECTRIC (<=10 HP)	WELL PUMP 2		CCP1 COOLING TOWER MEZZANINE	D3040	2027	9,054
MCCP1 PH01	PUMP - ELECTRIC (<=10 HP)	WELL PUMP 3		CCP1 COOLING TOWER MEZZANINE	D3040	2027	9,054
MCCP1 PH04	PUMP - ELECTRIC (20 - 25 HP)	FILTER PUMP		CCP1 COOLING TOWER ROOM 100	D3040	2027	23,681
MCCP1 MC06	MOTOR STARTER - 5KV	CH-1 STARTER		SCIENCE & TECH. ROOM C101	D5010	2027	47,090
MCCP1 MC06	MOTOR STARTER - 5KV	CH-2 STARTER		SCIENCE & TECH. ROOM C101	D5010	2027	47,090
MCCP1 MC06	MOTOR STARTER - 5KV	CH-3 STARTER		SCIENCE & TECH. ROOM C101	D5010	2027	47,090

FACILITIES RENEWAL PLAN

RECURRING COMPONENT REPLACEMENT COSTS

All costs shown as Present Value

ASSET CODE COMP CODE	COMPONENT	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	REPLACEMENT YEAR	REPLACEMENT COST
MCCP1 MC06	MOTOR STARTER - 5KV	CH-4 STARTER		SCIENCE & TECH. ROOM C101	D5010	2027	47,090
MCCP1 VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-4		CCP1 COOLING TOWER MEZZANINE	D5010	2027	67,199
MCCP1 WT02	WATER SOFTENER (71 - 120 GPM)	KINETICO WATER SOFT.		SCIENCE & TECH. ROOM C101	D2020	2030	11,931
MCCP1 CT13	COOLING WATER TREATMENT SYSTEM	MIOX WATER TREATMENT SYSTEM		SCIENCE & TECH. ROOM C101	D3030	2030	18,602
MCCP1 CH22	REFRIGERANT MONITORING SYSTEM	REF. MONITORING SYSTEM		SCIENCE & TECH. ROOM C101	D3060	2030	32,651
MCCP1 HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	CP-05 DDC, CHILLER PLANT ENERGY		SCIENCE & TECH. ROOM C101	D3060	2030	13,208
MCCP1 HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	COOLING TOWER 5-6		CCP1 COOLING TOWER MEZZANINE	D3060	2030	13,208
MCCP1 HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	DMS 3500 SIT - CHLR, 3500		SCIENCE & TECH. ROOM C101	D3060	2030	21,793
MCCP1 HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	COOLING TOWER 1-4		CCP1 COOLING TOWER MEZZANINE	D3060	2030	29,718
MCCP1 CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-1		SCIENCE & TECH. ROOM C101	D3030	2031	1,433,388
MCCP1 CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-2		SCIENCE & TECH. ROOM C101	D3030	2031	1,433,388
MCCP1 CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-3		SCIENCE & TECH. ROOM C101	D3030	2031	1,433,388

FACILITIES RENEWAL PLAN

RECURRING COMPONENT REPLACEMENT COSTS

All costs shown as Present Value

ASSET CODE COMP CODE	COMPONENT	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	REPLACEMENT YEAR	REPLACEMENT COST
MCCP1 CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-3		SCIENCE & TECH. ROOM C101	D3030	2031	1,433,388
MCCP1 CH21	CHILLER CONTROL CABINET	CH-1 CONTROLLER		CCP1 COOLING TOWER ROOM 100	D3060	2031	21,844
MCCP1 CH21	CHILLER CONTROL CABINET	CH-2 CONTROLLER		CCP1 COOLING TOWER ROOM 100	D3060	2031	21,844
MCCP1 CH21	CHILLER CONTROL CABINET	CH-3 CONTROLLER		CCP1 COOLING TOWER ROOM 100	D3060	2031	21,844
MCCP1 CH21	CHILLER CONTROL CABINET	CH-4 CONTROLLER		CCP1 COOLING TOWER ROOM 100	D3060	2031	21,844
MCCP1 VF06	VARIABLE FREQUENCY DRIVE (20-25 HP)	FILTER PUMP VFD		CCP1 COOLING TOWER ROOM 100	D5010	2031	9,762
						TOTAL	**$6,859,934**

FACILITIES RENEWAL PLAN

NONRECURRING PROJECT COSTS

All costs shown as Present Value

PROJECT NUMBER	PROJECT TITLE	UNI-FORMAT	PRIORITY CLASS	PROJECT CLASSIFICATION	PROJECT COST
MCCP1HV03	PURCHASE SPARE COOLING TOWER FAN MOTOR	D3030	1	Plant Adaption	19,581
MCCP1HV04	REPLACE DAMAGED COOLING TOWER INFILL	D3030	1	Corrective Action	65,549
MCCP1HV05	INSTALL CHEMICAL TREATMENT DIGITAL AUTOMATION	D3090	1	Plant Adaption	9,744
MCCP1EL01	REPAIR LIGHTNING PROTECTION AT COOLING TOWER BUILDING	D5090	1	Corrective Action	3,347
MCCP1HV01	MAJOR PUMP TEARDOWN AND REBUILD	D3030	2	Corrective Action	51,442
MCCP1HV02	REPLACE VALVE SEALS AND PACKING	D3030	2	Corrective Action	4,807
				TOTAL	**$154,471**

Section 3

All costs shown as Present Value

PURCHASE SPARE COOLING TOWER FAN MOTOR

Project Number:	MCCP1HV03	**Category Code:** HV2B	
Priority Sequence:	1		
Priority Class:	High	**System:**	HVAC
Project Class:	Plant Adaption	**Component:**	COOLING
Date Basis:	7/19/2022	**Element:**	HEAT REJECTION

Code Application:	Subclass/Savings:	Project Location:
Not Applicable	Not Applicable	Item Only: Floor(s) M

Description

It is recommended that a spare cooling tower fan motor be purchased and stored at the CCP#1 cooling Tower building.

All costs shown as Present Value

Project Cost Estimate

Task Description	Unit	Qnty	Material Unit Cost	Total Material Cost	Labor Unit Cost	Total Labor Cost	Total Cost
Purchase spare motor	HP	75	$248	$18,567	$16.54	$1,241	$19,808
Base Material/Labor Costs				**$18,567**		**$1,241**	
Indexed Material/Labor Costs				**$18,697**		**$884**	**$19,581**
No GCM Required							**$0**
Original Construction Cost							**$19,581**
Date of Original Estimate: 7/19/2022						**Inflation**	**$0**
Current Year Construction Cost							**$19,581**
No Professional Fees Required							**$0**
TOTAL PROJECT COST							**$19,581**

All costs shown as Present Value

REPLACE DAMAGED COOLING TOWER INFILL

Project Number:	MCCP1HV04	**Category Code:** HV2B	
Priority Sequence:	2		
Priority Class:	High	**System:**	HVAC
Project Class:	Corrective Action	**Component:**	COOLING
Date Basis:	7/12/2022	**Element:**	HEAT REJECTION

Code Application:	Subclass/Savings:	Project Location:
Not Applicable	Not Applicable	Undefined: Floor(s) 1

Description

There is evidence of damaged cooling tower infill and drift eliminator that is recommended for renewal.

All costs shown as Present Value

Project Cost Estimate

Task Description	Unit	Qnty	Material Unit Cost	Total Material Cost	Labor Unit Cost	Total Labor Cost	Total Cost
Replace tower infill	LOT	1	$41,500	$41,500	$18,000	$18,000	$59,500
Base Material/Labor Costs				**$41,500**		**$18,000**	
Indexed Material/Labor Costs				**$41,791**		**$12,834**	**$54,625**
Construction Mark Up at 20.0%							**$10,925**
Original Construction Cost							**$65,549**
Date of Original Estimate: 7/12/2022						**Inflation**	**$0**
Current Year Construction Cost							**$65,549**
No Professional Fees Required							**$0**
TOTAL PROJECT COST							**$65,549**

All costs shown as Present Value

INSTALL CHEMICAL TREATMENT DIGITAL AUTOMATION

Project Number:	MCCP1HV05	**Category Code:** HV8B	
Priority Sequence:	3		
Priority Class:	High	**System:**	HVAC
Project Class:	Plant Adaption	**Component:**	GENERAL
Date Basis:	7/12/2022	**Element:**	OTHER

Code Application:	Subclass/Savings:	Project Location:
Not Applicable	Not Applicable	Undefined: Floor(s) 1

Description

It is recommended that the closed loop water system be retrofit to include digital automation for chemical dispersion.

All costs shown as Present Value

Project Cost Estimate

Task Description	Unit	Qnty	Material Unit Cost	Total Material Cost	Labor Unit Cost	Total Labor Cost	Total Cost
Install water treatment controls	LOT	1	$5,500	$5,500	$2,050	$2,050	$7,550
			Base Material/Labor Costs	**$5,500**		**$2,050**	
			Indexed Material/Labor Costs	**$5,539**		**$1,462**	**$7,000**
					Construction Mark Up at 20.0%		**$1,400**
					Original Construction Cost		**$8,400**
Date of Original Estimate: 7/12/2022					**Inflation**		**$0**
					Current Year Construction Cost		**$8,400**
					Professional Fees at 16.0%		**$1,344**
					TOTAL PROJECT COST		**$9,744**

All costs shown as Present Value

REPAIR LIGHTNING PROTECTION AT COOLING TOWER BUILDING

Project Number:	MCCP1EL01	**Category Code:** EL8A	
Priority Sequence:	4		
Priority Class:	High	**System:**	ELECTRICAL
Project Class:	Corrective Action	**Component:**	GENERAL
Date Basis:	7/12/2022	**Element:**	OTHER

Code Application:	Subclass/Savings:	Project Location:
Not Applicable	Not Applicable	Area Wide: Floor(s) R

Description

The lighting protection system on the roof of the CCP#1 Cooling Tower Building is damaged and needs to be repaired. It is currently not totally affixed to the structure and requires repair.

All costs shown as Present Value

Project Cost Estimate

Task Description	Unit	Qnty	Material Unit Cost	Total Material Cost	Labor Unit Cost	Total Labor Cost	Total Cost
Repair lighting protection	LOT	1	$1,000	$1,000	$2,500	$2,500	$3,500
Base Material/Labor Costs				**$1,000**		**$2,500**	
Indexed Material/Labor Costs				**$1,007**		**$1,783**	**$2,790**
Construction Mark Up at 20.0%							**$558**
Original Construction Cost							**$3,347**
Date of Original Estimate: 7/12/2022						**Inflation**	**$0**
Current Year Construction Cost							**$3,347**
No Professional Fees Required							**$0**
TOTAL PROJECT COST							**$3,347**

All costs shown as Present Value

MAJOR PUMP TEARDOWN AND REBUILD

Project Number:	MCCP1HV01
Priority Sequence:	5
Priority Class:	Medium
Project Class:	Corrective Action
Date Basis:	7/12/2022

Category Code: HV5B

System:	HVAC
Component:	STEAM/HYDRONIC DISTRIB.
Element:	PUMPS

Code Application:	Subclass/Savings:	Project Location:
Not Applicable	Not Applicable	Item Only: Floor(s) B

Description

A tear-down internal inspection of the centrifugal chilled and condenser water pumps is recommended. This inspection and maintenance will ensure that internal leaks and deteriorated packing leaks do not cause the pumps to expend more horsepower to deliver the nameplate capacity. The actual pump production can be determined and corrective repairs made using the pump performance curve. Performing tear-downs on the largest pumps will provide the largest reduction in pump brake horsepower. This inspection and maintenance will also provide life extension to the equipment and will help to ensure reliable operation of the pumps.

All costs shown as Present Value

Project Cost Estimate

Task Description	Unit	Qnty	Material Unit Cost	Total Material Cost	Labor Unit Cost	Total Labor Cost	Total Cost
Major pump maintenance	EA	8	$1,250	$10,000	$5,750	$46,000	$56,000
Base Material/Labor Costs				**$10,000**		**$46,000**	
Indexed Material/Labor Costs				**$10,070**		**$32,798**	**$42,868**
Construction Mark Up at 20.0%							**$8,574**
Original Construction Cost							**$51,442**
Date of Original Estimate: 7/12/2022						**Inflation**	**$0**
Current Year Construction Cost							**$51,442**
No Professional Fees Required							**$0**
TOTAL PROJECT COST							**$51,442**

All costs shown as Present Value

REPLACE VALVE SEALS AND PACKING

Project Number:	MCCP1HV02	**Category Code:** HV5A	
Priority Sequence:	6		
Priority Class:	Medium	**System:**	HVAC
Project Class:	Corrective Action	**Component:**	STEAM/HYDRONIC DISTRIB.
Date Basis:	7/18/2022	**Element:**	PIPING NETWORK

Code Application:	Subclass/Savings:	Project Location:
Not Applicable	Not Applicable	Undefined: Floor(s) 1,B

Description

This project recommends that older chilled and condenser water valves be repaired with new seals and packing.

All costs shown as Present Value

Project Cost Estimate

Task Description	Unit	Qnty	Material Unit Cost	Total Material Cost	Labor Unit Cost	Total Labor Cost	Total Cost
Replace valve seals and packing	LOT	1	$1,500	$1,500	$3,500	$3,500	$5,000
Base Material/Labor Costs				**$1,500**		**$3,500**	
Indexed Material/Labor Costs				**$1,511**		**$2,496**	**$4,006**
Construction Mark Up at 20.0%							**$801**
Original Construction Cost							**$4,807**
Date of Original Estimate: 7/18/2022						**Inflation**	**$0**
Current Year Construction Cost							**$4,807**
No Professional Fees Required							**$0**
TOTAL PROJECT COST							**$4,807**

Section 4

RENEWABLE COMPONENT INVENTORY

COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	QTY	UNITS	CPLX FACTR	TOTAL COST	INSTL DATE	USEFUL LIFE	USEFUL LIFE ADJ	REPL YEAR
DR08	DOOR AND FRAME, EXTERIOR, SWINGING, HOLLOW METAL	EXTERIOR DOORS		CCP1 COOLING TOWER BUILDING	2	LEAF	1.00	$4,470	2002	40		2042
RR03	ROOF - 1-PLY, ADHERED (EPDM, PIB, CSPE, PVC)	CENTER ROOF		CCP1 COOLING TOWER BLDG. ROOF	1,500	SF	1.48	$16,477	2002	20	5	2027
DR26	DOOR PANIC HARDWARE	EXTERIOR DOORS		CCP1 COOLING TOWER BUILDING	2	EA	1.00	$2,682	2002	20	19	2041
WT02	WATER SOFTENER (71 - 120 GPM)	KINETICO WATER SOFT.		SCIENCE & TECH. ROOM C101	50	GPM	1.00	$11,931	2010	20		2030
HU52	UNIT HEATER, ELECTRIC	UH-1		CCP1 COOLING TOWER ROOM 100	5	KW	1.00	$901	2002	15	4	DR
HU52	UNIT HEATER, ELECTRIC	UH-2		CCP1 COOLING TOWER ROOM 100	5	KW	1.00	$901	2002	15	4	DR
CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-1		SCIENCE & TECH. ROOM C101	1,470	TON	1.00	$1,433,388	2002	30	-1	2031
CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-2		SCIENCE & TECH. ROOM C101	1,470	TON	1.00	$1,433,388	2002	30	-1	2031
CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-3		SCIENCE & TECH. ROOM C101	1,470	TON	1.00	$1,433,388	2002	30	-1	2031
CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-3		SCIENCE & TECH. ROOM C101	1,470	TON	1.00	$1,433,388	2002	30	-1	2031
CT08	COOLING TOWER (>701 TONS)	CT-1		CCP1 COOLING TOWER BLDG. ROOF	1,250	TON	1.00	$499,332	2002	23	8	2033

RENEWABLE COMPONENT INVENTORY

COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	QTY	UNITS	CPLX FACTR	TOTAL COST	INSTL DATE	USEFUL LIFE	USEFUL LIFE ADJ	REPL YEAR
CT08	COOLING TOWER (>701 TONS)	CT-2		CCP1 COOLING TOWER BLDG. ROOF	1,250	TON	1.00	$499,332	2002	23	8	2033
CT08	COOLING TOWER (>701 TONS)	CT-3		CCP1 COOLING TOWER BLDG. ROOF	1,250	TON	1.00	$499,332	2002	23	8	2033
CT08	COOLING TOWER (>701 TONS)	CT-4		CCP1 COOLING TOWER BLDG. ROOF	1,250	TON	1.00	$499,332	2002	23	8	2033
CT08	COOLING TOWER (>701 TONS)	CT-5		CCP1 COOLING TOWER BLDG. ROOF	1,250	TON	1.00	$499,332	2002	23	8	2033
CT08	COOLING TOWER (>701 TONS)	CT-6		CCP1 COOLING TOWER BLDG. ROOF	1,250	TON	1.00	$499,332	2002	23	8	2033
CT13	COOLING WATER TREATMENT SYSTEM	MIOX WATER TREATMENT SYSTEM		SCIENCE & TECH. ROOM C101	1	SYS	1.90	$18,602	2010	20		2030
HE03	COOLING SYSTEM DISTRIBUTION - UTILITY PLANT	CHILLED WATER PIPE, VALVES, ETC.		SCIENCE & TECH. ROOM C101	1	LOT	1.35	$772,668	2002	40		2042
HE03	COOLING SYSTEM DISTRIBUTION - UTILITY PLANT	CONDENSER WATER PIPE, VALVES, ETC.		CCP1 COOLING TOWER BUILDING	1	LOT	1.15	$658,199	2002	40		2042
TK33	EXPANSION TANK, DIAPHRAGM (250-550 GAL)	CHW EXPANSION TANK		SCIENCE & TECH. ROOM C101	422	GAL	1.00	$30,305	2002	25		2027
AH44	HEAT PUMP, WATER-SOURCE	AHU-1		CCP1 COOLING TOWER MEZZANINE	5	TON	1.00	$21,395	2002	20		2022
AH44	HEAT PUMP, WATER-SOURCE	AHU-2		CCP1 COOLING TOWER MEZZANINE	5	TON	1.00	$21,395	2002	20		2022

RENEWABLE COMPONENT INVENTORY

COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	QTY	UNITS	CPLX FACTR	TOTAL COST	INSTL DATE	USEFUL LIFE	USEFUL LIFE ADJ	REPL YEAR
FN21	FAN - INLINE CENTRIFUGAL AIRFOIL, SUPPLY, 2.5" SP (<=30 HP)	PUMP ROOM FAN		CCP1 COOLING TOWER ROOM 100	1	HP	1.85	$2,855	2002	20		2022
HV20	HVAC DISTRIBUTION NETWORKS - SHOPS / TRADES, DRY LABORATORY	DUCT WORK		CCP1 COOLING TOWER BUILDING	1,500	SF	1.18	$30,776	2002	40		2042
HX08	HEAT EXCHANGER - PLATE FRAME (>600 GPM)	FREE COOLING HEX		SCIENCE & TECH. ROOM C101	3,000	GPM	1.00	$429,220	2022	25		2047
PH01	PUMP - ELECTRIC (<=10 HP)	WATER TREATMENT PUMP		SCIENCE & TECH. ROOM C101	0.50	HP	1.00	$905	2001	25		2026
PH01	PUMP - ELECTRIC (<=10 HP)	WELL PUMP 1		CCP1 COOLING TOWER MEZZANINE	5	HP	1.00	$9,054	2002	25		2027
PH01	PUMP - ELECTRIC (<=10 HP)	WELL PUMP 2		CCP1 COOLING TOWER MEZZANINE	5	HP	1.00	$9,054	2002	25		2027
PH01	PUMP - ELECTRIC (<=10 HP)	WELL PUMP 3		CCP1 COOLING TOWER MEZZANINE	5	HP	1.00	$9,054	2002	25		2027
PH04	PUMP - ELECTRIC (20 - 25 HP)	FILTER PUMP		CCP1 COOLING TOWER ROOM 100	25	HP	1.00	$23,681	2002	25		2027
PH11	PUMP - ELECTRIC (150 - 200 HP)	CHP-4		SCIENCE & TECH. ROOM C101	150	HP	1.00	$94,279	2002	30		2032
PH11	PUMP - ELECTRIC (150 - 200 HP)	CHP-1		SCIENCE & TECH. ROOM C101	150	HP	1.00	$94,279	2002	30		2032
PH11	PUMP - ELECTRIC (150 - 200 HP)	CHP-2		SCIENCE & TECH. ROOM C101	150	HP	1.00	$94,279	2002	30		2032

RENEWABLE COMPONENT INVENTORY

COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	QTY	UNITS	CPLX FACTR	TOTAL COST	INSTL DATE	USEFUL LIFE	USEFUL LIFE ADJ	REPL YEAR
PH11	PUMP - ELECTRIC (150 - 200 HP)	CHP-3		SCIENCE & TECH. ROOM C101	150	HP	1.00	$94,279	2002	30		2032
PH12	PUMP - ELECTRIC (>200 HP)	CWP-1		CCP1 COOLING TOWER ROOM 100	250	HP	1.00	$164,808	2002	30		2032
PH12	PUMP - ELECTRIC (>200 HP)	CWP-2		CCP1 COOLING TOWER ROOM 100	250	HP	1.00	$164,808	2002	30		2032
PH12	PUMP - ELECTRIC (>200 HP)	CWP-3		CCP1 COOLING TOWER ROOM 100	250	HP	1.00	$164,808	2002	30		2032
PH12	PUMP - ELECTRIC (>200 HP)	CWP-4		CCP1 COOLING TOWER ROOM 100	250	HP	1.00	$164,808	2002	30		2032
CH21	CHILLER CONTROL CABINET	CH-1 CONTROLLER		CCP1 COOLING TOWER ROOM 100	1	EA	0.65	$21,844	2015	25	-9	2031
CH21	CHILLER CONTROL CABINET	CH-2 CONTROLLER		CCP1 COOLING TOWER ROOM 100	1	EA	0.65	$21,844	2015	25	-9	2031
CH21	CHILLER CONTROL CABINET	CH-3 CONTROLLER		CCP1 COOLING TOWER ROOM 100	1	EA	0.65	$21,844	2015	25	-9	2031
CH21	CHILLER CONTROL CABINET	CH-4 CONTROLLER		CCP1 COOLING TOWER ROOM 100	1	EA	0.65	$21,844	2015	25	-9	2031
CH22	REFRIGERANT MONITORING SYSTEM	REF. MONITORING SYSTEM		SCIENCE & TECH. ROOM C101	1	EA	1.00	$32,651	2015	15		2030
HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	CP-05 DDC, CHILLER PLANT ENERGY		SCIENCE & TECH. ROOM C101	1	EA	1.00	$13,208	2015	15		2030

RENEWABLE COMPONENT INVENTORY

COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	QTY	UNITS	CPLX FACTR	TOTAL COST	INSTL DATE	USEFUL LIFE	USEFUL LIFE ADJ	REPL YEAR
HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	DMS 3500 SIT - CHLR, 3500		SCIENCE & TECH. ROOM C101	1	EA	1.65	$21,793	2015	15		2030
HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	COOLING TOWER 1-4		CCP1 COOLING TOWER MEZZANINE	1	EA	2.25	$29,718	2015	15		2030
HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	COOLING TOWER 5-6		CCP1 COOLING TOWER MEZZANINE	1	EA	1.00	$13,208	2015	15		2030
MC06	MOTOR STARTER - 5KV	CH-4 STARTER		SCIENCE & TECH. ROOM C101	1	EA	1.00	$47,090	2002	25		2027
MC06	MOTOR STARTER - 5KV	CH-1 STARTER		SCIENCE & TECH. ROOM C101	1	EA	1.00	$47,090	2002	25		2027
MC06	MOTOR STARTER - 5KV	CH-2 STARTER		SCIENCE & TECH. ROOM C101	1	EA	1.00	$47,090	2002	25		2027
MC06	MOTOR STARTER - 5KV	CH-3 STARTER		SCIENCE & TECH. ROOM C101	1	EA	1.00	$47,090	2002	25		2027
SE20	ELECTRICAL DISTRIBUTION NETWORK - SHOPS / TRADES, DRY LABORATORY	SECONDARY ELECTRICAL		CCP1 COOLING TOWER BUILDING	3,000	SF	1.18	$58,678	2002	40		2042
SG05	MAIN SWITCHBOARD W/BREAKERS (1200-1600 AMP)	MDPB		CCP1 COOLING TOWER ROOM 100	1,200	AMP	1.00	$106,185	2002	20	11	2033
SG05	MAIN SWITCHBOARD W/BREAKERS (1200-1600 AMP)	MDPA		CCP1 COOLING TOWER ROOM 100	1,200	AMP	1.00	$106,185	2002	20	11	2033
VF02	VARIABLE FREQUENCY DRIVE (5-7.5 HP)	WELL PUMP 2 VFD		CCP1 COOLING TOWER MEZZANINE	5	HP	1.00	$3,496	2009	12		DR

RENEWABLE COMPONENT INVENTORY

COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	QTY	UNITS	CPLX FACTR	TOTAL COST	INSTL DATE	USEFUL LIFE	USEFUL LIFE ADJ	REPL YEAR
VF02	VARIABLE FREQUENCY DRIVE (5-7.5 HP)	WELL PUMP 1 VFD		CCP1 COOLING TOWER MEZZANINE	5	HP	1.00	$3,496	2002	12	7	DR
VF02	VARIABLE FREQUENCY DRIVE (5-7.5 HP)	WELL PUMP 3 VFD		CCP1 COOLING TOWER MEZZANINE	5	HP	1.00	$3,496	2002	12	7	DR
VF06	VARIABLE FREQUENCY DRIVE (20-25 HP)	FILTER PUMP VFD		CCP1 COOLING TOWER ROOM 100	25	HP	1.00	$9,762	2015	16		2031
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-3 FAN VFD		CCP1 COOLING TOWER MEZZANINE	60	HP	1.00	$16,223	2002	16	3	DR
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-4 FAN VFD		CCP1 COOLING TOWER MEZZANINE	75	HP	1.00	$20,278	2018	16		2034
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-1 FAN VFD		CCP1 COOLING TOWER MEZZANINE	60	HP	1.00	$16,223	2002	16	3	DR
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-2 FAN VFD		CCP1 COOLING TOWER MEZZANINE	60	HP	1.00	$16,223	2002	16	3	DR
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-5 FAN VFD		CCP1 COOLING TOWER MEZZANINE	60	HP	1.00	$16,223	2002	16	3	DR
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-6 FAN VFD		CCP1 COOLING TOWER MEZZANINE	60	HP	1.00	$16,223	2002	16	3	DR
VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-4 VFD		SCIENCE & TECH. ROOM C101	150	HP	1.00	$42,620	2002	20		2022
VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-3 VFD		SCIENCE & TECH. ROOM C101	150	HP	1.00	$42,620	2002	20		2022

RENEWABLE COMPONENT INVENTORY

COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	QTY	UNITS	CPLX FACTR	TOTAL COST	INSTL DATE	USEFUL LIFE	USEFUL LIFE ADJ	REPL YEAR
VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-2 VFD		SCIENCE & TECH. ROOM C101	150	HP	1.00	$42,620	2002	20		2022
VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-1 VFD		SCIENCE & TECH. ROOM C101	150	HP	1.00	$42,620	2002	20		2022
VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-3		CCP1 COOLING TOWER MEZZANINE	250	HP	1.00	$67,199	2002	20		2022
VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-2		CCP1 COOLING TOWER MEZZANINE	250	HP	1.00	$67,199	2002	20		2022
VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-1		CCP1 COOLING TOWER MEZZANINE	250	HP	1.00	$67,199	2002	20		2022
VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-4		CCP1 COOLING TOWER MEZZANINE	250	HP	1.00	$67,199	2002	20	5	2027
LE07	LIGHTING - EXTERIOR, WALL FLOOD (SV, MH, ID, LED)	ROOF LIGHTING		CCP1 COOLING TOWER BLDG. ROOF	4	EA	1.00	$4,351	2002	15	4	DR
LI20	LIGHTING SYSTEM, INTERIOR - SHOPS / TRADES, DRY LABORATORY	SURFACE WITH T8 LAMPS		CCP1 COOLING TOWER BUILDING	3,000	SF	1.18	$18,567	2002	20		2022
LP01	LIGHTNING PROTECTION	LIGHTNING ARRESTATION		CCP1 COOLING TOWER BLDG. ROOF	6,000	SF	1.00	$9,960	2002	50		2052
							Grand Total:	**$13,091,577**				

RECURRING NEEDS BY YEAR

All costs shown as Future Value using a 3% average inflation rate

DEFERRED RENEWAL									
COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	QTY	UNITS	REPLACEMENT COST	YEAR
HU52	UNIT HEATER, ELECTRIC	UH-1		CCP1 COOLING TOWER ROOM 100	D3020	5	KW	$901	DR
HU52	UNIT HEATER, ELECTRIC	UH-2		CCP1 COOLING TOWER ROOM 100	D3020	5	KW	$901	DR
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-1 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	60	HP	$16,223	DR
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-2 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	60	HP	$16,223	DR
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-5 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	60	HP	$16,223	DR
VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-6 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	60	HP	$16,223	DR
VF02	VARIABLE FREQUENCY DRIVE (5-7.5 HP)	WELL PUMP 2 VFD		CCP1 COOLING TOWER MEZZANINE	D5010	5	HP	$3,496	DR
VF02	VARIABLE FREQUENCY DRIVE (5-7.5 HP)	WELL PUMP 1 VFD		CCP1 COOLING TOWER MEZZANINE	D5010	5	HP	$3,496	DR
VF02	VARIABLE FREQUENCY DRIVE (5-7.5 HP)	WELL PUMP 3 VFD		CCP1 COOLING TOWER MEZZANINE	D5010	5	HP	$3,496	DR

RECURRING NEEDS BY YEAR

All costs shown as Future Value using a 3% average inflation rate

VF10	VARIABLE FREQUENCY DRIVE (50-75 HP)	CT-3 FAN VFD		CCP1 COOLING TOWER MEZZANINE	D5010	60	HP	$16,223	DR
LE07	LIGHTING - EXTERIOR, WALL FLOOD (SV, MH, ID, LED)	ROOF LIGHTING		CCP1 COOLING TOWER BLDG. ROOF	D5020	4	EA	$4,351	DR
							TOTAL DEFERRED RENEWAL COST	$97,755	

2022

COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	QTY	UNITS	REPLACEMENT COST	YEAR
AH44	HEAT PUMP, WATER-SOURCE	AHU-1		CCP1 COOLING TOWER MEZZANINE	D3040	5	TON	$21,395	2022
AH44	HEAT PUMP, WATER-SOURCE	AHU-2		CCP1 COOLING TOWER MEZZANINE	D3040	5	TON	$21,395	2022
FN21	FAN - INLINE CENTRIFUGAL AIRFOIL, SUPPLY, 2.5" SP (<=30 HP)	PUMP ROOM FAN		CCP1 COOLING TOWER ROOM 100	D3040	1	HP	$2,855	2022
VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-3		CCP1 COOLING TOWER MEZZANINE	D5010	250	HP	$67,199	2022

RECURRING NEEDS BY YEAR

All costs shown as Future Value using a 3% average inflation rate

VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-2		CCP1 COOLING TOWER MEZZANINE	D5010	250	HP	$67,199	2022
VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-1		CCP1 COOLING TOWER MEZZANINE	D5010	250	HP	$67,199	2022
VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-4 VFD		SCIENCE & TECH. ROOM C101	D5010	150	HP	$42,620	2022
VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-3 VFD		SCIENCE & TECH. ROOM C101	D5010	150	HP	$42,620	2022
VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-2 VFD		SCIENCE & TECH. ROOM C101	D5010	150	HP	$42,620	2022
VF12	VARIABLE FREQUENCY DRIVE (100-150 HP)	CHP-1 VFD		SCIENCE & TECH. ROOM C101	D5010	150	HP	$42,620	2022
LI20	LIGHTING SYSTEM, INTERIOR - SHOPS / TRADES, DRY LABORATORY	SURFACE WITH T8 LAMPS		CCP1 COOLING TOWER BUILDING	D5020	3,000	SF	$18,567	2022
				2022 PROJECTED COMPONENT REPLACEMENT COST				**$436,290**	

No Projected Component Replacement Cost for Asset No. MCCP1 for 2023

RECURRING NEEDS BY YEAR

All costs shown as Future Value using a 3% average inflation rate

No Projected Component Replacement Cost for Asset No. MCCP1 for 2024

No Projected Component Replacement Cost for Asset No. MCCP1 for 2025

2026									
COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	QTY	UNITS	REPLACEMENT COST	YEAR
PH01	PUMP - ELECTRIC (<=10 HP)	WATER TREATMENT PUMP		SCIENCE & TECH. ROOM C101	D3040	0.50	HP	$1,019	2026
						2026 PROJECTED COMPONENT REPLACEMENT COST		$1,019	

RECURRING NEEDS BY YEAR

All costs shown as Future Value using a 3% average inflation rate

2027									
COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	QTY	UNITS	REPLACEMENT COST	YEAR
RR03	ROOF - 1-PLY, ADHERED (EPDM, PIB, CSPE, PVC)	CENTER ROOF		CCP1 COOLING TOWER BLDG. ROOF	B3010	1,500	SF	$19,101	2027
TK33	EXPANSION TANK, DIAPHRAGM (250-550 GAL)	CHW EXPANSION TANK		SCIENCE & TECH. ROOM C101	D3030	422	GAL	$35,132	2027
PH01	PUMP - ELECTRIC (<=10 HP)	WELL PUMP 1		CCP1 COOLING TOWER MEZZANINE	D3040	5	HP	$10,496	2027
PH01	PUMP - ELECTRIC (<=10 HP)	WELL PUMP 2		CCP1 COOLING TOWER MEZZANINE	D3040	5	HP	$10,496	2027
PH01	PUMP - ELECTRIC (<=10 HP)	WELL PUMP 3		CCP1 COOLING TOWER MEZZANINE	D3040	5	HP	$10,496	2027
PH04	PUMP - ELECTRIC (20 - 25 HP)	FILTER PUMP		CCP1 COOLING TOWER ROOM 100	D3040	25	HP	$27,453	2027
VF13	VARIABLE FREQUENCY DRIVE (>150 HP)	CWP-4		CCP1 COOLING TOWER MEZZANINE	D5010	250	HP	$77,902	2027
MC06	MOTOR STARTER - 5KV	CH-4 STARTER		SCIENCE & TECH. ROOM C101	D5010	1	EA	$54,591	2027
MC06	MOTOR STARTER - 5KV	CH-1 STARTER		SCIENCE & TECH. ROOM C101	D5010	1	EA	$54,591	2027
MC06	MOTOR STARTER - 5KV	CH-2 STARTER		SCIENCE & TECH. ROOM C101	D5010	1	EA	$54,591	2027

RECURRING NEEDS BY YEAR

All costs shown as Future Value using a 3% average inflation rate

MC06	MOTOR STARTER - 5KV	CH-3 STARTER		SCIENCE & TECH. ROOM C101	D5010	1	EA	$54,591	2027
2027 PROJECTED COMPONENT REPLACEMENT COST								**$409,436**	

No Projected Component Replacement Cost for Asset No. MCCP1 for 2028

No Projected Component Replacement Cost for Asset No. MCCP1 for 2029

2030									
COMP CODE	**COMPONENT DESCRIPTION**	**IDENTIFIER**	**CUSTOMER ID**	**LOCATION**	**UNI-FORMAT**	**QTY**	**UNITS**	**REPLACEMENT COST**	**YEAR**
WT02	WATER SOFTENER (71 - 120 GPM)	KINETICO WATER SOFT.		SCIENCE & TECH. ROOM C101	D2020	50	GPM	$15,114	2030

RECURRING NEEDS BY YEAR

All costs shown as Future Value using a 3% average inflation rate

CT13	COOLING WATER TREATMENT SYSTEM	MIOX WATER TREATMENT SYSTEM		SCIENCE & TECH. ROOM C101	D3030	1	SYS	$23,565	2030
CH22	REFRIGERANT MONITORING SYSTEM	REF. MONITORING SYSTEM		SCIENCE & TECH. ROOM C101	D3060	1	EA	$41,362	2030
HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	CP-05 DDC, CHILLER PLANT ENERGY		SCIENCE & TECH. ROOM C101	D3060	1	EA	$16,732	2030
HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	DMS 3500 SIT - CHLR, 3500		SCIENCE & TECH. ROOM C101	D3060	1	EA	$27,607	2030
HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	COOLING TOWER 1-4		CCP1 COOLING TOWER MEZZANINE	D3060	1	EA	$37,646	2030
HE04	COOLING SYSTEM CONTROLS - UTILITY PLANT	COOLING TOWER 5-6		CCP1 COOLING TOWER MEZZANINE	D3060	1	EA	$16,732	2030
						2030 PROJECTED COMPONENT REPLACEMENT COST		**$178,756**	

2031

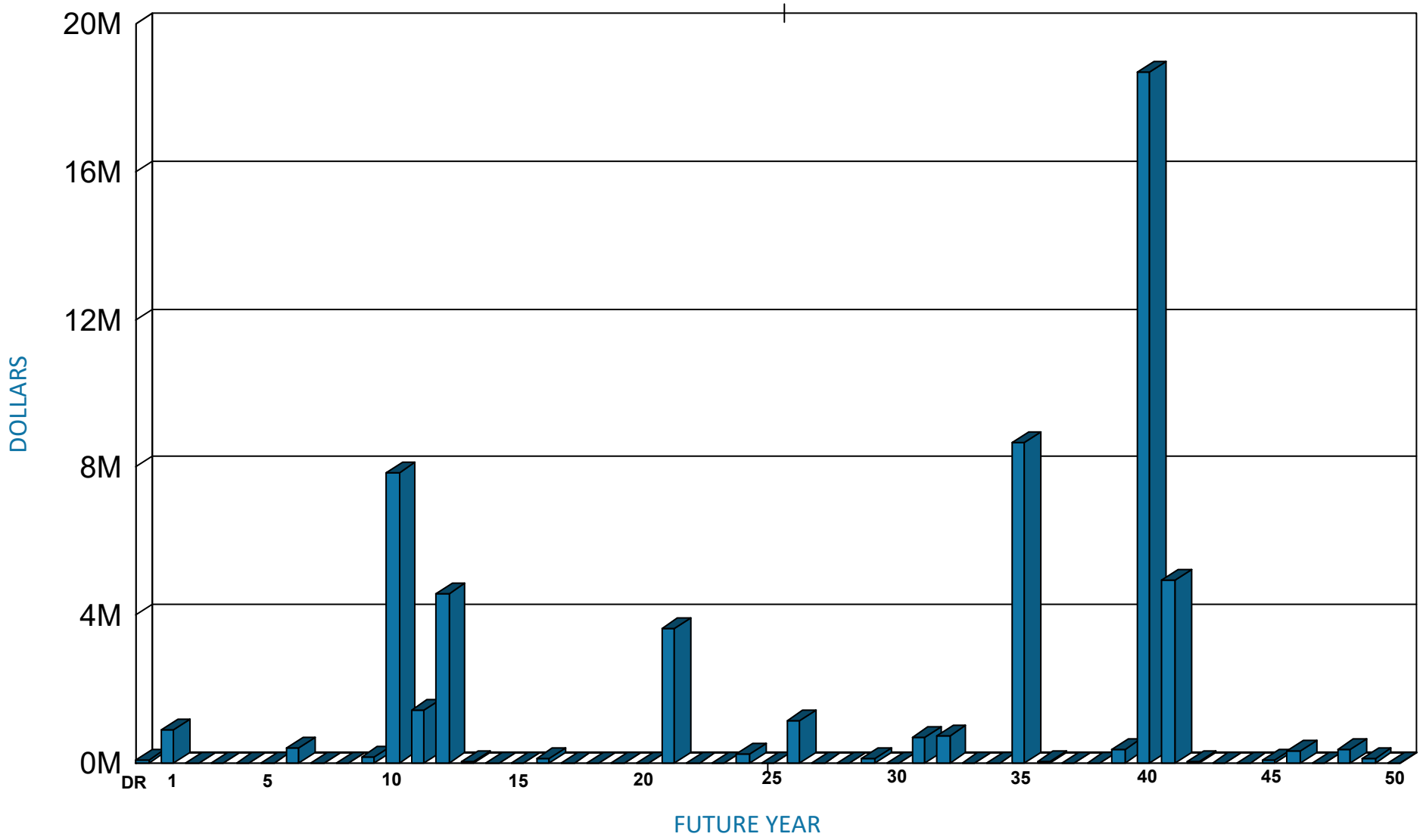
COMP CODE	COMPONENT DESCRIPTION	IDENTIFIER	CUSTOMER ID	LOCATION	UNI-FORMAT	QTY	UNITS	REPLACEMENT COST	YEAR
CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-1		SCIENCE & TECH. ROOM C101	D3030	1,470	TON	$1,870,246	2031
CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-2		SCIENCE & TECH. ROOM C101	D3030	1,470	TON	$1,870,246	2031

RECURRING NEEDS BY YEAR

All costs shown as Future Value using a 3% average inflation rate

CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-3		SCIENCE & TECH. ROOM C101	D3030	1,470	TON	$1,870,246	2031
CH05	CHILLER - WATER-COOLED CENTRIFUGAL OR SCREW (> 1000 TONS)	CH-3		SCIENCE & TECH. ROOM C101	D3030	1,470	TON	$1,870,246	2031
CH21	CHILLER CONTROL CABINET	CH-1 CONTROLLER		CCP1 COOLING TOWER ROOM 100	D3060	1	EA	$28,501	2031
CH21	CHILLER CONTROL CABINET	CH-2 CONTROLLER		CCP1 COOLING TOWER ROOM 100	D3060	1	EA	$28,501	2031
CH21	CHILLER CONTROL CABINET	CH-3 CONTROLLER		CCP1 COOLING TOWER ROOM 100	D3060	1	EA	$28,501	2031
CH21	CHILLER CONTROL CABINET	CH-4 CONTROLLER		CCP1 COOLING TOWER ROOM 100	D3060	1	EA	$28,501	2031
VF06	VARIABLE FREQUENCY DRIVE (20-25 HP)	FILTER PUMP VFD		CCP1 COOLING TOWER ROOM 100	D5010	25	HP	$12,737	2031
					2031 PROJECTED COMPONENT REPLACEMENT COST			**$7,607,726**	

RECURRING COMPONENT EXPENDITURE PROJECTIONS



Section 5

MCCP1001e 4/6/2022
Water treatment chemical feeder pump
Science & Tech room C101

MCCP1002e 4/6/2022
Condenser water pipe and valves
Science & Tech room C101

MCCP1003e 4/6/2022
Condenser water pipe
Science & Tech room C101

MCCP1004e 4/6/2022
Chilled water supply and return pipe to campus
Science & Tech room C101

MCCP1005e 4/6/2022
Electronically operated isolation valves
Science & Tech room C101

MCCP1006e 4/6/2022
1,470-ton, water-cooled chiller CH-1
Science & Tech room C101

MCCP1007e 4/6/2022
Chilled water pump CHP-1
Science & Tech room C101

MCCP1008e 4/6/2022
Free cooling plate-and-frame heat exchanger
Science & Tech room C101

MCCP1009e 4/6/2022
Chilled water pump CHP-2
Science & Tech room C101

MCCP1010e 4/6/2022
1,470-ton, water-cooled chiller CH-2
Science & Tech room C101

MCCP1011e 4/6/2022
Refrigerant monitoring system
Science & Tech room C101

MCCP1012e 4/6/2022
Chiller CH-3 and pump CHP-3
Science & Tech room C101

MCCP1013e 4/6/2022
MIOX water treatment system
Science & Tech room C101

MCCP1014e 4/6/2022
Water softening and treatment equipment
Science & Tech room C101

MCCP1015e 4/6/2022
Chiller Water Plant energy panel
Science & Tech room C101

MCCP1016e 4/6/2022
Chilled Water Plant controls
Science & Tech room C101

MCCP1017e 4/6/2022
Chiller CH-1 motor starter
Science & Tech room C101

MCCP1018e 4/6/2022
Chiller 1 control panel
Science & Tech room C101

MCCP1019e 4/6/2022
Chiller 2 control panel
Science & Tech room C101

MCCP1020e 4/6/2022
Chiller CH-2 motor starter
Science & Tech room C101

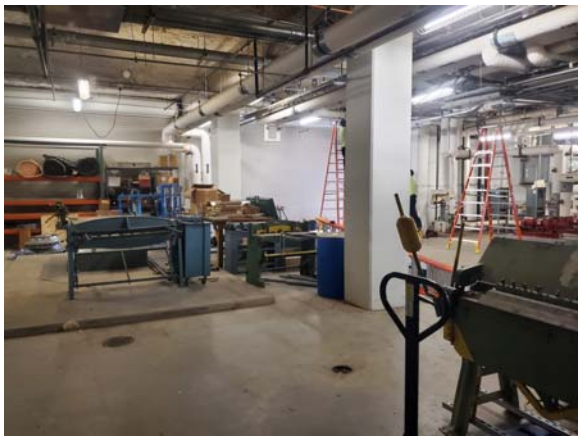
MCCP1021e 4/6/2022
422-gallon chilled water expansion tank
Science & Tech room C101

MCCP1022e 4/6/2022
Chiller CH-4 and pump CHP-4
Science & Tech room C101

MCCP1023e 4/6/2022
Chiller CH-4 under maintenance
Science & Tech room C101

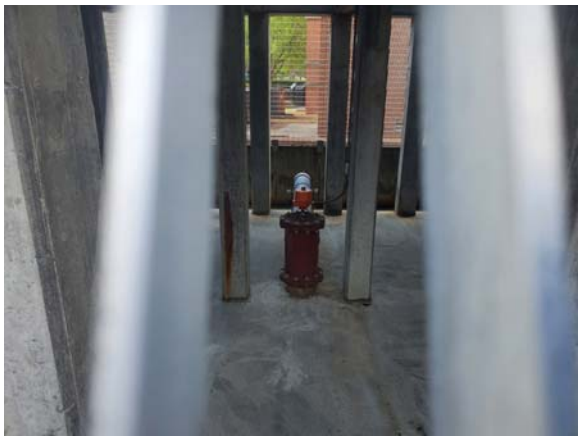
MCCP1024e 4/6/2022
Various distribution piping
Science & Tech room C101

MCCP1025e 4/6/2022
Aged variable speed drives for the chilled water pumps
Science & Tech room C101



MCCP1026e 4/6/2022
Open area for future expansion
Science & Tech room C101

MCCP1027e 4/6/2022
Overview of cooling tower facility
CCP#1 Cooling Tower



MCCP1028e 4/6/2022
Spare inlet for future cooling tower expansion
CCP#1 Cooling Tower

MCCP1029e 4/6/2022
Fan and electric unit heater
CCP#1 Cooling Tower room 100

MCCP1030e 4/6/2022
Condenser water pump 1 with minor scale and corrosion
CCP#1 Cooling Tower room 100

MCCP1031e 4/6/2022
CHP-1 motor assembly
CCP#1 Cooling Tower room 100

MCCP1032e 4/6/2022
Condenser water pump CHP-2
CCP#1 Cooling Tower room 100

MCCP1033e 4/6/2022
Condenser water pump 2 with minor scale and corrosion
CCP#1 Cooling Tower room 100

MCCP1034e 4/6/2022
Condenser water pump CHP-3
CCP#1 Cooling Tower room 100

MCCP1035e 4/6/2022
Condenser water combined header and filtration
CCP#1 Cooling Tower room 100

MCCP1036e 4/6/2022
Condenser water pump CHP-4
CCP#1 Cooling Tower room 100

MCCP1037e 4/6/2022
Filter pump
CCP#1 Cooling Tower room 100

MCCP1038e 4/6/2022
Filter pump variable speed drive
CCP#1 Cooling Tower room 100

MCCP1039e 4/6/2022
Various secondary electric equipment
CCP#1 Cooling Tower room 100

MCCP1040e 4/6/2022
Overview of condenser water pump room
CCP#1 Cooling Tower room 100

MCCP1041e 4/6/2022
Overview of drive room
CCP#1 Cooling Tower mezzanine

MCCP1042e 4/6/2022
VFDs for pumps CWP-1 to CWP-3 and towers CT-3 and CT-4
CCP#1 Cooling Tower mezzanine

MCCP1043e 4/6/2022
VFDs for towers CT-5 and CT-6 and well pumps
CCP#1 Cooling Tower mezzanine

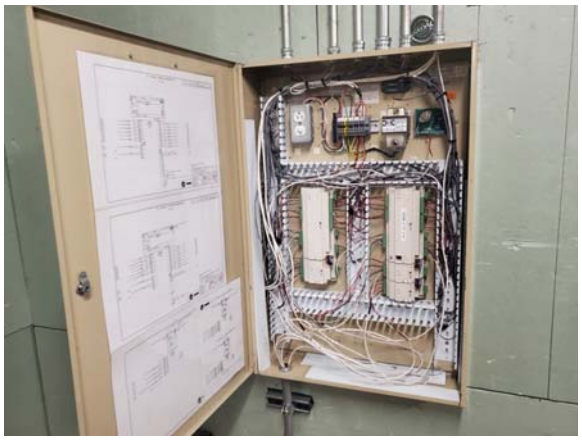
MCCP1044e 4/6/2022
VFDs for towers CT-1 and CT-2
CCP#1 Cooling Tower mezzanine

MCCP1045e 4/6/2022
Water source heat pumps AHU-1 and AHU-2
CCP#1 Cooling Tower mezzanine

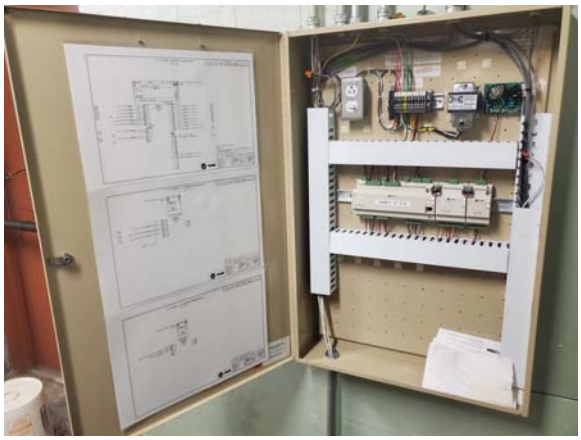
MCCP1046e 4/6/2022
Deficient display for VFD CWP-3
CCP#1 Cooling Tower mezzanine

MCCP1047e 4/6/2022
Deficient display for VFD CWP-2
CCP#1 Cooling Tower mezzanine

MCCP1048e 4/6/2022
Deficient display for VFD CWP-1
CCP#1 Cooling Tower mezzanine



MCCP1049e 4/6/2022
Control panel for towers CT-1 through CT-4
CCP#1 Cooling Tower mezzanine



MCCP1050e 4/6/2022
Control panel for towers CT-5 and CT-6
CCP#1 Cooling Tower mezzanine

MCCP1051e 4/6/2022
Overview of tower fan assemblies CT-1 to CT-4
CCP#1 Cooling Tower roof

MCCP1052e 4/6/2022
Overview of tower fan assemblies CT-5 to CT-6
CCP#1 Cooling Tower roof

MCCP1053e 4/6/2022
Re-epoxied cooling tower CT-1 fan assembly
CCP#1 Cooling Tower roof

MCCP1054e 4/6/2022
Cooling tower CT-1 fan gear box
CCP#1 Cooling Tower roof

MCCP1055e 4/6/2022
Cooling tower CT-1 fan motor
CCP#1 Cooling Tower roof

MCCP1056e 4/6/2022
Damaged lightning protection
CCP#1 Cooling Tower roof

MCCP1057e 4/6/2022
Surface-mounted exterior lighting
CCP#1 Cooling Tower roof

MCCP1058e 4/6/2022
Secondary electrical outlet
CCP#1 Cooling Tower roof

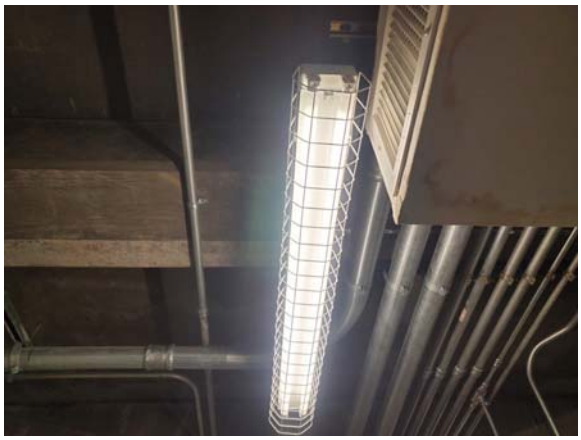
MCCP1059e 4/6/2022
Damaged lightning protection
CCP#1 Cooling Tower roof

MCCP1060e 4/6/2022
Re-epoxied cooling tower shell
CCP#1 Cooling Tower roof

MCCP1061e 4/6/2022
Cooling tower infill
CCP#1 Cooling Tower roof

MCCP1062e 4/6/2022
Area for cooling tower expansion
CCP#1 Cooling Tower roof

MCCP1063e 4/6/2022
Area for cooling tower expansion
CCP#1 Cooling Tower roof



MCCP1064e 4/6/2022
Surface-mounted, interior lighting with T8 lamps
CCP#1 Cooling Tower room 100

MCCP1065e 4/6/2022
Exterior brick facade
CCP#1 Cooling Tower

MCCP1066e 4/6/2022
Leaking inlet water pipe and union
CCP#1 Cooling Tower basin

MCCP1067e 4/6/2022

Leaking inlet water pipe and union

CCP#1 Cooling Tower basin