EAST CAROLINA UNIVERSITY

Health Sciences Campus

Potable Water & Fire Protection System

Utility Condition Assessment

May 12, 2017

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UTILITY CONDITION ASSESSMENT

SECTION 1

OVERVIEW

OVERVIEW

Introduction

The Brody School of Medicine at East Carolina University (ECU) is on the Health Sciences Campus (HSC), west of downtown Greenville, and was started in the late 1970s/early 1980s. The campus is between about 75 feet (Brody building) and 25 feet above sea level (retention pond northwest of the Dental School) in an area of slightly sloping coastal plain upland from the Tar River floodplain. The south side of campus is relatively flat, with a gradual downslope to the north. Because of this slightly sloping terrain, extensive mechanical pumping is not required to provide adequate water pressures around campus.

Both potable water and fire water are supplied to the campus by the same city water mains via the Central Utility Plant. Potable or domestic water is distributed by 8 inch ductile iron water pipe to each building through the central plant utility tunnel. The only buildings with service-specific water meters are the Leo Jenkins Cancer Center and Warren Life Sciences.

Fire sprinkler service is provided to each building through a central distribution system generally located in the utility tunnel. A 125 hp fire pump provides ample supply and pressure for the fire sprinkler service of all connected buildings. This pump is located in room 113 of the HSC Central Utility Plant, along with the fire pump controller, jockey pump, and the two domestic water pumps with variable frequency drives. Fire protection sprinkler water piping is primarily routed through the utility tunnel and is connected to the individual buildings from the tunnel using buried line construction. Outside of the tunnel on campus are some dedicated branch fire mains and connections supplied from the larger 8 inch and 10 inch city supply lines supporting some individual facilities and both city and university owned fire hydrants.

The Brody building has a separate dedicated fire pump located in room GW58A. This 100 hp fire pump and controller were upgraded in 2012. The pump is not included in this report, as it was assessed in 2016 as part of the Facility Condition Assessment for the building.

Costs Overview

Current Replacement Value

The estimated cost in current dollars to replace the potable water and fire protection system is $1,700,000. This is not a construction estimate or a detailed take-off but rather an estimate of replacement with like components. It does not include any fire protection in the individual buildings previously inspected by ISES engineers. This was covered in the Facility Condition Assessment reports for those buildings.

Total Renewal Costs

The estimated renewal costs for the potable water and fire protection system total $703,743. The dual potable/domestic water pump system and variable frequency drives are recommended for lifecycle replacement. The potable/domestic water pipe within the first 350-375 linear feet of the original tunnel will also require replacement, and the installation of a new fire service connection for Leo Jenkins Cancer Center is recommended, as is a new secure post indicator valve for the line running to Vidant Hospital. Also replace the water valves and post indicator valve for the Pediatrics/Biotechnology outside vault.

Methodology

Data collected during inspections conducted on March 8 and 9, 2017 have been used to generate this utility infrastructure report. The goal was to produce a single campuswide potable water and fire protection system report with recommendations developed by ISES engineers. The assessments and estimates are based solely on visual and nondestructive observations, discussions with university personnel, and a review of existing drawings and previous engineering reports, such as the September 2014 *HSC Utilities Master Plan, Phase One and Two* (updated in October 2014) and the Affiliated Engineers, Inc. April 19, 2017 draft *ECU Health Sciences Campus – Utility Tunnel Evaluation* report. Nonstandard and/or additional inspection procedures and methods, along with engineering design support, may be necessary to fully define the specific costs and scope to renew various infrastructure utility asset components.

Approach to Lifecycle Calculation

Each component of the potable water and fire protection system has a quantifiable industry standard expected lifecycle. Information related to system performance was reviewed to determine trends that might affect that lifecycle and the future safety, reliability, and efficiency of the system. The table below shows the expected useful, reliable life of typical system components.

Table 1: Average Expected Useful Life

COMPONENT	TYPE	USEFUL LIFE (YEARS)
Potable water supply line	PVC or plastic	50
Potable water supply line	Ductile iron	75
Potable water supply line	Cast-iron	75
Fire hydrant	Cast-iron	65
Fire pump	125 hp, 1,000 GPM	25
Domestic water pump	15 hp, electric	20

COMPONENT	TYPE	USEFUL LIFE (YEARS)
Variable frequency drive	15 hp	12

Source Data: ASHRAE, BOMA, Hartford Ins. Co., ISES Database

The realization of the full expected useful life preserves the original capital investment strategy while accelerated depreciation results in premature expenditure of resources. It should be emphasized that expected useful life values are averaged forecasts based on components that are properly maintained and operated without frequent and/or severe operating conditions. Chronological age is not the primary determinant of service life. In many instances, there is ample evidence of components operating well beyond predicted useful life values. This is why it is important to modify these values based on actual conditions, service history, operating conditions, installation environment, and actual field performance.

In addition, system components reaching the predicted endpoint of expected useful life do not necessarily cease to function. What does occur is a downward trend toward loss of service reliability, a potential increase in maintenance costs, and potential loss of water supply or fire protection support if a major supply line has a failure.

It is important to note that utility infrastructure assets normally encompass more than just a single component and will, in most situations, represent a section or group of materials, i.e. linear footage of installed piping systems. The majority of these systems will continue to operate reliably and safely beyond the ten-year planning horizon of this assessment. However, beyond the next ten years, it will be necessary to reinspect the systems to ensure that they continue to operate reliably.

UTILITY CONDITION ASSESSMENT

SECTION 2

SYSTEM FINDINGS

SYSTEM FINDINGS

Description

The potable water and fire protection system appears to be properly sized and in overall good condition. This is due in great measure to the operating age of the majority of the system. There are no indications of a significant accumulation of deferred maintenance Most of the main water supply loop and fire protection water lines were installed around 1980 or later, making them almost 40 years old, and none are nearing the end of their expected service life. Typically, the distribution branches and/or building services were constructed around the same time as the buildings they supply.

The combined potable water and fire protection system consists of approximately 9,000 linear feet of piping (approximately 1.7 miles) ranging from 4 to 10 inches in diameter. Of this piping, 4,995 linear feet of it is for potable water distribution and 3,975 linear feet for fire protection water. These lines generally connect to and receive water from the larger 10 inch municipal supply lines running through the center of the HSC between Heart Drive and West Fifth Street or the 8 inch line running west of Moye Boulevard to a connection with the 10 inch line running through the campus proper. Overall, the campus potable water and fire protection system is a small, partially looped system within a much larger municipal loop with isolation valves to permit isolation of a section of campus line or an area of campus with minimal service interruption. Most of the campus buildings are fed from campus water mains and are not metered, making specific facility water losses impossible to determine unless directly observed. The following table is an estimate of the potable water and fire protection system components that serve the HSC.

Table 2: Summary of Potable Water and Fire Protection System Components

MATERIALS	QUANTITY	UNITS	ESTIMATED INSTALL DATE
4 inch water supply pipe	3,870	Linear feet	1980-2010
6 inch water supply pipe	970	Linear feet	1980-2010
8 inch water supply pipe	75	Linear feet	1980-2010
10 inch water supply pipe	80	Linear feet	1980-2010
6 inch fire water line	445	Linear feet	1980-2010
8 inch fire water line	2680	Linear feet	1980-2010
10 inch fire water line	850	Linear feet	1980-2010
Fire hydrants	10	Each	1980-2010
Fire pump	125	Horsepower	2005
Domestic water pump	2 x 15 = 30	Horsepower	2005
Variable frequency drive	2 x 15 = 30	Horsepower	2005

There are approximately 25 campus fire hydrants of various ages and conditions. Of these, 15 are owned by the city and ten appear to be owned by the university. Of those ten, eight appear to have been installed in the last five or six years. The hydrants are flushed routinely, and the campus pressure is adequate and satisfactory. All of the hydrants are in good condition and should outlast the scope of this assessment.

In 2016, Affiliated Engineers inspected the tunnel water piping where the first 350 feet of original 8 inch mechanical joint-ductile iron potable water pipe experienced a significant leak that resulted in a major domestic water outage on campus. Mechanical joint piping is normally reserved for underground piping due to the joint design having a leak allowance; when installed underground, the piping is locked into place from soil friction and weight. Movement in the pipe in the tunnel resulted in leakage at multiple mechanical joints and failure at one joint. The failed joint was repaired with flanged piping. Affiliated Engineers evaluated all of the piping in the tunnel and provided recommendations to address the 8 inch mechanical joint-ductile iron domestic/potable water piping. The newer tunnel piping has flanged joints and does not appear to have the same problems as the original 350 foot installation.

Recommendations

Based on the relatively good condition and young age of the main pipe network, none of the linear assets of the potable and fire water supply are expected to require general lifecycle replacement. However, the two 15 hp domestic pumps and their variable frequency drives in room 113 of the Central Utility Plant are expected to reach the end of their lifecycles within the next ten years and should be replaced.

Regarding the problematic oldest tunnel piping, of the options presented by Affiliated Engineers, ECU has chosen to replace the 350-375 feet of piping with mechanical joint fittings with a new domestic water pipe routed above the existing chilled water piping in the tunnel. The new line will be constructed in the original section of the tunnel and sized to accommodate anticipated future expansion. The existing supply laterals in the tunnel will be reconnected to the new line. The options for new piping material were stainless steel and HDPE materials. HDPE materials have high thermal expansion rates, requiring additional piping length for loops and making them cost competitive with stainless steel. Stainless steel will keep expansion to a minimum while providing a continuously welded piping system, with the only flanged connections at service laterals and connections to existing piping. The welded stainless steel would eliminate piping joints in this section of the tunnel and eliminate the long-term maintenance needs associated with the piping. ECU has opted for stainless steel. The existing piping will remain active while the new piping is constructed, and shutdowns will be required to switch over to the new piping.

Additional issues were brought up during discussions with medical campus facility staff. They indicated that a new fire service connection for the Leo Jenkins Cancer Center would be necessary to provide adequate fire sprinkling pressure and flows to the additional upper floors. Also mentioned was the need for a new secure post indicator valve for the line running to Vidant Hospital and the need to replace the water valves and post indicator valve for the Pediatrics/Biotechnology outside vault.

SECTION 3

CONDITION ASSESSMENT DEFINITIONS

CONDITION ASSESSMENT DEFINITIONS

The following information is a clarification of the Asset Report using example definitions.

Material and Labor Cost Factors and Additional Markups

The database contains an R. S. Means City Cost Index for material and labor cost factors to adjust the project costs from the national averages to reflect conditions in Greenville. The percentage adjustment of the national average is shown below. Typical general contractor fees (which could include profit, overhead, bonds, and insurance) and professional fees (architect or engineer design fees and in-house design costs) are also included. However, most of the project costs were provided by University personnel, so no mark-ups have been applied.

GLOBAL MARKUP	%
Local Labor Index	71.3
Local Materials Index	100.7
General Contractor Markup	20.0
Professional Fees	16.0

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 Lifecycle 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. For these nonrecurring costs, projects have been developed and include estimated material and labor costs.

Recurring Costs

Asset Component Inventory and Cost Projections

The Asset Component Inventory is a list of major systems and components and is based on industry standard lifecycle expectancies. Each indicated component has the following associated information:

CATEGORY	DEFINITION
Uniformat Code	The standard Uniformat Code that applies to the component
Component Description	This line item describes the individual component
Identifier	Unique identifying information entered for a component as necessary
Quantity	The quantity of the listed component
Units	The unit of measure associated with the quantity
Unit Cost	The cost to replace each individual component unit (this cost is in today's dollars)
Complexity Adjustment	A factor utilize to adjust component replacement costs accordingly when it is anticipated that the actual cost will deviate from the average for that component
Total Cost	Unit cost multiplied by quantity, in today's dollars. Note that this is a one-time renewal/replacement cost
Install Date	Year that the component was or is estimated to have been installed. When this data is not available, it defaults to the year the asset was constructed
Life Expectancy	Average life expectancy for each individual component
Life Expectancy Adjustment	Utilized to adjust the first lifecycle of the component and to express when the next replacement should occur

The component listing forms the basis of the Recurring Component Renewal Schedule, which provides a year-by-year list of projected recurring renewal costs over the next ten years. Each individual component is assigned a replacement year based on lifecycles, and the costs for each item are in future year dollars. For items that are already past the end of their lifecycle, the replacement year is shown as Deferred Renewal.

Recurring Cost Classifications

- Deferred Renewal
  Recurring repairs, generated by the Asset 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. Estimated Deferred Renewal costs 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 Asset 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 are not included in the Lifecycle Component Inventory. For each such deficiency, a project with an estimated cost to rectify said deficiency is recommended. These projects each have a unique number 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 fourth electrical project identified for asset 0001 would have a project number of 0001EL04:

Example: Project Number 0001EL04		
0001	-	Asset Identification Number
EL	-	System Code (EL represents Electrical)
04	-	The next sequential number for an Electrical project

Project Classification

- Plant Adaption
  Nonrecurring expenditures 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 codes and improvements occasioned by the adoption of modern technology (e.g., the use of personal computer networks).

- Corrective Action
  Nonrecurring expenditures 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 utility safety or usability.

Priority Class

- Immediate

  Projects in this category require immediate action to:

  a. correct a cited safety hazard
  b. stop accelerated deterioration
  c. and/or return a facility to normal operation

- Critical

  Projects in this category include actions that must be addressed in the short-term:

  a. repairs to prevent further deterioration
  b. improvements to facilities associated with critical accessibility needs
  c. potential safety hazards

- Noncritical

  Projects in this category include:

  a. improvements to facilities associated with noncritical accessibility needs
  b. actions to bring a facility into compliance with current building codes
  c. actions to improve the usability of a facility following an occupancy or use change

Category Code

CATEGORY CODE*	SYSTEM DESCRIPTION
EL1A – EL8A	ELECTRICAL
FS1A – FS6A	FIRE/LIFE SAFETY
HV1A – HV8B	HVAC
PL1A – PL5A	PLUMBING

**Refer to the Category Code Report starting on the following page.*

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
2	PL1D	0001PL02	02
2	EL4C	0001EL03	03

CATEGORY CODE REPORT

FIRE/LIFE SAFETY			
CODE	COMPONENT DESCRIPTION	ELEMENT DESCRIPTION	DEFINITION
FS1A	Lighting	Egress Lighting/Exit Signage	R&R work on exit signage and packaged AC/DC emergency lighting.
FS2A	Detection/Alarm	General	Repair or replacement of fire alarm/detection system/components, including alarms, pull boxes, smoke/heat detectors, annunciator panels, central fire control stations, remote dialers, fire station communications, etc.
FS3A	Suppression	Sprinklers	Repair or installation of water sprinkler type automatic fire suppressions, including wet-pipe and dry-pipe systems, heads, piping, deflectors, valves, monitors, associated fire pump, etc.
FS3B	Suppression	Standpipe/Hose	Repair or installation of standpipe system or components, including hardware, hoses, cabinets, nozzles, necessary fire pumping system, etc.
FS3C	Suppression	Extinguishers	Repairs or upgrades to F.E. cabinets/wall fastenings and handheld extinguisher testing/replacement.
FS3D	Suppression	Other	Other fire suppression items not specifically categorized elsewhere, including fire blankets, carbon dioxide automatic systems, Halon systems, dry chemical systems, etc.
FS4A	Hazardous Materials	Storage Environment	Installation or repair of special storage environment for the safe holding of flammable or otherwise dangerous materials/supplies, including vented flammables storage cabinets, holding pens/rooms, cages, fire safe chemical storage rooms, etc.
FS4B	Hazardous Materials	User Safety	Improvements, repairs, installation, or testing of user safety equipment, including emergency eyewashes, safety showers, emergency panic/shut-down system, etc.
FS5A	Egress Path	Designation	Installation, relocation or repair of posted diagrammatic emergency evacuation routes.
FS5B	Egress Path	Distance/ Geometry	Work involving remediation of egress routing problems, including elimination of dead end corridors, excessive egress distance modifications, and egress routing inadequacies.
FS5C	Egress Path	Separation Rating	Restoration of required fire protective barriers, including wall rating compromises, fire-rated construction, structural fire proofing, wind/safety glazing, transom retrofitting, etc.
FS5D	Egress Path	Obstruction	Clearance of items restricting the required egress routes.
FS5E	Egress Path	Stairs Railing	Retrofit of stair/landing configurations/structure, railing heights/geometries, etc.
FS5F	Egress Path	Fire Doors/ Hardware	Installation/replacement/repair of fire doors and hardware, including labeled fire doors, fire shutters, closers, magnetic holders, panic hardware, etc.
FS5G	Egress Path	Finish/Furniture Ratings	Remediation of improper fire/smoke ratings of finishes and furniture along egress routes.
FS6A	General	Other	Life/fire safety items not specifically categorized elsewhere.

PLUMBING			
CODE	COMPONENT DESCRIPTION	ELEMENT DESCRIPTION	DEFINITION
PL1A	Domestic Water	Piping Network	Repair or replacement of domestic water supply piping network, insulation, hangers, etc.
PL1B	Domestic Water	Pumps	Domestic water booster pumps, circulating pumps, related controls, etc.
PL1C	Domestic Water	Storage/ Treatment	Equipment or vessels for storage or treatment of domestic water.
PL1D	Domestic Water	Metering	Installation, repair, or replacement of water meters.
PL1E	Domestic Water	Heating	Domestic water heaters, including gas, oil, and electric water heaters, shell-and-tube heat exchangers, tank type, and instantaneous.
PL1F	Domestic Water	Cooling	Central systems for cooling and distributing drinking water.
PL1G	Domestic Water	Fixtures	Plumbing fixtures, including sinks, drinking fountains, water closets, urinals, etc.

PL1H	Domestic Water	Conservation	Alternations made to the water distribution system to conserve water.
PL1I	Domestic Water	Backflow Protection	Backflow protection devices, including backflow preventers, vacuum breakers, etc.
PL2A	Wastewater	Piping Network	Repair or replacement of building wastewater piping network.
PL2B	Wastewater	Pumps	Pump systems used to lift wastewater, including sewage ejectors and other sump systems.
PL3A	Special Systems	Process Gas/Fluids	Generation and/or distribution of process steam, compressed air, natural and LP gas, process water, vacuum, etc.
PL4A	Infrastructure	Potable Water Storage/ Treatment	Storage and treatment of potable water for distribution.
PL4B	Infrastructure	Industrial Water Distribution/ Treatment	Storage and treatment of industrial water for distribution.
PL4C	Infrastructure	Sanitary Water Collection	Sanitary water collection systems and sanitary sewer systems, including combined systems.
PL4D	Infrastructure	Stormwater Collection	Stormwater collection systems and storm sewer systems; stormwater only.
PL4E	Infrastructure	Potable Water Distribution	Potable water distribution network.
PL4F	Infrastructure	Wastewater Treatment	Wastewater treatment plants, associated equipment, etc.
PL5A	General	Other	Plumbing issues not categorized elsewhere.

SECTION 4

COST SUMMARIES AND TOTALS

RENEWAL COSTS MATRIX

All dollars shown as Present Value

CATEGORY	NONRECURRING PROJECT NEEDS			RECURRING COMPONENT REPLACEMENT NEEDS											
	Immediate	Critical	Noncritical	Deferred Renewal	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	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	0	0	0	0	0	$0
INTERIOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
PLUMBING	0	292,547	0	0	0	0	0	0	0	0	0	0	350,162	0	$642,708
HVAC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
FIRE/LIFE SAFETY	0	49,931	0	0	0	0	0	0	0	0	0	0	0	0	$49,931
ELECTRICAL	0	0	0	0	0	0	0	11,103	0	0	0	0	0	0	$11,103
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	$0	$342,478	$0	$0	$0	$0	$0	$11,103	$0	$0	$0	$0	$350,162	$0	$703,743
TOTAL NONRECURRING PROJECT NEEDS			$342,478	TOTAL RECURRING COMPONENT REPLACEMENT NEEDS										$361,265	

CURRENT REPLACEMENT VALUE	$1,700,000
FACILITY CONDITION NEEDS INDEX	0.41
FACILITY CONDITION INDEX	0.00

GSF	TOTAL 10-YEAR FACILITY RENEWAL NEEDS	10-YEAR NEEDS/SF
NA	$703,743	NA

FACILITIES RENEWAL PLAN

NONRECURRING PROJECT COST{

All costs shown as Present Value

PROJECT NUMBER	PROJECT TITLE	UNI-FORMAT	PRIORITY CLASS	PROJECT CLASSIFICATION	PROJECT COST
HSPWFPPL01	REPLACE ORIGINAL POTABLE WATER PIPE IN UTILITY TUNNEL		2	Corrective Action	211,204
HSPWFPFS01	PROVIDE NEW FIRE SERVICE FOR LEO JENKINS BLDG		2	Plant Adaption	49,931
HSPWFPPL02	INSTALL NEW POST INDICATOR VALVE FOR LINE TO VIDANT		2	Plant Adaption	11,562
HSPWFPPL03	NEW VALVES AND PIV - PEDIATRICS/BIOTECHNOLOGY OUTSIDE VAULT		2	Capital Renewal	69,781
				TOTAL	**$342,478**

FACILITIES RENEWAL PLAN

RECURRING COMPONENT REPLACEMENT COSTS

All costs shown as Present Value

ASSET CODE COMP CODE	COMPONENT	IDENTIFIER	UNI-FORMAT	REPLACEMENT YEAR	REPLACEMENT COST
HSPWFP VF04	VARIABLE FREQUENCY DRIVE (10-15 HP)	VSD-DWP1	D5010	2020	5,552
HSPWFP VF04	VARIABLE FREQUENCY DRIVE (10-15 HP)	VSD-DWP2	D5010	2020	5,552
HSPWFP PP01	DOMESTIC WATER BOOSTER SYSTEM	ROOM 113	D2020	2025	350,162
				TOTAL	**$361,265**

UTILITY CONDITION ASSESSMENT

SECTION 5

PROJECT DETAILS

All costs shown as Present Value

PROVIDE NEW FIRE SERVICE FOR LEO JENKINS BLDG

Project Number:	HSPWFPFS01	**Category Code:**	FS3D
Priority Sequence:	1		
Priority Class:	Critical	**System:**	FIRE/LIFE SAFETY
Project Class:	Plant Adaption	**Component:**	SUPPRESSION
Date Basis:	4/4/2017	**Element:**	OTHER

Code Application:	**Subclass/Savings:**	**Project Location:**
NFPA	Not Applicable	Undefined: Floor(s) S

Description

Medical campus facility staff indicated that a new fire service connection is needed for the Leo Jenkins Cancer Center. The new service is required to provide adequate fire sprinkling pressure and flows to the additional upper floors.

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
Add new fire service with larger capacity	LOT	1	$25,000	$25,000	$15,000	$15,000	$40,000
			Base Material/Labor Costs	**$25,000**		**$15,000**	
			Indexed Material/Labor Costs	**$25,175**		**$10,695**	**$35,870**
						General Contractor Mark Up at 20.0%	**$7,174**
						Original Construction Cost	**$43,044**
Date of Original Estimate:	4/4/2017					**Inflation**	**$0**
						Current Year Construction Cost	**$43,044**
						Professional Fees at 16.0%	**$6,887**
						TOTAL PROJECT COST	**$49,931**

All costs shown as Present Value

REPLACE ORIGINAL POTABLE WATER PIPE IN UTILITY TUNNEL

Project Number:	HSPWFPPL01	**Category Code:**	PL4E
Priority Sequence:	2		
Priority Class:	Critical	**System:**	PLUMBING
Project Class:	Corrective Action	**Component:**	INFRASTRUCTURE
Date Basis:	4/4/2017	**Element:**	POTABLE WATER DISTR.

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

Description

Replace the first 350 feet of original water piping with a new domestic water pipe routed above the existing chilled water piping in the tunnel. The new line would be constructed in the original section of the tunnel and replace all of the existing domestic water piping with mechanical joint fittings. The existing supply laterals in the tunnel would be reconnected to the new line.

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 tunnel domestic water pipe	LF	375	$200	$75,000	$285	$106,875	$181,875
			Base Material/Labor Costs	**$75,000**		**$106,875**	
			Indexed Material/Labor Costs	**$75,525**		**$76,202**	**$151,727**
						General Contractor Mark Up at 20.0%	**$30,345**
						Original Construction Cost	**$182,072**
Date of Original Estimate:	4/4/2017					**Inflation**	**$0**
						Current Year Construction Cost	**$182,072**
						Professional Fees at 16.0%	**$29,132**
						TOTAL PROJECT COST	**$211,204**

All costs shown as Present Value

INSTALL NEW POST INDICATOR VALVE FOR LINE TO VIDANT

Project Number:	HSPWFPPL02
Priority Sequence:	3
Priority Class:	Critical
Project Class:	Plant Adaption
Date Basis:	4/4/2017

Category Code: PL4E

System:	PLUMBING
Component:	INFRASTRUCTURE
Element:	POTABLE WATER DISTR.

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

Description

Medical campus facility staff indicated that a new secure post indicator valve would be needed for the line running to Vidant Hospital.

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 a new post indicator valve	EA	1	$4,000	$4,000	$6,000	$6,000	$10,000
			Base Material/Labor Costs	**$4,000**		**$6,000**	
			Indexed Material/Labor Costs	**$4,028**		**$4,278**	**$8,306**
						General Contractor Mark Up at 20.0%	**$1,661**
						Original Construction Cost	**$9,967**
Date of Original Estimate:	4/4/2017					**Inflation**	**$0**
						Current Year Construction Cost	**$9,967**
						Professional Fees at 16.0%	**$1,595**
						TOTAL PROJECT COST	**$11,562**

All costs shown as Present Value

NEW VALVES AND PIV - PEDIATRICS/BIOTECHNOLOGY OUTSIDE VAULT

Project Number:	HSPWFPPL03	**Category Code:**	PL4E
Priority Sequence:	4		
Priority Class:	Critical	**System:**	PLUMBING
Project Class:	Capital Renewal	**Component:**	INFRASTRUCTURE
Date Basis:	4/4/2017	**Element:**	POTABLE WATER DISTR.

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

Description

Medical campus facility staff indicated that the water valves and post indicator valve for the Pediatrics/Biotechnology outside vault would need to be replaced in the next ten years.

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 the PIV and water valves in outside vault	LOT	1	$25,000	$25,000	$35,000	$35,000	$60,000
			Base Material/Labor Costs	**$25,000**		**$35,000**	
			Indexed Material/Labor Costs	**$25,175**		**$24,955**	**$50,130**
						General Contractor Mark Up at 20.0%	**$10,026**
						Original Construction Cost	**$60,156**
Date of Original Estimate:	4/4/2017					**Inflation**	**$0**
						Current Year Construction Cost	**$60,156**
						Professional Fees at 16.0%	**$9,625**
						TOTAL PROJECT COST	**$69,781**

SECTION 6

ASSET COMPONENT INVENTORY

ASSET COMPONENT INVENTORY

UNI-FORMAT	COMPONENT DESCRIPTION	IDENTIFIER	QTY	UNITS	UNIT COST	CMPLX ADJ	TOTAL COST	INSTALL DATE	USEFUL LIFE	USEFUL LIFE ADJ
D2020	DOMESTIC WATER BOOSTER SYSTEM	ROOM 113	30	HP	$11,672.06		$350,162	2005	20	
D4010	FIRE PUMP - ELECTRIC, 250 GPM, 2" ID (<=15 HP)	FP2	3	HP	$2,412.79		$7,238	2005	25	
D4010	FIRE PUMP - ELECTRIC, 1000 GPM, 5" ID (120-150 HP)	CUP RM 113	125	HP	$513.77		$64,221	2005	25	
D5010	VARIABLE FREQUENCY DRIVE (10-15 HP)	VSD-DWP1	15	HP	$370.11		$5,552	2005	12	3
D5010	VARIABLE FREQUENCY DRIVE (10-15 HP)	VSD-DWP2	15	HP	$370.11		$5,552	2005	12	3
G3010	FIRE HYDRANT		2	EA	$8,684.81		$17,370	1980	65	
G3010	FIRE HYDRANT		8	EA	$8,684.81		$69,478	2010	65	
G3010	DUCTILE IRON PIPE - 6" DIAMETER - SUPPLY	FIRE PROTECTION	445	LF	$146.19		$65,053	2000	75	
G3010	DUCTILE IRON PIPE - 6" DIAMETER - SUPPLY	POTABLE WATER	870	LF	$146.19		$127,182	1980	75	
G3010	DUCTILE IRON PIPE - 6" DIAMETER - SUPPLY	POTABLE WATER	100	LF	$146.19		$14,619	2000	75	
G3010	DUCTILE IRON PIPE - 8" DIAMETER - SUPPLY	POTABLE WATER	75	LF	$155.61		$11,671	1980	75	
G3010	DUCTILE IRON PIPE - 8" DIAMETER - SUPPLY	FIRE PROTECTION, PVC	665	LF	$155.61		$103,482	1980	75	
G3010	DUCTILE IRON PIPE - 8" DIAMETER - SUPPLY	FIRE PROTECTION	640	LF	$155.61		$99,592	1980	75	
G3010	DUCTILE IRON PIPE - 8" DIAMETER - SUPPLY	FIRE PROTECTION	660	LF	$155.61		$102,704	2000	75	
G3010	DUCTILE IRON PIPE - 8" DIAMETER - SUPPLY	FIRE PROTECTION	400	LF	$155.61		$62,245	2010	75	
G3010	DUCTILE IRON PIPE - 10" DIAMETER - SUPPLY	FIRE PROTECTION	770	LF	$163.11		$125,598	1980	75	

ASSET COMPONENT INVENTORY

UNI-FORMAT	COMPONENT DESCRIPTION	IDENTIFIER	QTY	UNITS	UNIT COST	CMPLX ADJ	TOTAL COST	INSTALL DATE	USEFUL LIFE	USEFUL LIFE ADJ
G3010	DUCTILE IRON PIPE - 10" DIAMETER - SUPPLY	FIRE PROTECTION	80	LF	$163.11		$13,049	2000	75	
G3010	DUCTILE IRON PIPE - 10" DIAMETER - SUPPLY	POTABLE WATER	80	LF	$163.11		$13,049	1980	75	
G3010	PVC PLASTIC PIPE - 4" DIAMETER	POTABLE WATER	2,600	LF	$107.75		$280,146	1980	50	
G3010	PVC PLASTIC PIPE - 4" DIAMETER	POTABLE WATER	170	LF	$107.75		$18,317	2000	50	
G3010	PVC PLASTIC PIPE - 4" DIAMETER	POTABLE WATER	1,100	LF	$107.75		$118,523	2010	50	
					Grand Total:		$1,674,802			

SECTION 7

SYSTEM PHOTOLOG

HSPWFP001e 3/8/2017
Older fire hydrant
Campus grounds

HSPWFP002e 3/8/2017
City-owned 15 inch ductile iron pipe crossing creek
South side of West 5th Street

HSPWFP003e 3/8/2017
Older fire hydrant
Campus grounds

HSPWFP004e 3/8/2017
Older fire hydrant
Campus grounds

HSPWFP005e 3/8/2017
Older fire hydrant
Campus grounds

HSPWFP006e 3/8/2017
Older fire hydrant
Campus grounds

HSPWFP007e 3/8/2017
Older fire hydrant
Campus grounds

HSPWFP008e 3/8/2017
Older fire hydrant
Campus grounds

HSPWFP009e 3/8/2017
Older fire hydrant
Campus grounds

HSPWFP010e 3/8/2017
Older fire hydrant
Campus grounds

HSPWFP011e 3/8/2017
125 hp fire pump
Central Plant

HSPWFP012e 3/8/2017
Electric fire pump controller
Central Plant

HSPWFP013e 3/8/2017

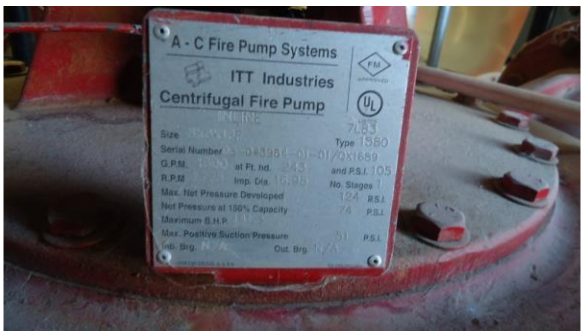
125 hp fire pump set-up

Central Plant

HSPWFP014e 3/8/2017

Inline centrifugal pump

Central Plant



HSPWFP015e 3/8/2017

Inline centrifugal pump

Central Plant

HSPWFP016e 3/8/2017

125 hp fire pump set-up

Central Plant

HSPWFP017e 3/8/2017

Older fire hydrant

Campus grounds

HSPWFP018e 3/8/2017

Older fire hydrant

Campus grounds

HSPWFP019e 3/8/2017

Older fire hydrant

Campus grounds

HSPWFP020e 3/8/2017

Older hydrant and new FDC

Family Medicine

HSPWFP021e 3/8/2017

Older fire hydrant

Campus grounds

HSPWFP022e 3/8/2017

Other side of fire hydrant in photo 21e

Campus grounds