EAST CAROLINA UNIVERSITY
Health Sciences Campus

Sanitary Sewer System
Utility Condition Assessment

May 3, 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 sanitary sewer system is in good operating condition and mostly dates to this time period, although the campus has since experienced phases of remodel and growth that caused the system to be modified. All of the lines are typically first time installations, not replacements of previous lines. The system owned by the university consists of over 7,000 linear feet of sewer collection line, mostly ductile iron, PVC, or other plastic pipe (ABS Truss) construction. All of the sewer collection lines on campus are 12 inches or smaller, and service laterals are typically sized between 4 to 6 inches in diameter. There are also approximately 31 sanitary sewer manholes of various depths on campus.

The south side of the campus is relatively flat, with a gradual downslope to the north. Due to the topography of the site, the sanitary sewer network flows are conveyed by gravity, not mechanically pumped. The university does not treat its own sewage but discharges it to the municipal sewer mains, which transport it to the City wastewater treatment plant. The treatment plant and municipal lines were not part of the ISES evaluation.

Due to the relative location of the university to the ocean and the semitropical coastal environment, minor and major rainfall events occur regularly throughout the year. The annual precipitation for this area is around 49 inches, but previous engineering studies indicate that there appears to be minimal surface and groundwater infiltration into the sanitary sewer network.

Costs Overview

Current Replacement Value

The estimated cost in current dollars to replace the sanitary sewer system is $1,600,000. 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 ejector pumps or sanitary sewer lift stations within the individual buildings previously inspected by ISES engineers. They were covered in the Facility Condition Assessment reports for those buildings.

Total Renewal Costs

The estimated renewal costs for the sanitary sewer system total $1,220,300. Since the lines are well within their lifecycles and no problems were indicated, no lifecycle replacement of linear assets is recommended. Instead, the recommendations consist of constructing a new sanitary sewer outfall to divert the Vidant Hospital flows around the campus, to remove the abandoned utility lines in the former trailer area, and to initiate a video-monitoring program for the buried lines.

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 sanitary sewer 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 Two, Sanitary Sewer and Storm Sewer System Evaluation* report by Rivers and Associates, Inc. and its January 2016 Amendment. 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 sanitary sewer 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 sanitary sewer system components.

Table 1: Average Expected Useful Life

COMPONENT	TYPE	USEFUL LIFE (YEARS)
Sanitary sewer pipe	Concrete	100
Sanitary sewer pipe	Vitrified clay	75
Sanitary sewer pipe	Ductile iron	50
Sanitary sewer pipe	PVC or plastic	50
Manhole	Concrete	100
Manhole	Brick masonry	75

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 damage caused by sewage backups in lower elevation facilities.

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 sanitary sewer system is a collection and conveyance system. The HSC has multiple means of managing its sanitary sewage. The medical facilities along Moye Boulevard and some on Arlington Boulevard typically discharge sanitary sewage to City-owned manholes and collection lines along the municipal street right-of-way. The discharge is then transported via City-owned outfall lines to the municipal wastewater treatment plant. In the central core of the medical campus, a 12-inch sewer collection main carries flow from the upstream Vidant Hospital, then collects and carries the sewage through the medical campus, and subsequently discharges into a city-owned manhole along West Fifth Street just north of Lake Laupus. Along the western side of the campus, another 10-inch City sewer outfall collects and carries sewage down MacGregor Downs Road until it discharges into a City manhole along West Fifth Street.

Originally installed in the early 1980s and modified as new construction has taken place, the sanitary sewer system is in overall good condition. This is due in great measure to the operating age of the majority of the system (almost 40 years old). None of the installed lines or subsurface structures are nearing the end of their expected service life, and there is no significant accumulation of deferred maintenance. Even though this area has a relatively high average annual rainfall, there were no indications during the inspection of significant stormwater infiltration or inflow issues within the system.

There are over 1.3 miles of buried sanitary sewer lines of various ages, material compositions, and sizes on campus. The larger diameter main lines are generally ductile iron or ABS Truss (plastic), while the small service lateral collection lines may be the original terra cotta clay tile or PVC. The following table is an estimate of the sanitary pipe that serves the HSC.

Table 2: Summary of Sanitary Sewer System Components

MATERIALS	QUANTITY	UNITS	ESTIMATED INSTALL DATE
4 INCH PIPE	985	LINEAR FEET	1980-2010
6 INCH PIPE	875	LINEAR FEET	1980-2010
8 INCH PIPE	3,960	LINEAR FEET	1980-2010
10 INCH PIPE	190	LINEAR FEET	1980-2010
12 INCH PIPE	1,825	LINEAR FEET	1980-2010
MANHOLES 0-5’ DEPTH	5	EACH	1980-2010
MANHOLES 5-10’ DEPTH	16	EACH	1980-2010
MANHOLES 10-15’DEPTH	10	EACH	1980-2010

Because of the relatively good condition of the main pipe network and the lack of root intrusion, there is no recommendation for addressing deficient or substandard piping. However, there is a question about long-term capacity for future expansion of the medical school. A significant amount of sewage flow was observed within the pipes from the upstream Vidant Hospital system. The main trunk line through campus was about half full of hospital flow before collecting additional HSC discharges. The large amount of flow from the hospital significantly reduces the overall capacity of the school's lines.

Questions concerning future capacity were brought up in the 2014 *HSC Utilities Master Plan, Phase Two, Sanitary Sewer and Storm Sewer System Evaluation* report by Rivers and Associates, Inc., and were evaluated further. In January 2016, Rivers and Associates, in their *HSC Utility Master Plan, Phase Two Amendment*, concluded, based on recalculating potential future flows, that even though there currently is significant flow from the upstream Vidant facilities, the campus sanitary sewer system should have adequate capacity and should be able to handle projected campus growth.

However, the fairly constant flow from the upstream 24/7 hospital facilities would cause any kind of blockage in the campus lines to become critical, with potential damaging effects. With the inability to closed-circuit videotape the sanitary sewers because of the continuous significant flow, ECU is unable to pre-emptively locate potential problem areas by video-monitoring older or problematic sections of pipe.

One section of line owned and utilized by the City along MacGregor Downs Road and primarily used for upstream non-university services was flagged in the Rivers and Associates computer modeling to be at critical capacity when loaded for future HSC development. It is expected that the City will address this issue before the future development.

Recommendations

The university lines are primarily filled with Vidant Hospital sewage flows, with only marginal additional flow from the HSC facilities. If the Vidant Hospital sewage were redirected away from the HSC network, the medical school would have almost unlimited capacity for future growth. Future plans for creating two separate sewer diversions were discussed with the HSC facilities staff. The desire is to divert the main Vidant Hospital sanitary sewer flows from the ECU medical campus to the City system at Arlington and Heart Streets (diversion #1). A future public extension is also recommended to pick up existing sewer flows from Arlington and MacGregor Downs Road with dedicated public lines that run north around the western perimeter of the medical campus and tie back into the City system along Fifth Street (diversion #2), thus leaving additional capacity in the existing ECU lines for future medical campus growth.

The former trailer area has numerous underground utility lines that were left after the modular units were moved from the site. These abandoned lines should be removed from the subsurface to return the site to predevelopment conditions.

It is a good policy and a recommendation of this report to develop and conduct a preventative maintenance program for the sanitary sewer system. A vital part of that program is video-monitoring the linear assets when and where feasible and jetwashing any built-up debris or solids in the lines and manholes to ensure that the pipes have the maximum flow capacity to handle peak demand. Since lines need to be generally free of flow to allow proper observations and the main ECU trunk lines are usually half full, video-monitoring is not possible. However, when and where possible and practical in the smaller branch lines, it is recommended that the university start a program of jetwashing and CCTV inspections. The oldest and/or most problematic lines are typically evaluated first to determine the characteristics of the typical flow and identify any urgent or critical repair or replacement needs. Routinely CCTV inspect a portion of the infrastructure every couple of years and all lines typically at least once every ten years. With the age of this system and its expected lifecycle, it is inevitable that portions will wear out and need to be repaired or replaced. The CCTV inspections will allow the university to identify problem areas and then plan and budget for repair or replacement.

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
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

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.

UTILITY CONDITION ASSESSMENT

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	1,165,863	38,236	0	0	0	0	0	0	0	0	0	0	0	$1,204,099
HVAC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
FIRE/LIFE SAFETY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
ELECTRICAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	$0
SITE	0	0	16,200	0	0	0	0	0	0	0	0	0	0	0	$16,200
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	$1,165,863	$54,436	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,220,299
TOTAL NONRECURRING PROJECT NEEDS			$1,220,299	TOTAL RECURRING COMPONENT REPLACEMENT NEEDS										$0	

CURRENT REPLACEMENT VALUE	$1,600,000
FACILITY CONDITION NEEDS INDEX	0.76
FACILITY CONDITION INDEX	0.00

GSF	TOTAL 10-YEAR FACILITY RENEWAL NEEDS	10-YEAR NEEDS/SF
NA	$1,220,299	NA

FACILITIES RENEWAL PLAN

NONRECURRING PROJECT COSTS

All costs shown as Present Value

PROJECT NUMBER	PROJECT TITLE	UNI-FORMAT	PRIORITY CLASS	PROJECT CLASSIFICATION	PROJECT COST
HSSANIPL01	CONSTRUCT NEW ARLINGTON DIVERSION OUTFALLS		2	Plant Adaption	1,165,863
HSSANISI01	REMOVE ABANDONED UTILITY LINES FROM FORMER TRAILER AREA		3	Plant Adaption	16,200
HSSANIPL02	CCTV CRITICAL SANITARY SEWER LINES FOR DEFICIENCIES		3	Plant Adaption	38,236
				TOTAL	**$1,220,299**

UTILITY CONDITION ASSESSMENT

SECTION 5

PROJECT DETAILS

All costs shown as Present Value

CONSTRUCT NEW ARLINGTON DIVERSION OUTFALLS

Project Number:	HSSANIPL01	**Category Code:**	PL4C
Priority Sequence:	1		
Priority Class:	Critical	**System:**	PLUMBING
Project Class:	Plant Adaption	**Component:**	INFRASTRUCTURE
Date Basis:	4/4/2017	**Element:**	SANITARY WATER COLLECTION

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

Description

This university-owned sewer lines across the ECU medical campus are half full most of time with Vidant Hospital discharges, and ECU cannot closed-circuit videotape their sewers because of the constant flow. It is proposed that the Vidant Hospital sanitary sewer flows be diverted from the ECU medical campus to the City system at Arlington and Heart Streets (diversion #1). It is further recommended that a future public extension be provided to pick up existing sewer flows from Arlington and MacGregor Downs Road with dedicated public lines that run north around the western perimeter of the medical campus and tying back into the City system along Fifth Street (diversion #2), thus leaving additional capacity in the existing ECU lines for future medical campus growth.

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 new 12"-15" gravity flow diversion #1 sewer main	LF	1,700	$58.70	$99,790	$88.05	$149,685	$249,475
Install new manholes	EA	20	$1,856	$37,116	$2,784	$55,674	$92,789
Install new 12"-15" gravity flow diversion #2 sewer main	EA	3,375	$58.70	$198,113	$88.05	$297,169	$495,281
Base Material/Labor Costs				**$335,018**		**$502,527**	
Indexed Material/Labor Costs				**$335,018**		**$502,527**	**$837,545**
General Contractor Mark Up at 20.0%							**$167,509**
Original Construction Cost							**$1,005,055**
Date of Original Estimate: 4/4/2017						**Inflation**	**$0**
Current Year Construction Cost							**$1,005,055**
Professional Fees at 16.0%							**$160,809**
TOTAL PROJECT COST							**$1,165,863**

All costs shown as Present Value

CCTV CRITICAL SANITARY SEWER LINES FOR DEFICIENCIES

Project Number:	HSSANIPL02
Priority Sequence:	2
Priority Class:	Noncritical
Project Class:	Plant Adaption
Date Basis:	4/28/2017

Category Code: PL4C

System:	PLUMBING
Component:	INFRASTRUCTURE
Element:	SANITARY WATER COLLECTION

Code Application:	Subclass/Savings:	Project Location:
Not Applicable	Not Applicable	Campus-wide: Floor(s) S

Description

Where possible, monitor and record via closed-circuit television (CCTV) existing flow characteristics and structural conditions of any problematic primary sanitary sewer lines, along with any secondary lines not recently inspected using CCTV. Jetwash lines before the CCTV inspection.

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
Jetwash lines	LF	7,000	$0.70	$4,900	$1.55	$10,850	$15,750
CCTV lines	LF	7,000	$1.15	$8,050	$0.35	$2,450	$10,500
Bypass water pumping	LF	2,500	$1.15	$2,875	$1.15	$2,875	$5,750
			Base Material/Labor Costs	**$15,825**		**$16,175**	
			Indexed Material/Labor Costs	**$15,936**		**$11,533**	**$27,469**
						General Contractor Mark Up at 20.0%	**$5,494**
						Original Construction Cost	**$32,962**
Date of Original Estimate:	4/28/2017					**Inflation**	**$0**
						Current Year Construction Cost	**$32,962**
						Professional Fees at 16.0%	**$5,274**
						TOTAL PROJECT COST	**$38,236**

All costs shown as Present Value

REMOVE ABANDONED UTILITY LINES FROM FORMER TRAILER AREA

Project Number:	HSSANISI01	**Category Code:**	SI4A
Priority Sequence:	3		
Priority Class:	Noncritical	**System:**	SITE
Project Class:	Plant Adaption	**Component:**	GENERAL
Date Basis:	4/4/2017	**Element:**	OTHER

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

Description

The former trailer area has numerous underground utility lines that were left after the modular units were moved from the site. The abandoned lines should be removed from the subsurface to return the site to predevelopment conditions.

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
Remove 3"-4" sewer lines	LF	300	$10.00	$3,000	$25.00	$7,500	$10,500
Remove water service lines	LF	150	$5.00	$750	$15.00	$2,250	$3,000
Base Material/Labor Costs				**$3,750**		**$9,750**	
Indexed Material/Labor Costs				**$3,750**		**$9,750**	**$13,500**
General Contractor Mark Up at 20.0%							**$2,700**
Original Construction Cost							**$16,200**
Date of Original Estimate: 4/4/2017						**Inflation**	**$0**
Current Year Construction Cost							**$16,200**
No Professional Fees Required							**$0**
TOTAL PROJECT COST							**$16,200**

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
G3020	CONCRETE MANHOLE - LESS THAN 5 FT DEEP - SANITARY SEWER		3	EA	$2,722.41		$8,167	1980	100	
G3020	CONCRETE MANHOLE - LESS THAN 5 FT DEEP - SANITARY SEWER		1	EA	$2,722.41		$2,722	2010	100	
G3020	CONCRETE MANHOLE - LESS THAN 5 FT DEEP - SANITARY SEWER		1	EA	$2,722.41		$2,722	2000	100	
G3020	CONCRETE MANHOLE - 5 TO 10 FT DEEP - SANITARY SEWER		7	EA	$5,488.57		$38,420	1980	100	
G3020	CONCRETE MANHOLE - 5 TO 10 FT DEEP - SANITARY SEWER		7	EA	$5,488.57		$38,420	2000	100	
G3020	CONCRETE MANHOLE - 5 TO 10 FT DEEP - SANITARY SEWER		2	EA	$5,488.57		$10,977	2010	100	
G3020	CONCRETE MANHOLE - 10 TO 15 FT DEEP - SANITARY SEWER		8	EA	$8,215.25		$65,722	1980	100	
G3020	CONCRETE MANHOLE - 10 TO 15 FT DEEP - SANITARY SEWER		1	EA	$8,215.25		$8,215	2000	100	
G3020	CONCRETE MANHOLE - 10 TO 15 FT DEEP - SANITARY SEWER		1	EA	$8,215.25		$8,215	2010	100	
G3020	DUCTILE IRON PIPE - 4" DIAMETER - SANITARY		575	LF	$133.77		$76,921	1980	75	
G3020	DUCTILE IRON PIPE - 4" DIAMETER - SANITARY	EXISTING PVC	295	LF	$133.77		$39,464	1980	75	
G3020	DUCTILE IRON PIPE - 4" DIAMETER - SANITARY	EXISTING PVC	115	LF	$133.77		$15,384	2000	75	
G3020	DUCTILE IRON PIPE - 6" DIAMETER - SANITARY	EXISTING PVC	400	LF	$146.19		$58,475	1980	75	
G3020	DUCTILE IRON PIPE - 6" DIAMETER - SANITARY	EXISTING PVC	355	LF	$146.19		$51,896	2000	75	
G3020	DUCTILE IRON PIPE - 6" DIAMETER - SANITARY		120	LF	$146.19		$17,542	1980	75	
G3020	DUCTILE IRON PIPE - 8" DIAMETER - SANITARY		1,565	LF	$190.35		$297,894	1980	50	

ASSET COMPONENT INVENTORY

UNI-FORMAT	COMPONENT DESCRIPTION	IDENTIFIER	QTY	UNITS	UNIT COST	CMPLX ADJ	TOTAL COST	INSTALL DATE	USEFUL LIFE	USEFUL LIFE ADJ
G3020	DUCTILE IRON PIPE - 8" DIAMETER - SANITARY		600	LF	$190.35		$114,209	2010	50	
G3020	PVC PIPE - 8" DIAMETER		650	LF	$169.81		$110,378	1980	50	
G3020	PVC PIPE - 8" DIAMETER		730	LF	$169.81		$123,963	2000	50	
G3020	PVC PIPE - 8" DIAMETER		115	LF	$169.81		$19,528	2010	50	
G3020	VITRIFIED CLAY PIPE - 8" PIPE	TERRA COTTA	100	LF	$166.91		$16,691	1980	75	
G3020	VITRIFIED CLAY PIPE - 12" PIPE	TERRA COTTA	1,125	LF	$189.06		$212,693	1980	75	
G3020	VITRIFIED CLAY PIPE - 12" PIPE	TERRA COTTA	285	LF	$189.06		$53,882	2000	75	
G4020	PLASTIC HDPE - 8 INCH	EXISTING PVC	200	LF	$180.21		$36,043	2010	50	
G4020	PLASTIC HDPE - 10 INCH	TRUSS PIPE	100	LF	$193.35		$19,335	1980	50	
G4020	PLASTIC HDPE - 10 INCH	TRUSS PIPE	90	LF	$193.35		$17,401	2000	50	
G4020	PLASTIC HDPE - 12 INCH	TRUSS PIPE	350	LF	$208.07		$72,825	1980	50	
G4020	PLASTIC HDPE - 12 INCH	TRUSS PIPE	65	LF	$208.07		$13,525	2000	50	
					Grand Total:		$1,551,631			

SECTION 7

SYSTEM PHOTOLOG

HSSANI001e 3/8/2017
Concrete manhole with significant flow from one inlet
East side of Facilities Services C1.1

HSSANI002e 3/8/2017
Concrete manhole with significant flow from two inlets
East side of Facilities Services C1.1

HSSANI003e 3/8/2017
Concrete manhole with metal rings and fast flow
North side of Facilities Services C1.1

HSSANI004e 3/8/2017
Concrete manhole with flow from one inlet
North Campus Drive by Biotechnology B1.2

HSSANI005e 3/8/2017
Concrete manhole with flow from one inlet
North Campus Drive by Biotechnology B1.2

HSSANI006e 3/8/2017
Concrete manhole with moderate flow from two inlets
East side of HSB in Health Sciences Drive C1.2

HSSANI007e 3/8/2017
Concrete manhole with low flow from one inlet
Northeast corner of HSB C1.2

HSSANI008e 3/8/2017
Concrete manhole with minimal flow from one inlet
North side of Family Medicine D4.1

HSSANI009e 3/8/2017
Concrete manhole with minimal flow from one inlet
North side of Family Medicine D4.1

HSSANI010e 3/8/2017
Concrete manhole with minimal flow from one inlet
Northwest corner of Family Medicine D4.1

HSSANI011e 3/8/2017
Concrete manhole with moderate flow from two inlets
Northwest side of Family Medicine D4.1