

# Lake Junaluska

Assembly Public Works

## Water and Sewer Capital Improvements Plan 10-Year Outlay

May 1, 2012

Prepared By:

**Cavanaugh & Associates, P.A.**

Will J. Jernigan, P.E.  
Larry Lewison, CPESC  
37 Montford Ave.  
Asheville, N.C. 28801



**CAVANAUGH**

*Stewardship Through Innovation*

**Table of Contents**

Background, Objective and Method .....2  
Capital Outlay - Water System .....3  
Capital Outlay - Sewer System .....4  
Summary .....4  
Water Exhibit .....5  
Sewer Exhibit.....6

## Background

The Lake Junaluska Assembly (LJA) is located north of Waynesville, N.C. along US Highway 19/23. The oldest portions of LJA's water distribution and wastewater collection system (system) date back to the early 1910's. The newest portions of the system have been installed in the past year. Pipe materials from some of the oldest portions of the system's lines still functioning are considered to be original cast iron and/or vitrified clay pipe. Sections of these lines have been failing over recent years and repairs have been costly. LJA has spent over \$150,000 in water and sewer line replacements over the past 2-3 years. For further background and narrative on the context of this Capital Improvements Plan, the reader is referred to the Assessment and Appraisal document by Buddy Young and Andrew d'Adesky dated Spring 2012.

## Objective

Cavanaugh Associates, P.A. was retained to analyze and project the anticipated capital needs in the water and sewer system over a period of the next ten (10) years. The objective of this Capital Improvements Plan (CIP) is to develop a general system inventory consisting of pipe material, age of installation and pipe size based on available mapping and staff interviews. This information will be used to create a schedule of capital needs for identified priorities in the system. The CIP does not involve field investigation or field survey. Based on the value of the needs identified, the CIP will assist LJA in the evaluation of the options presented in the Preliminary Report on the Municipal Status of Lake Junaluska.

## Method

The following methodology was employed in completing this Capital Improvements Plan:

1. Cavanaugh performed staff interviews and mapping reviews to develop a general system inventory. This information was evaluated to identify pipe material, age of installation, pipe diameter and in some cases water system pressure.
2. Cavanaugh met with LJA's staff to determine an order of prioritization of the needs identified. Consideration of service criticality, pipe age and history of repairs were used as the basis for developing a high, mid and low priority system for the replacements identified.
3. Cavanaugh collected costing data from local contractors to apply in performing a valuation of the replacements. The linear foot price noted in the table reflects a typical road shoulder type installation with no asphalt repair and minimal restoration costs. A lump sum value was established for other ancillary costs (assumed at 10% of utility installation costs and categorized as General Conditions & Sitework) associated such as testing, erosion control, traffic control and minor surface restoration. A per lineal foot cost was also applied for asphalt repair (assumed 50% of replacement footage) for the case where replacements are immediately adjacent or under a paved surface and would require asphalt or concrete pavement repair. Consideration of new pavement overlap should be directed towards paving study by LJA called the "Strategic Paving Survey", posted in the spring of 2011. Coordination of new pavement projects and capital replacement installations will be directed by LJA.
4. An annual escalation factor of 5% was applied for future material and installation costs.

- Based on the information collected, Cavanaugh created a valuation matrix to assess the prioritized needs over the next ten years.

**10-Year Capital Outlay:**

**Table 1 – Water System Capital Outlay**

<i>Escalation Factor (5%)</i>	Base Unit Cost	QTY	Year 1-3 \$/Unit	High Priority Total	QTY LF	Year 4-7 \$/Unit	Mid Priority Total	QTY LF	Year 8-10 \$/Unit	Low Priority Total
2" Replacement (LF)	\$14.00	10,675	\$14.70	\$156,923	3,800	\$17.44	\$66,281		\$20.68	
4" Replacement (LF)	\$20.00		\$21.00		1,500	\$24.92	\$37,377	1,860	\$29.55	\$54,962
6" Replacement (LF)	\$27.00	3,285	\$28.35	\$93,130	3,075	\$33.64	\$103,440	625	\$39.89	\$24,932
Fire Hydrant Replace (EA)	\$2,400.00	2	\$2,520.00	\$5,040	2	\$3,000	\$6,000	1	\$3,500	\$3,500
Valve Replacement (EA)	\$800.00	2	\$840.00	\$1,680	2	\$900	\$1,800	1	\$1,000	\$1,000
Air Release Valves (EA)	\$2,300.00	1	\$2,415.00	\$2,415	1	\$2,300	\$2,300	1	\$2,300	\$2,300
<b>Subtotal Utility Installation</b>				<b>\$259,187</b>			<b>\$217,937</b>			<b>\$88,019</b>
Gen Conditions & Sitework (LS) (10% of Utility Installation)				\$25,919			\$21,794			\$8,802
Asphalt Repair (LF)	\$16.67	6,980	\$17.50	\$122,174	4,188	\$20.77	\$86,970	1,243	\$24.63	\$30,602
Water System Mapping & Valve Inventory (LS)				\$50,000						
<b>Subtotal</b>				<b>\$457,280</b>			<b>\$326,701</b>			<b>\$127,423</b>
<b>Contingency (15%)</b>				\$68,592			\$49,005			\$19,113
<b>Engineering/Admin (15%)</b>				\$68,592			\$49,005			\$19,113
<b>Total Water Capital Outlay by Priority Tier</b>				<b>\$594,465</b>			<b>\$424,712</b>			<b>\$165,650</b>
<b>Total Water Capital Outlay</b>	<b>\$ 1,184,826</b>									

The attached water exhibit depicts general locations, pipe diameters and priority tiers of the water system improvements indicated in the above table.

Table 2 – Sewer System Capital Outlay

<i>Escalation Factor (5%)</i>	Base Unit Cost	QTY	Year 1-3	High Priority	QTY	Year 4-7	Mid Priority	QTY	Year 8-10	Low Priority
			\$/Unit	Total	LF	\$/Unit	Total	LF	\$/Unit	Total
6" Replacement (LF)	\$18.00	3,240	\$18.90	\$61,236	3,030	\$22.43	\$67,951		\$26.59	
8" Replacement (LF)	\$34.00	1,600	\$35.70	\$57,120	1,415	\$42.36	\$59,940	175	\$50.23	\$8,791
New Manholes (EA)	\$2,400.00	6	\$2,520.00	\$15,120	4	\$2,989.20	\$11,957	2	\$3,545.88	\$7,092
New Cleanouts (EA)	\$100.00	40	\$105.00	\$4,200	35	\$124.55	\$4,359		\$147.75	
<b>Subtotal Utility Installation</b>				<b>\$137,676</b>			<b>\$144,207</b>			<b>\$15,883</b>
General Conditions & Sitework (LS) (10% of Utility Installation)				\$13,768			\$14,421			\$1,588
Asphalt Repair (LF)	\$16.67	2,420	\$17.50	\$42,358	2,222.50	\$20.76	\$46,145	88	\$20.76	\$1,817
Sewer System Mapping & MH Inventory (LS)				\$35,000						
<b>Subtotal</b>				<b>\$228,802</b>			<b>\$204,772</b>			<b>\$19,288</b>
<b>Contingency (15%)</b>				\$34,320			\$30,716			\$2,893
<b>Engineering/Admin (15%)</b>				\$34,320			\$30,716			\$2,893
<b>Total Sewer Capital Outlay by Priority Tier</b>				<b>\$297,443</b>			<b>\$266,204</b>			<b>\$25,074</b>
<b>Total Sewer Capital Outlay</b>	<b>\$ 588,720</b>									

The attached sewer exhibit depicts general locations, pipe diameters and priority tiers of the sewer system improvements indicated in the above table.

**Summary:**

Total 10-year Capital Outlay for the LJA water and sewer system is estimated at \$1,773,546. The water and sewer replacements indicated in the tables above and the associated replacement costs are based on a general conditions inventory that includes age of material, material type, pipe size, history of repairs and system pressure. Prioritization was determined based on criticality, age of materials and history of repairs. As demonstrated in the table above the water line replacement costs are considerably higher than the sewer replacements. Generally, water lines made of cast iron (as are most of the original lines in the system) are more likely to deteriorate or fail over time especially when subjected to higher pressures, similar to those found in most areas of the LJA water system.

The replacements/improvements referenced in this report are, by necessity, generalized; more finite mapping and design is required to properly quantify and implement the replacements. This report is intended to provide a general understanding of the 10-year Capital Outlay for LJA as they evaluate long term options regarding ownership and management of the water and sewer system. For further background and narrative on the context of this Capital Improvements Plan, the reader is referred to the Assessment and Appraisal document by Buddy Young and Andrew d’Adesky dated Spring 2012.

# LAKE JUNNALUSKA ASSEMBLY WATER CAPITAL IMPROVEMENTS EXHIBIT

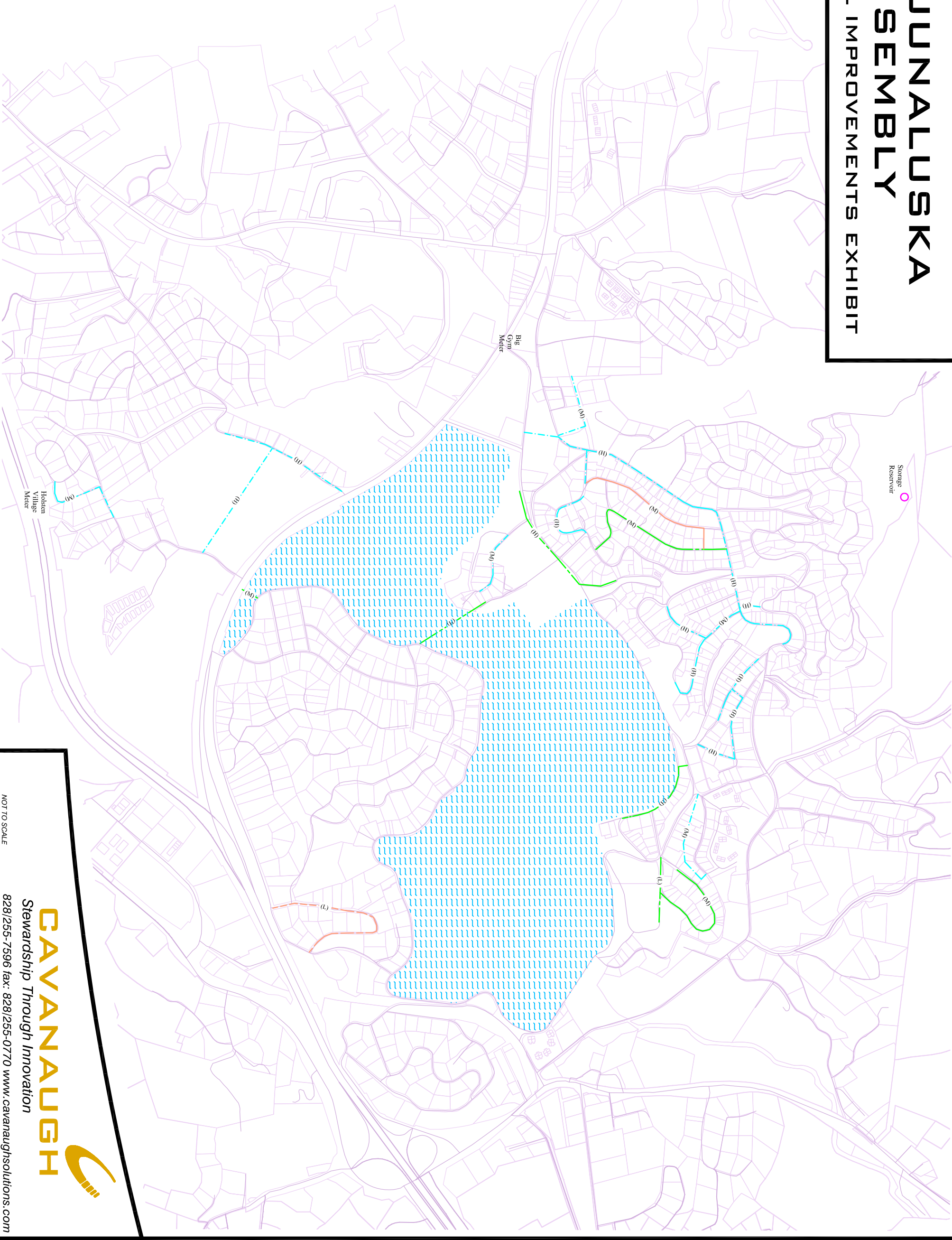


### REPLACEMENT LEGEND

- 2" Water
- 4" Water
- 6" Water

- (H) HIGH PRIORITY
- (M) MID PRIORITY
- (L) LOW PRIORITY

NOTE: FOR EXHIBIT CLARITY, ANY  
EXISTING UTILITIES NOT IDENTIFIED FOR  
REPLACEMENT ARE NOT SHOWN

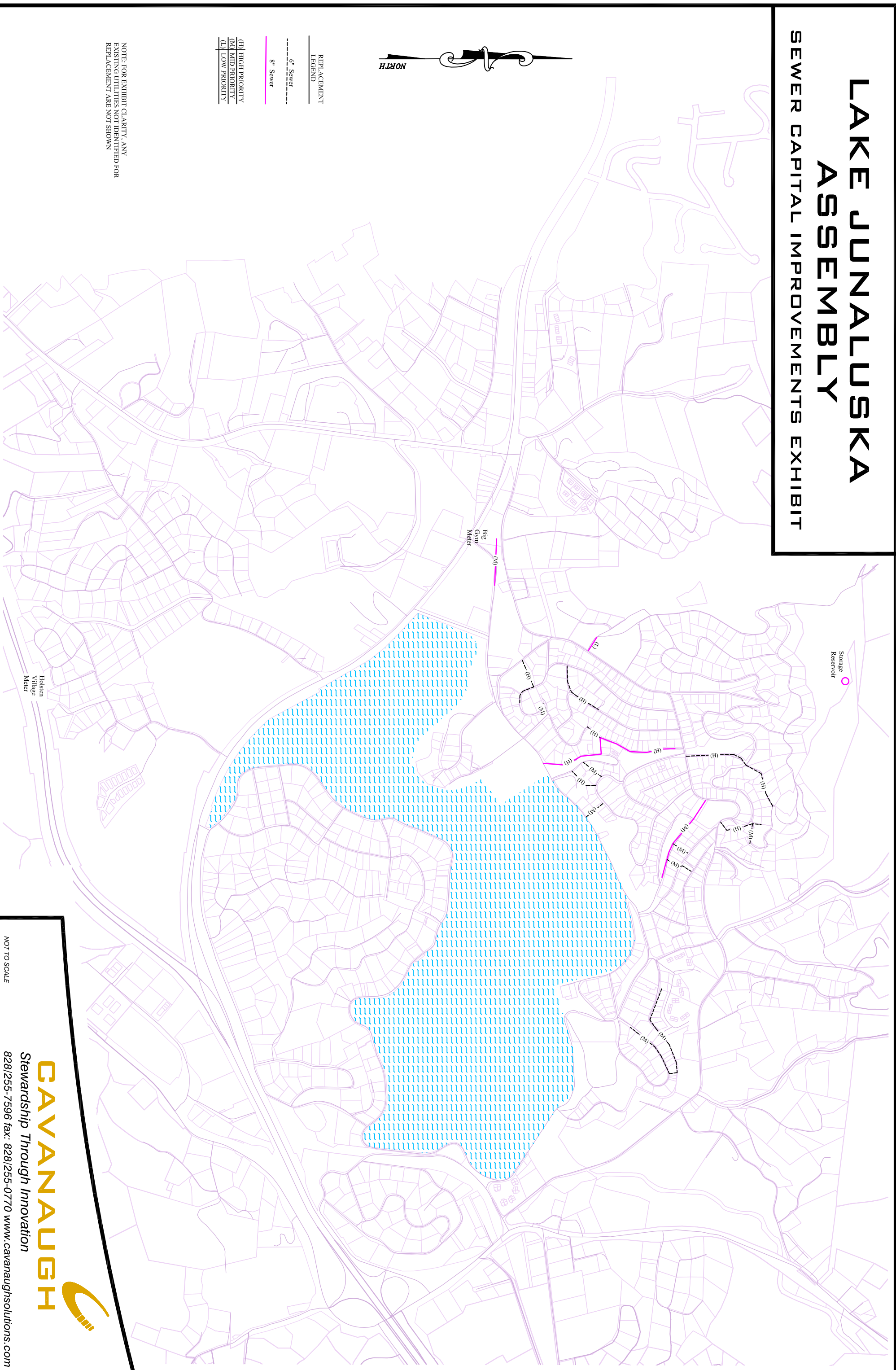


**CAVANNAUGH**  
Stewardship Through Innovation  
828/255-7596 fax: 828/255-0770 www.cavanaugholutions.com

NOT TO SCALE



# LAKE JUNNALUSKA ASSEMBLY SEWER CAPITAL IMPROVEMENTS EXHIBIT



NOTE: FOR EXHIBIT CLARITY, ANY  
EXISTING UTILITIES NOT IDENTIFIED FOR  
REPLACEMENT ARE NOT SHOWN

REPLACEMENT LEGEND	
---	6" Sewer
—	8" Sewer
(H)	HIGH PRIORITY
(M)	MID PRIORITY
(L)	LOW PRIORITY

NOT TO SCALE

**CAVANAUGH**  
Stewardship Through Innovation  
828/255-7596 fax: 828/255-0770 www.cavanaughhsolutions.com