

February 3, 2011
W-P Project No. 11304A

Mr. Peter H. Rice, P.E.
City Engineer
Public Works Department
680 Peverly Hill Road
Portsmouth, NH 03801

Subject: Sagamore Avenue South Sewer Extension
Technical Letter Report

Dear Peter:

In accordance with our engineering agreement, we have completed our evaluation of options for extending the sewer system to the Sagamore South Area, the Walker's Bungalow Road Area, and a portion of Sagamore Avenue in the Town of Rye. This technical letter report presents the following items:

- Background
- Methodology and assumptions used
- Summary of alternatives
- Cost analysis
- Next steps

BACKGROUND

The intent of this evaluation is to explore options for extending public sewer service to the southern portions of Sagamore Avenue. A number of businesses in the area have been identified as having failed septic systems, holding tanks, and / or difficult soil conditions / lack of space to address wastewater flows with on-site systems. In addition, the New Hampshire Department of Environmental Services (NHDES) has recently completed a Total Maximum Daily Load (TMDL) study of Little Harbor and has identified Sagamore Creek (adjacent to the project area) as a potential contributor to impaired water quality within Little Harbor. Within the TMDL, NHDES encouraged the City to consider extending sewer service to both the Sagamore Avenue area and Walker's Bungalow Road.



Based on the original scope and subsequent discussions with the City, the following areas have been identified for detailed study:

- Sagamore Avenue South (SAS)
 - Includes portions of Sagamore Avenue and Wentworth Road and all of Sagamore Grove
 - Parcels Served: 28
 - Refer to Figure 1 for a map showing the area served.
- Walker Bungalow Road (WBR)
 - Includes portions of Sagamore Avenue and Walker Bungalow Road and all of Shaw Road and Cliff Road
 - Parcels Served: 55
 - Refer to Figure 2 for a map showing the area served.
- Town of Rye (TOR)
 - Includes a portion of Sagamore Avenue in Portsmouth and Rye
 - Parcels Served: 24
 - Refer to Figure 3 for a map showing the area served.

CONCEPT DESIGN ASSUMPTIONS

The City provided Wright-Pierce with GIS data including the topography for the areas of interest as well as on the parcels located in each area. This data was reviewed and preliminary sewer alignments were developed using the following baseline assumptions:

- Proposed sewers in each area would flow to the following existing sewer locations:
 - SAS - gravity sewer at Odiorne Point Road
 - WBR - gravity sewer at Tidewatch Condominiums
 - TOR - gravity sewer at Odiorne Point Road via the Sagamore Avenue South area
- All sewers would be located in streets/right-of-ways.
- All gravity sewers would be 8-inch diameter PVC pipe with a minimum slope of 0.4%
- All low pressure sewers would be 3-inch diameter PVC pipe.
- All properties abutting the new gravity or pressure sewers would have a service stub installed.
- Flushing manholes would be installed at the end of low pressure lines.
- Minimum ground cover would be 5 feet from the top of the pipe.
- Maximum manhole spacing would be 300 feet.
- Ledge was assumed to be 50% of the trench depth for all areas except Sagamore Grove. For Sagamore Grove, 90% ledge was assumed. It is important to note that this assumption has a significant impact on project costs as it represents 10% to 20% of the cost depending on the option.
- Trench paving would be performed over installed sewer/force mains; no road width overlay is accounted for herein.



SUMMARY OF ALTERNATIVES

Two alternatives were considered for each of the three project areas:

- Alternative 1 - Conventional gravity sewer with new, City-owned pumping station(s)
- Alternative 2 - Combination of conventional gravity sewer and low pressure sewer

Both alternatives utilize a conventional gravity sewer approach for providing sewer to the areas that, based on topography, will be able to flow by gravity into the existing sewer collection system. Based on discussions with the City, it was determined that Alternative 1 would not be a feasible alternative for the Walker's Bungalow Road (WBR) area due to topography and preference of the homeowners in the area. For this reason, this alternative was not further evaluated for the WBR area.

Alternative 1

Alternative 1 would consist of 8-inch diameter PVC gravity sewer pipes, standard 4-foot diameter precast concrete manholes located approximately every 300 feet, and City-owned pump station(s). The pump station(s) and corresponding force main(s) would be sized based on the flow to the station. All areas that cannot flow by gravity to the existing collection system would flow to a new pump station and then be pumped to the existing collection system. In addition, based on topography, some parcels would require private pump stations.

Alternative 2

Alternative 2 would consist of conventional gravity sewer in areas that can flow by gravity to the existing collection system and low pressure sewer for the remaining areas. Low pressure sewer systems consist of small grinder pump stations installed near each dwelling and a common 3-inch PVC forcemain. These stations can either be placed in the basement of the building (if plumbing allows) or outside in a buried configuration. The outside installation allows for plumbing fixtures, such as bathrooms and sinks, to be located in the basement and to drain by gravity to the pumping system. The systems come complete with fully assembled pump, collection basin, control/alarm panel, connecting power cable, discharge flexible connector and onsite start-up inspection by the manufacturer.

Wright-Pierce recommends that the homeowner be responsible for the purchase, operation and maintenance of the low pressure pump station. The City would be responsible for the force main in the street and the check valves for each service connection. This is a standard approach to ownership among many communities and is one that the City has utilized successfully in the past. On a previous similar project, the City pre-negotiated a price with the manufacturer which allowed for homeowners to purchase the systems for a fixed price for a two-year term.



During the start-up year(s) for the low pressure sewer alternatives, there would be relatively long detention times in the low pressure forcemain. Accordingly, odor generation should be anticipated and would manifest itself at the sewer manhole where the forcemain(s) discharge. Capital costs have not been included for odor control approaches. This should be considered in the preliminary design phase of the project.

COST ANALYSIS

Planning level project costs have been prepared for each area based on the above-mentioned alternatives and are summarized in Table 1. More detailed cost information is presented in the attachment tables. Table 1 also shows the breakdown of costs associated with work on public versus private properties. These costs were developed using standard cost estimating procedures consistent with industry standards utilizing conceptual layouts and unit cost information as necessary. Total project capital costs include an allowance of 35% of the construction costs to account for construction contingency, design and construction engineering, and permitting as well as financing, administrative expenses, and legal expenses. The project cost information presented herein is in current dollars (ENR CCI 8940). These estimates have been developed primarily for evaluating alternative solutions and are generally reliable for determining the relative costs of various options.

At the City's request, an evaluation of costs per parcel was also performed using two methods: cost based on total area of each parcel and cost based on the Equivalent Dwelling Units per parcel. The following assumptions were made as part of this evaluation:

- Cost based on Total Parcel Area:
 - Two City-owned parcels along Sagamore Avenue in the Sagamore Avenue South area (Map Lot ID Nos. 0201-0026-0000 and 0223-0025-000B) were not included in this evaluation.

- Cost based on Equivalent Dwelling Units (EDU):
 - Residential parcels and undeveloped parcels were assigned a value of 1 EDU, business/commercial parcels were assigned a value of 10 EDUs.
 - The only exception to this was the Sagamore Landing parcel in the Walker Bungalow Road area which was assigned an EDU of 7 based on the number of existing residences on the parcel.

It will likely be necessary to refine these assumptions for any parcels that have significant redevelopment potential.



**Table 1 - Summary of Planning-Level Costs
 Sagamore Avenue South Sewer Extension Alternatives**

	Alternative 1 Conventional Sewer	Alternative 2 Low Pressure Sewer
Sagamore Avenue South		
Total Estimated Cost	\$2,260,000	\$1,450,000
No. of Parcels Served	28	28
Est. No. of EDUs	91	91
Total Parcel Area (sf)	1,073,200	1,073,200
Cost per Parcel Basis	\$80,700	\$51,800
Cost per EDU Basis	\$24,800	\$15,900
Cost per SF Basis (for 40,000sf)	\$84,200	\$54,000
Walker's Bungalow Road		
Total Estimated Cost	--	\$1,830,000
No. of Parcels Served	55	55
Est. No. of EDUs	64	64
Total Parcel Area (sf)	1,843,300	1,843,300
Cost per Parcel Basis	--	\$33,300
Cost per EDU Basis	--	\$28,600
Cost per SF Basis (for 40,000sf)	--	\$39,700
Town of Rye		
Total Estimated Cost	\$1,290,000	\$850,000
No. of Parcels Served	24	24
Est. No. of EDUs	69	69
Total Parcel Area (sf)	1,441,600	1,441,600
Cost per Parcel Basis	\$53,800	\$35,400
Cost per EDU Basis	\$18,700	\$12,300
Cost per SF Basis (for 40,000sf)	\$35,800	\$23,600

Notes:

- 1) Costs presented above do not include sewer connection fees or capacity use charges.
- 2) Costs exclude City-owned parcels 1417 and 1446.
- 3) Costs presented in current dollars (ENR CCI 8940).



PERMITTING

Permitting requirements will vary for each alternative. As a linear municipal (roadway) project, any work within state roads (Sagamore Avenue, Wentworth Road, etc) will require DOT road-opening permits, and any new pump station sites will require DOT driveway permits. Based on the anticipated size of any disturbance, it is not envisioned that a NHDES Alteration of Terrain permit will be required. However, any work within 250' of Sagamore Creek will require NHDES Shoreland Zone Permit, and will also likely require approval from the Portsmouth Conservation Commission.

NEXT STEPS

The following next steps are recommended:

- Consider developing and issuing a questionnaire to potential sewer users to gauge level of interest. Alternatively, consider holding a public meeting to discuss the project. Update the cost model based on input received from the public.
- Review cost allocation scenarios for each alternative and select the preferred approach.
- Perform ledge probes along each potential alignment to refine cost estimates. The assumed ledge quantities and unit prices represent approximately 10% to 20% of the total cost of the projects depending on the option.

We appreciate the opportunity to assist the City with this evaluation. If you have any questions, please don't hesitate contact us.

Very truly yours,

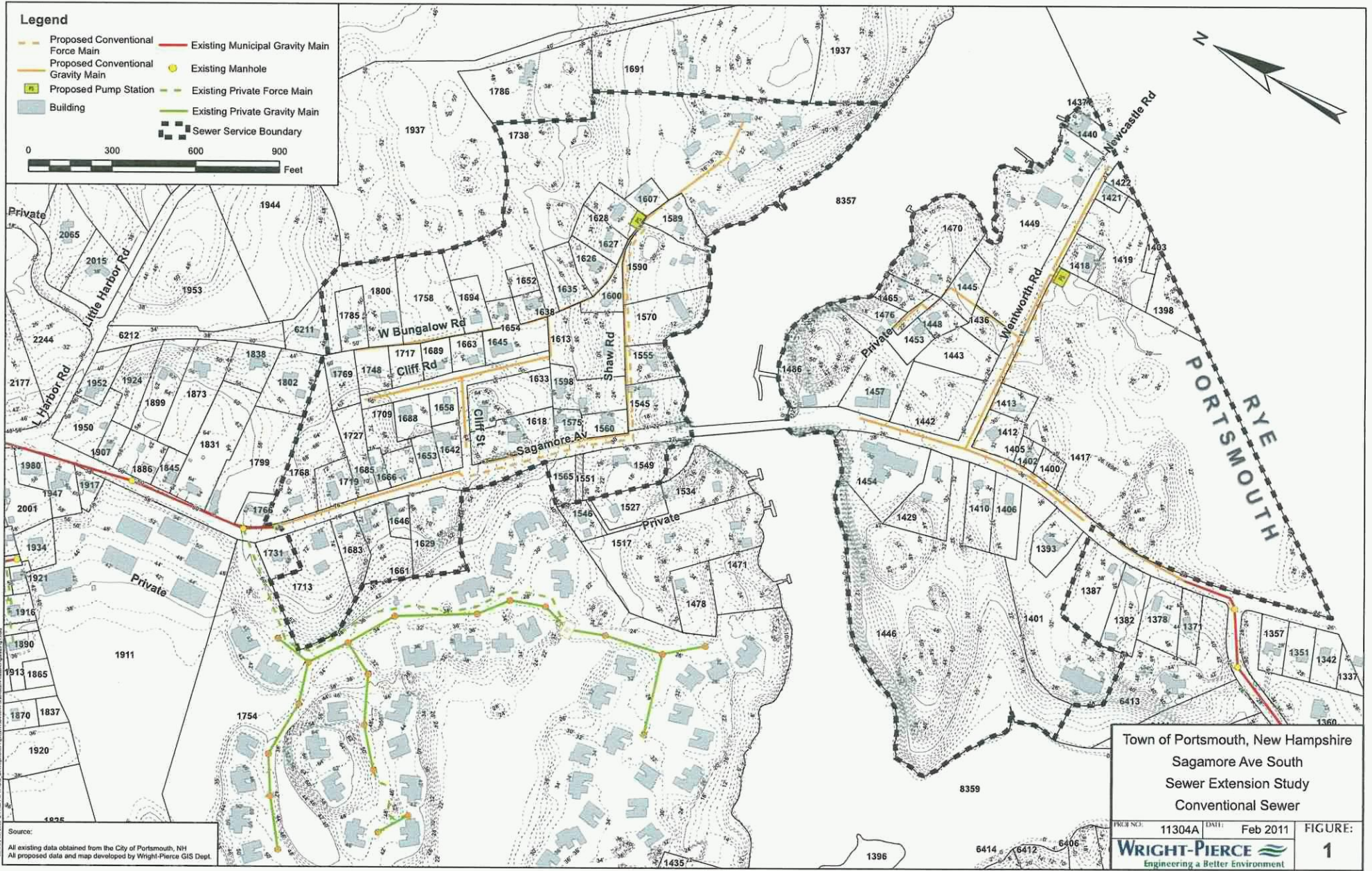
WRIGHT-PIERCE

A handwritten signature in black ink, appearing to read 'E. Leonard', written over the printed name.

Edward J. Leonard, P.E.
Project Manager

Attachments: Study Area Figures
Detailed Alternative Cost Tables

CC: File (11304A-1)



Legend

- Proposed Conventional Force Main
- Existing Municipal Gravity Main
- Proposed Conventional Gravity Main
- Existing Manhole
- Proposed Pump Station
- Existing Private Force Main
- Building
- Existing Private Gravity Main
- Sewer Service Boundary

0 300 600 900 Feet

Town of Portsmouth, New Hampshire
 Sagamore Ave South
 Sewer Extension Study
 Conventional Sewer

PROJECT: 11304A DATE: Feb 2011 FIGURE: 1

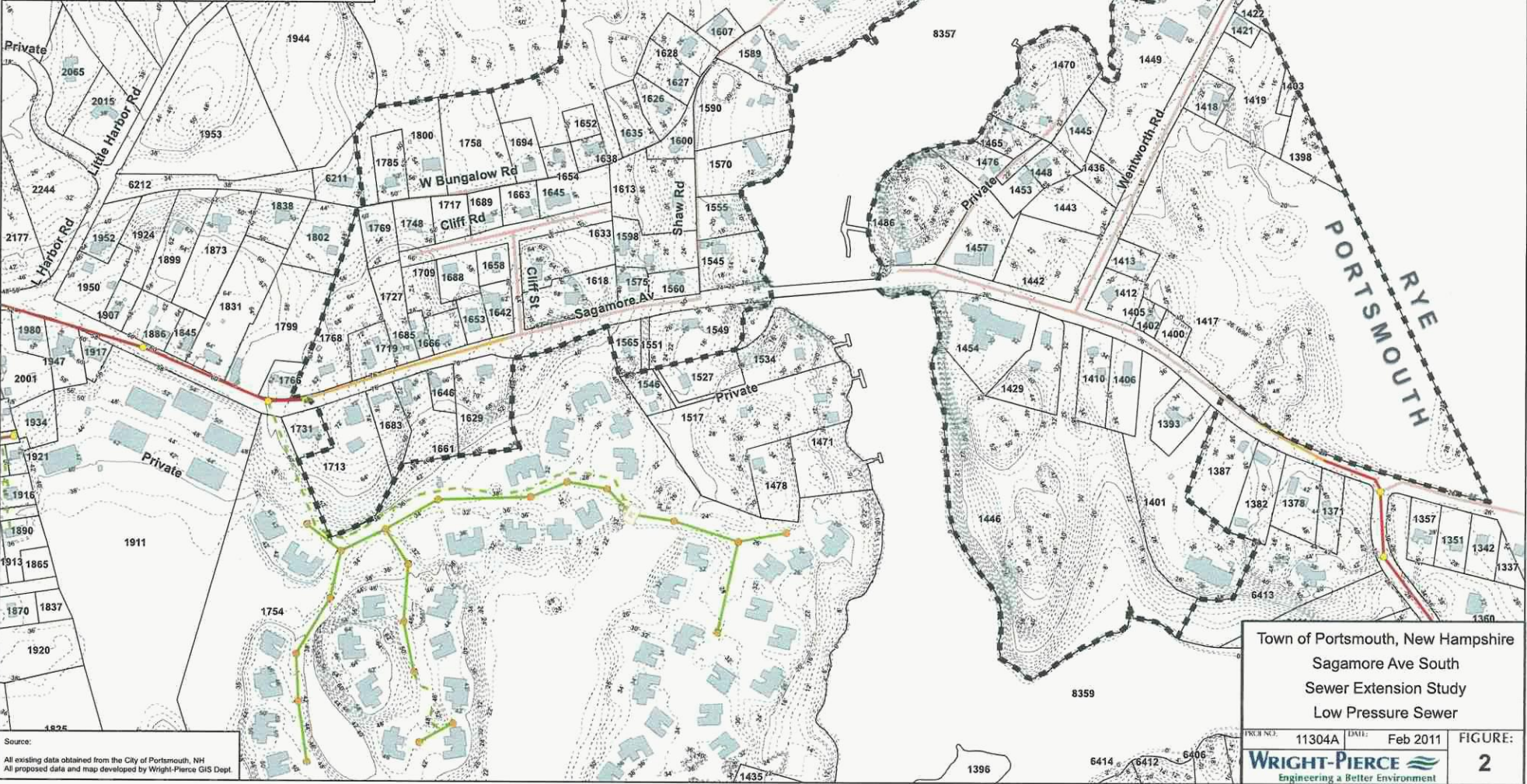
WRIGHT-PIERCE
 Engineering a Better Environment

Source:
 All existing data obtained from the City of Portsmouth, NH
 All proposed data and map developed by Wright-Pierce GIS Dept.

Legend

- Proposed Low Pressure Sewer Main
- Proposed Conventional Gravity Sewer Main
- Building
- Existing Manhole
- Existing Municipal Gravity Main
- Existing Private Force Main
- Existing Private Gravity Main
- Sewer Service Boundary

0 300 600 900 Feet



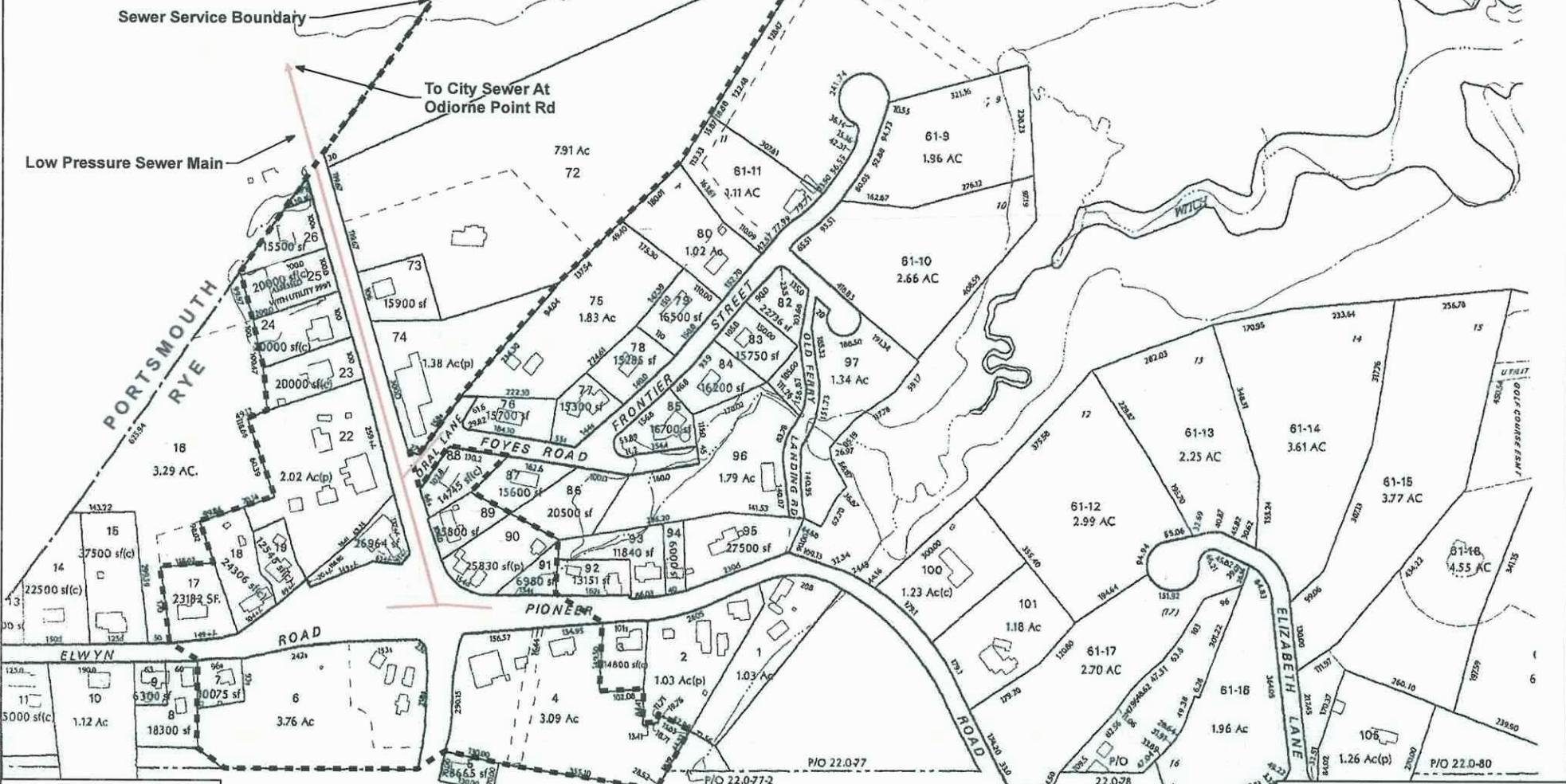
Source:
 All existing data obtained from the City of Portsmouth, NH
 All proposed data and map developed by Wright-Pierce GIS Dept.

Town of Portsmouth, New Hampshire
 Sagamore Ave South
 Sewer Extension Study
 Low Pressure Sewer

PROJECT: 11304A	DATE: Feb 2011	FIGURE: 2
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WRIGHT-PIERCE
 Engineering a Better Environment

Source:
Scanned image of plan developed by Coast
Engineering Assco., Inc. (undated)



Legend

- Proposed Low Pressure Sewer Main
- Sewer Service Boundary
- Building

Town of Rye, New Hampshire
Sagamore Ave South
Sewer Extension Study
Low Pressure Sewer

PROJECT NO: 11304A DATE: Feb 2011 FIGURE: 3

WRIGHT-PIERCE
Engineering a Better Environment

CONCEPTUAL CONSTRUCTION COST ESTIMATE (ENR INDEX 8940)

Alternative 1 - Conventional Gravity Sewer

NO.	DESCRIPTION	UNIT PRICE	UNIT	SAGAMORE AVE. (S)		WENTWORTH RD.		SAGAMORE GROVE		TOTAL	
				QUAN.	COST	QUAN.	COST	QUAN.	COST	QUAN.	COST
1	6" PVC SANITARY SERVICE (PUBLIC)	\$55	LF	390	\$21,450	270	\$14,850	60	\$3,300	720	\$39,600
2	6" PVC SANITARY SERVICE (PRIVATE)	\$55	LF	390	\$21,450	270	\$14,850	240	\$13,200	900	\$49,500
3	8" PVC SANITARY SEWER	\$80	LF	1,300	\$104,000	1,500	\$120,000	600	\$48,000	3,400	\$272,000
4	6" DI FORCE MAIN	\$110	LF	700	\$77,000	1,200	\$132,000	0	\$0	1,900	\$209,000
5	4' DIA. SEWER MANHOLE	\$3,500	EA	6	\$21,000	7	\$24,500	3	\$10,500	16	\$56,000
6	PUMP STATION	\$350,000	EA	0	\$0	1	\$350,000	0	\$0	1	\$350,000
7	LEDGE EXCAVATION	\$140	CY	833	\$116,667	833	\$116,667	600	\$84,000	2,267	\$317,333
8	AGGREGATE BASE (INCL. EXCAV.)	\$30	CY	222	\$6,667	222	\$6,667	89	\$2,667	533	\$16,000
9	AGGREGATE SUB-BASE (INCL. EXCAV.)	\$30	CY	1,333	\$40,000	1,333	\$40,000	533	\$16,000	3,200	\$96,000
10	LOAMING AND SEEDING	\$5	SY	7	\$33	7	\$33	9	\$44	22	\$111
11	HOT BIT. PAVEMENT (OVERLAY)	\$175	TONS	0	\$0	0	\$0	0	\$0	0	\$0
12	HOT BIT. PAVEMENT (TRENCH PATCH)	\$175	TONS	497	\$87,010	480	\$83,930	194	\$33,880	1,170	\$204,820
13	TRAFFIC CONTROL	\$8,000	LS	1	\$8,000	1	\$8,000	1	\$8,000	3	\$24,000
14	TEST PITS	\$500	EA	0	\$0	0	\$0	0	\$0	0	\$0
15	PAVEMENT MARKINGS	\$1,000	LS	1	\$1,000	1	\$1,000	0	\$0	2	\$2,000
16	GRANITE CURBING - RESET	\$20	LF	0	\$0	0	\$0	0	\$0	0	\$0
17	BITUMINOUS CURBING	\$10	LF	0	\$0	0	\$0	0	\$0	0	\$0
18	ABANDON SEPTIC SYSTEM (PRIVATE)	\$2,000	EA	9	\$18,000	5	\$10,000	6	\$12,000	20	\$40,000
				CONSTRUCTION:		\$522,000	\$922,000	\$232,000	\$1,676,000		
				TECHNICAL SERVICES & CONTINGENCY: 35%		\$183,000	\$323,000	\$81,000	\$587,000		
				TOTAL:		\$705,000	\$1,245,000	\$313,000	\$2,263,000		

COST BREAKDOWN

Public vs. Private Costs					
	Public Cost	\$651,000	\$1,211,000	\$279,000	\$2,142,000
	Private Cost	\$54,000	\$34,000	\$34,000	\$121,000
	Average Private Cost per Parcel	\$4,200	\$3,800	\$5,700	\$4,300
Cost Based on Square Footage					
	Total Parcel Area (SF)	586,256	323,380	163,612	1,073,249
	Unit Cost per Square Foot of Property	\$1.11	\$3.74	\$1.71	\$2.00
	Public Cost per Parcel				
	Average	\$50,100	\$134,600	\$46,500	\$76,500
	Minimum	\$4,600	\$23,300	\$22,900	\$4,600
	Maximum	\$166,100	\$559,200	\$129,800	\$559,200
	Median	\$32,600	\$56,800	\$31,200	\$42,000
	Average Total Cost per Parcel	\$54,000	\$138,000	\$52,000	\$81,000
Cost Based on Equivalent Dwelling Units					
	Total Assumed EDUs	58	27	6	91
	Unit Cost per EDU	\$12,155	\$46,111	\$52,167	\$24,868
	Average Total Cost per Residential Parcel	\$16,000	\$50,000	\$58,000	\$29,000
	Average Total Cost per Industrial/Commercial Parcel	\$126,000	\$465,000	\$527,000	\$253,000

CONCEPTUAL CONSTRUCTION COST ESTIMATE (ENR INDEX 8940)

Alternative 2 - Low Pressure Sewer

NO.	DESCRIPTION	UNIT PRICE	UNIT	SAGAMORE AVE. (S)		WENTWORTH RD.		SAGAMORE GROVE		TOTAL	
				QUAN.	COST	QUAN.	COST	QUAN.	COST	QUAN.	COST
1	1 1/2" LP SANITARY SERVICE (PUBLIC)	\$45	LF	390	\$17,550	270	\$12,150	60	\$2,700	720	\$32,400
2	1 1/2" LP SANITARY SERVICE (PRIVATE)	\$45	LF	390	\$17,550	270	\$12,150	240	\$10,800	900	\$40,500
3	8" PVC SANITARY SEWER	\$80	LF	500	\$40,000	0	\$0	0	\$0	500	\$40,000
4	3" LP SANITARY SEWER MAIN	\$60	LF	1,200	\$72,000	1,200	\$72,000	750	\$45,000	3,150	\$189,000
5	4' DIA. SEWER MANHOLE	\$3,500	EA	3	\$10,500	0	\$0	0	\$0	3	\$10,500
6	LPS STATION (PRIVATE)	\$7,500	EA	13	\$97,500	9	\$67,500	6	\$45,000	28	\$210,000
7	LEDGE EXCAVATION	\$140	CY	472	\$66,111	333	\$46,667	375	\$52,500	1,181	\$165,278
8	AGGREGATE BASE (INCL. EXCAV.)	\$30	CY	252	\$7,556	178	\$5,333	111	\$3,333	541	\$16,222
9	AGGREGATE SUB-BASE (INCL. EXCAV.)	\$30	CY	1,511	\$45,333	1,067	\$32,000	667	\$20,000	3,244	\$97,333
10	LOAMING AND SEEDING	\$5	SY	7	\$33	7	\$33	9	\$44	22	\$111
11	HOT BIT. PAVEMENT (OVERLAY)	\$175	TONS	0	\$0	0	\$0	0	\$0	0	\$0
12	HOT BIT. PAVEMENT (TRENCH PATCH)	\$175	TONS	556	\$97,277	392	\$68,530	238	\$41,580	1,185	\$207,387
13	TRAFFIC CONTROL	\$8,167	LS	1	\$8,167	1	\$8,167	1	\$8,167	3	\$24,500
14	TEST PITS	\$500	EA	0	\$0	0	\$0	0	\$0	0	\$0
15	PAVEMENT MARKINGS	\$1,000	LS	1	\$1,000	1	\$1,000	0	\$0	2	\$2,000
16	GRANITE CURBING - RESET	\$20	LF	0	\$0	0	\$0	0	\$0	0	\$0
17	BITUMINOUS CURBING	\$10	LF	0	\$0	0	\$0	0	\$0	0	\$0
18	ABANDON SEPTIC SYSTEM (PRIVATE)	\$2,000	EA	9	\$18,000	5	\$10,000	6	\$12,000	20	\$40,000
				CONSTRUCTION:		\$499,000	\$336,000	\$241,000	\$1,075,000		
				TECHNICAL SERVICES & CONTINGENCY: 35%		\$174,650	\$117,600	\$84,350	\$376,250		
				TOTAL:		\$673,650	\$453,600	\$325,350	\$1,451,250		

COST BREAKDOWN

Public vs. Private Costs					
	Public Cost	\$494,000	\$333,000	\$234,000	\$1,059,000
	Private Cost	\$180,000	\$121,000	\$91,000	\$392,000
	Average Private Cost per Parcel	\$13,800	\$13,400	\$15,200	\$14,000
Cost Based on Square Footage					
	Total Parcel Area (SF)	586,256	323,380	163,612	1,073,249
	Unit Cost per Square Foot of Property	\$0.84	\$1.03	\$1.43	\$0.99
	Public Cost per Parcel				
	Average	\$38,000	\$37,000	\$39,000	\$37,900
	Minimum	\$3,500	\$6,400	\$19,200	\$3,500
	Maximum	\$126,100	\$153,800	\$108,900	\$153,800
	Median	\$24,800	\$15,600	\$26,200	\$23,500
	Average Total Cost per Parcel	\$52,000	\$50,000	\$54,000	\$52,000
Cost Based on Equivalent Dwelling Units					
	Total Assumed EDUs	58	27	6	91
	Unit Cost per EDU	\$11,615	\$16,800	\$54,225	\$15,948
	Average Total Cost per Residential Parcel	\$25,000	\$30,000	\$69,000	\$30,000
	Average Total Cost per Industrial/Commercial Parcel	\$130,000	\$181,000	\$557,000	\$173,000

CONCEPTUAL CONSTRUCTION COST ESTIMATE (ENR INDEX 8940)

Alternative 2 - Low Pressure Sewer

NO.	DESCRIPTION	UNIT PRICE	UNIT	SAGAMORE AVE. (N)		CLIFF ROAD		WALKER BUNGALOW RD.		SHAW ROAD		TOTAL	
				QUAN.	COST	QUAN.	COST	QUAN.	COST	QUAN.	COST	QUAN.	COST
1	6" PVC SANITARY SERVICE (PUBLIC)	\$55	LF	330	\$18,150	0	\$0	0	\$0	0	\$0	330	\$18,150
2	6" PVC SANITARY SERVICE (PRIVATE)	\$55	LF	330	\$18,150	0	\$0	0	\$0	0	\$0	330	\$18,150
3	1 1/2" LP SANITARY SERVICE (PUBLIC)	\$45	LF	210	\$9,450	120	\$5,400	270	\$12,150	75	\$3,375	675	\$30,375
4	1 1/2" LP SANITARY SERVICE (PRIVATE)	\$45	LF	210	\$9,450	360	\$16,200	1,080	\$48,600	425	\$19,125	2,075	\$93,375
5	8" PVC SANITARY SEWER	\$80	LF	650	\$52,000	0	\$0	0	\$0	0	\$0	650	\$52,000
6	3" LP SANITARY SEWER MAIN	\$60	LF	700	\$42,000	950	\$57,000	1,000	\$60,000	650	\$39,000	3,300	\$198,000
7	4' DIA. SEWER MANHOLE	\$3,500	EA	3	\$10,500	0	\$0	0	\$0	0	\$0	3	\$10,500
8	LPS STATION (PRIVATE)	\$7,500	EA	7	\$52,500	8	\$60,000	18	\$135,000	5	\$37,500	38	\$285,000
9	LEDGE EXCAVATION	\$140	CY	375	\$52,500	264	\$36,944	278	\$38,889	181	\$25,278	1,097	\$153,611
10	AGGREGATE BASE (INCL. EXCAV.)	\$30	CY	200	\$6,000	141	\$4,222	148	\$4,444	96	\$2,889	585	\$17,556
11	AGGREGATE SUB-BASE (INCL. EXCAV.)	\$30	CY	1,200	\$36,000	844	\$25,333	889	\$26,667	578	\$17,333	3,511	\$105,333
12	LOAMING AND SEEDING	\$5	SY	7	\$33	10	\$50	13	\$67	19	\$94	49	\$244
13	HOT BIT. PAVEMENT (OVERLAY)	\$175	TONS	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
14	HOT BIT. PAVEMENT (TRENCH PATCH)	\$175	TONS	475	\$83,160	302	\$52,873	346	\$60,573	205	\$35,933	1,329	\$232,540
15	TRAFFIC CONTROL	\$6,500	LS	1	\$6,500	1	\$6,500	1	\$6,500	1	\$6,500	4	\$26,000
16	TEST PITS	\$500	EA	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
17	PAVEMENT MARKINGS	\$1,000	LS	1	\$1,000	1	\$1,000	0	\$0	0	\$0	2	\$2,000
18	GRANITE CURBING - RESET	\$20	LF	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
19	BITUMINOUS CURBING	\$10	LF	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
20	ABANDON SEPTIC SYSTEM (PRIVATE)	\$2,000	EA	18	\$36,000	8	\$16,000	24	\$48,000	5	\$10,000	55	\$110,000

CONSTRUCTION:	\$433,000	\$282,000	\$441,000	\$197,000	\$1,353,000
TECHNICAL SERVICES & CONTINGENCY: 35%	\$151,550	\$98,700	\$154,350	\$68,950	\$473,550
TOTAL:	\$584,550	\$380,700	\$595,350	\$265,950	\$1,826,550

COST BREAKDOWN

Public vs. Private Costs					
Public Cost	\$428,000	\$256,000	\$283,000	\$176,000	\$1,143,000
Private Cost	\$0	\$125,000	\$0	\$90,000	\$684,000
Average Private Cost per Parcel	\$0	\$15,600	\$0	\$18,000	\$14,000
Cost Based on Square Footage					
Total Parcel Area (SF)	509,419	158,739	976,840	198,333	1,843,332
Unit Cost per Square Foot of Property	\$0.84	\$1.61	\$0.29	\$0.89	\$0.62
Public Cost per Parcel					
Average	\$23,800	\$32,000	\$15,700	\$35,200	\$23,300
Minimum	\$3,700	\$19,000	\$2,900	\$20,100	\$2,900
Maximum	\$71,000	\$73,300	\$154,200	\$54,200	\$154,200
Median	\$15,000	\$27,900	\$6,100	\$31,300	\$17,400
Average Total Cost per Parcel	\$24,000	\$48,000	\$16,000	\$53,000	\$37,000
Cost Based on Equivalent Dwelling Units					
Total Assumed EDUs	27	8	24	5	64
Unit Cost per EDU	\$21,650	\$47,588	\$24,806	\$53,190	\$28,540
Average Total Cost per Residential Parcel	\$22,000	\$63,000	\$25,000	\$71,000	\$43,000
Average Total Cost per Industrial/Commercial Parcel	\$217,000	\$491,000	\$248,000	\$550,000	\$299,000

CONCEPTUAL CONSTRUCTION COST ESTIMATE (ENR INDEX 8940)

Alternative 1 - Conventional Gravity Sewer

NO.	DESCRIPTION	UNIT		SAGAMORE AVE.		TOTAL	
		PRICE	UNIT	QUAN.	COST	QUAN.	COST
1	6" PVC SANITARY SERVICE (PUBLIC)	\$55	LF	720	\$39,600	720	\$39,600
2	6" PVC SANITARY SERVICE (PRIVATE)	\$55	LF	720	\$39,600	720	\$39,600
3	8" PVC SANITARY SEWER	\$80	LF	1,600	\$128,000	1,600	\$128,000
4	6" DI FORCE MAIN	\$110	LF	400	\$44,000	400	\$44,000
5	4' DIA. SEWER MANHOLE	\$3,500	EA	6	\$21,000	6	\$21,000
6	PUMP STATION	\$350,000	EA	1	\$350,000	1	\$350,000
7	LEDGE EXCAVATION	\$140	CY	889	\$124,444	889	\$124,444
8	AGGREGATE BASE (INCL. EXCAV.)	\$30	CY	237	\$7,111	237	\$7,111
9	AGGREGATE SUB-BASE (INCL. EXCAV.)	\$30	CY	1,422	\$42,667	1,422	\$42,667
10	LOAMING AND SEEDING	\$5	SY	7	\$33	7	\$33
11	HOT BIT. PAVEMENT (OVERLAY)	\$175	TONS	0	\$0	0	\$0
12	HOT BIT. PAVEMENT (TRENCH PATCH)	\$175	TONS	575	\$100,613	575	\$100,613
13	TRAFFIC CONTROL	\$10,500	LS	1	\$10,500	1	\$10,500
14	TEST PITS	\$500	EA	0	\$0	0	\$0
15	PAVEMENT MARKINGS	\$1,000	LS	1	\$1,000	1	\$1,000
16	GRANITE CURBING - RESET	\$20	LF	0	\$0	0	\$0
17	BITUMINOUS CURBING	\$10	LF	0	\$0	0	\$0
18	ABANDON SEPTIC SYSTEM (PRIVATE)	\$2,000	EA	24	\$48,000	24	\$48,000
				CONSTRUCTION:			\$957,000
				TECHNICAL SERVICES & CONTINGENCY: 35%			\$335,000
				TOTAL:			\$1,292,000

COST BREAKDOWN

Public vs. Private Costs			
	Public Cost	\$1,174,000	\$1,174,000
	Private Cost	\$118,000	\$118,000
	Average Private Cost per Parcel	\$4,900	\$4,900
Cost Based on Square Footage			
	Total Parcel Area (SF)	1,441,584	1,441,584
	Unit Cost per Square Foot of Property	\$0.81	\$0.81
	Public Cost per Parcel		
	Average	\$48,900	\$48,900
	Minimum	\$300	\$300
	Maximum	\$280,600	\$280,600
	Median	\$16,300	\$16,300
	Average Total Cost per Parcel	\$54,000	\$54,000
Cost Based on Equivalent Dwelling Units			
	Total Assumed EDUs	69	69
	Unit Cost per EDU	\$18,725	\$18,725
	Average Total Cost per Residential Parcel	\$24,000	\$24,000
	Average Total Cost per Industrial/Commercial Parcel	\$192,000	\$192,000

CONCEPTUAL CONSTRUCTION COST ESTIMATE (ENR INDEX 8940)
 Alternative 2 - Low Pressure Sewer

NO.	DESCRIPTION	UNIT		SAGAMORE AVE.		TOTAL	
		PRICE	UNIT	QUAN.	COST	QUAN.	COST
1	6" PVC SANITARY SERVICE (PUBLIC)	\$55	LF	0	\$0	0	\$0
2	6" PVC SANITARY SERVICE (PRIVATE)	\$55	LF	0	\$0	0	\$0
3	1 1/2" LP SANITARY SERVICE (PUBLIC)	\$45	LF	720	\$32,400	720	\$32,400
4	1 1/2" LP SANITARY SERVICE (PRIVATE)	\$45	LF	720	\$32,400	720	\$32,400
5	8" PVC SANITARY SEWER	\$80	LF	0	\$0	0	\$0
6	3" LP SANITARY SEWER MAIN	\$60	LF	1,600	\$96,000	1,600	\$96,000
7	4' DIA. SEWER MANHOLE	\$3,500	EA	4	\$14,000	4	\$14,000
8	LPS STATION (PRIVATE)	\$7,500	EA	24	\$180,000	24	\$180,000
9	LEDGE EXCAVATION	\$140	CY	444	\$62,222	444	\$62,222
10	AGGREGATE BASE (INCL. EXCAV.)	\$30	CY	237	\$7,111	237	\$7,111
11	AGGREGATE SUB-BASE (INCL. EXCAV.)	\$30	CY	1,422	\$42,667	1,422	\$42,667
12	LOAMING AND SEEDING	\$5	SY	7	\$33	7	\$33
13	HOT BIT. PAVEMENT (OVERLAY)	\$175	TONS	0	\$0	0	\$0
14	HOT BIT. PAVEMENT (TRENCH PATCH)	\$175	TONS	575	\$100,613	575	\$100,613
15	TRAFFIC CONTROL	\$10,500	LS	1	\$10,500	1	\$10,500
16	TEST PITS	\$500	EA	0	\$0	0	\$0
17	PAVEMENT MARKINGS	\$1,000	LS	1	\$1,000	1	\$1,000
18	GRANITE CURBING - RESET	\$20	LF	0	\$0	0	\$0
19	BITUMINOUS CURBING	\$10	LF	0	\$0	0	\$0
20	ABANDON SEPTIC SYSTEM (PRIVATE)	\$2,000	EA	24	\$48,000	24	\$48,000
				CONSTRUCTION:		\$627,000	
				TECHNICAL SERVICES & CONTINGENCY: 35%		\$219,450	
				TOTAL:		\$846,450	

COST BREAKDOWN

Public vs. Private Costs			
	Public Cost	\$495,000	\$495,000
	Private Cost	\$0	\$351,000
	Average Private Cost per Parcel	\$0	\$14,600
Cost Based on Square Footage			
	Total Parcel Area (SF)	1,441,584	1,441,584
	Unit Cost per Square Foot of Property	\$0.34	\$0.34
	Public Cost per Parcel		
	Average	\$20,600	\$23,300
	Minimum	\$100	\$2,900
	Maximum	\$118,300	\$154,200
	Median	\$6,900	\$17,400
	Average Total Cost per Parcel	\$21,000	\$38,000
Cost Based on Equivalent Dwelling Units			
	Total Assumed EDUs	69	69
	Unit Cost per EDU	\$12,267	\$12,267
	Average Total Cost per Residential Parcel	\$12,000	\$27,000
	Average Total Cost per Industrial/Commercial Parcel	\$123,000	\$137,000