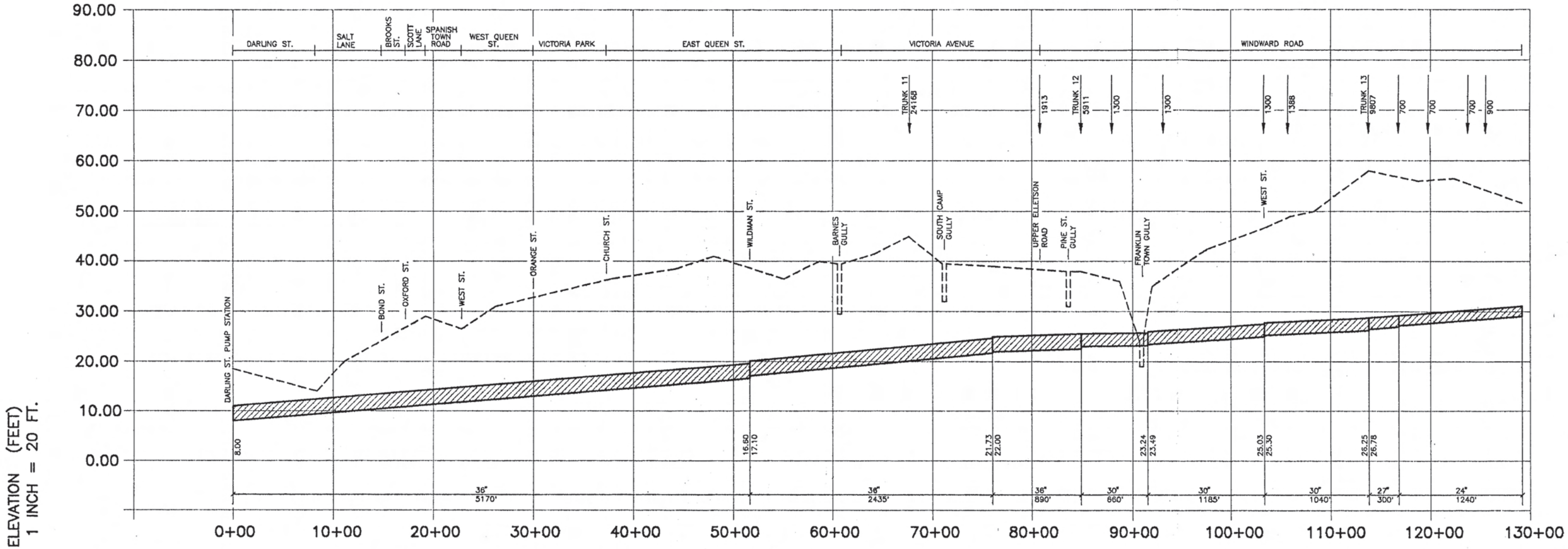
Trunk No. 19 DESIGN FLOW (igpd) 58 n= 0.013

LOCATION	STREET/ROAD		POPULATION		DESIGN FLOW				SEWER DESIGN				PROFILE			
			INDIVIDUAL	CUMMULATIVE	PEAK	SEWAGE	INFILTR.	TOTAL	SLOPE	DIAM.	Q	V	LENGTH		UPPER	LOWER
	FROM	TO	P	P	FACTOR	CFS	% OF FLOW	Q CFS	%	INCHES	CFS	FPS	FT.		INVERT	INVERT
WINDWARD			10091	10091	2.950775	3.206987	10	3.527686	1.2	12	3.900878	4.969272	1270		51.7	36.46
WINDWARD			7322	17413	2.712981	5.088001	10	5.596801	0.14	21	5.925667	2.464856	1120	*	35.2	30.88
WINDWARD			5422	22835	2.594788	6.381602	10	7.019763	0.14	24	8.460236	2.694343	1120	*	35.2	30.88
WINDWARD			1142	23977	2.573629	6.646113	10	7.310725	0.14	24	8.460236	2.694343	1120	*	35.2	30.88
WINDWARD			2355	26332	2.533159	7.184114	10	7.902526	0.15	24	8.757176	2.78891	2400	**	30.38	26.78
WINDWARD			680	27012	2.522185	7.33771	10	8.071481	0.15	24	8.757176	2.78891	2400	**	30.38	26.78
WINDWARD			900	27912	2.508104	7.539861	10	8.293848	0.15	24	8.757176	2.78891	2400	**	30.38	26.78
WINDWARD			700	28612	2.497483	7.696225	10	8.465847	0.15	24	8.757176	2.78891	2400	**	30.38	26.78
WINDWARD			700	29312	2.487138	7.851854	10	8.63704	0.15	24	8.757176	2.78891	2400	**	30.38	26.78
WINDWARD			700	30012	2.477055	8.006772	10	8.807449	0.15	27	11.98866	3.016728	2400	**	30.38	26.78
WINDWARD			9807	39819	2.357875	10.11202	10	11.12322	0.117308	30	14.04133	2.861928	1040		26.25	25.03
WINDWARD			1388	41207	2.343664	10.40144	10	11.44158	0.117308	30	14.04133	2.861928	1040		26.25	25.03
WINDWARD			1300	42507	2.330831	10.67083	10	11.73791	0.129958	30	14.77904	3.012289	1185		25.03	23.49
WINDWARD			1300	43807	2.318431	10.93867	10	12.03254	0.129958	30	14.77904	3.012289	1185		25.03	23.49
WINDWARD			1300	45107	2.306436	11.20501	10	12.32551	0.097419	30	12.79581	2.608063	1550	***	23.24	21.73
WINDWARD			5911	51018	2.256429	12.39858	10	13.63844	0.097419	36	20.8074	2.945138	1550	***	23.24	21.73
VICTORIA			1913	52931	2.241644	12.7792	10	14.05712	0.097419	36	20.8074	2.945138	1550	***	23.24	21.73
VICTORIA			24168	77099	2.09541	17.39982	15	20.00979	0.190144	36	29.06941	4.114565	2435		21.73	17.1
TO DARLING			0	77099	2.09541	17.39982	15	20.00979	0.166344	36	27.18937	3.848459	5170		16.6	8
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				

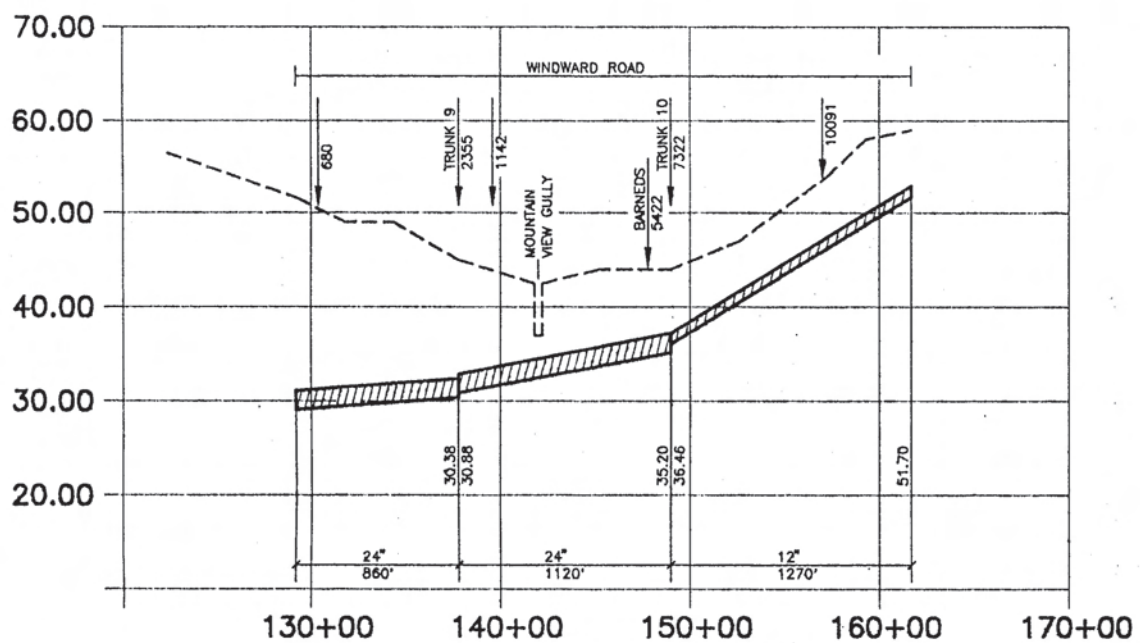
NOTES: * 120 feet - 21 inch dia., and 1000 feet - 24 inch dia.

** 2100 feet - 24 inch dia., and 300 feet - 27 inch dia.

*** 660 feet - 30 inch dia., and 890 feet - 36 inch dia.



STATIONS (FEET)
1 INCH = 1000 FT.



STATIONS (FEET)
1 INCH = 1000 FT.

LEGEND :

- PROPOSED PIPE
- EXISTING PIPE

4743 DISTRIBUTED POPULATION

4743 CONCENTRATED POPULATION

TRUNK 19

NOVEMBER, 1993

Trunk No. 17 DESIGN FLOW (igpd) 58 n= 0.013

LOCATION	STREET/ROAD		POPULATION		DESIGN FLOW				SEWER DESIGN				PROFILE			
			INDIVIDUAL	CUMMULATIVE	PEAK	SEWAGE	INFILTR.	TOTAL	SLOPE	DIAM.	Q	V	LENGTH		UPPER	LOWER
	FROM	TO	P	P	FACTOR	CFS	% OF FLOW	Q CFS	%	INCHES	CFS	FPS	FT.		INVERT	INVERT
WELLINGTON			2800	2800	3.467691	1.045744	5	1.098031	3.590244	8	2.288532	6.559488	2050		500	426.4
MUNROE			1413	4213	3.313071	1.503312	5	1.578478	3.590244	8	2.288532	6.559488	2050		500	426.4
HOPE			1500	5713	3.190859	1.963354	5	2.061522	2.164706	10	3.221968	5.910362	3400		426	352.4
SEYMOUR			2500	8213	3.039082	2.68826	5	2.822673	2.164706	10	3.221968	5.910362	3400		426	352.4
SEYMOUR			1000	9213	2.989967	2.966842	5	3.115184	1.115044	12	3.76026	4.79014	5650	*	352	289
MUSGRAVE			2032	11245	2.903892	3.516956	5	3.692803	1.115044	12	3.76026	4.79014	5650	*	352	289
TRAFALGAR			640	11885	2.879835	3.686325	5	3.870642	1.115044	15	6.817804	5.558465	5650	*	352	289
TRAFALGAR			889	12774	2.848411	3.91883	5	4.114772	1.115044	15	6.817804	5.558465	5650	*	352	289
TRAFALGAR			1929	14703	2.78698	4.413332	5	4.633999	0.414286	18	6.757693	3.826012	1400		280	274.2
HOLBORN			2483	17186	2.718719	5.032295	5	5.28391	0.414286	18	6.757693	3.826012	1400		280	274.2
HOLBORN			166	17352	2.714515	5.073045	5	5.326697	2.917647	12	6.082585	7.748516	850	**	274	249.2
CHELSEA			1494	18846	2.678416	5.436559	5	5.708387	0.988889	15	6.42055	5.234589	1800	***	249	231.2
GROVE			4000	22846	2.594579	6.384162	5	6.70337	1.84	15	8.75805	7.140321	2000	!	231	194.2
KEW			2020	24866	2.557878	6.850349	5	7.192866	0.580645	18	8.000256	4.529515	1550	!!	194	185
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				

NOTES:

* 3650 feet - 12 inch dia., and 2000 feet - 15 inch dia.

** Existing 10 inch dia. to be replaced with larger pipe

*** Existing 9 inch dia. pipe to be replaced with larger pipe

! Existing 18 inch dia. pipe

!! Existing 18 inch dia. pipe (150 feet), and 21 inch dia. pipe (1400 feet)

Trunk No. 18 | DESIGN FLOW (igp 58 | n= 0.013

LOCATION	STREET/ROAD		POPULATION		DESIGN FLOW				SEWER DESIGN				PROFILE		
			INDIVIDUAL	CUMMULATIVE	PEAK	SEWAGE	INFILTR.	TOTAL	SLOPE	DIAM.	Q	V	LENGTH	UPPER	LOWER
	FROM	TO	P	P	FACTOR	CFS	% OF FLOW	Q CFS	%	INCHES	CFS	FPS	FT.	INVERT	INVERT
SOUTH PARA			6296	6293	3.1510051	2.135668	15	2.4560182	0.1926097	15	2.833594	2.310191	2165	19.2	15.03
WILDE			5911	5911	3.1768691	2.0224937	10	2.2247431	1.6585366	10	2.820229	5.173413	2050	68	34
					4.5	0	10	0	ERR	15	ERR	ERR			
					4.5	0	10	0	ERR	15	ERR	ERR			
					4.5	0	10	0	ERR	15	ERR	ERR			
					4.5	0	10	0	ERR	21	ERR	ERR			
					4.5	0	15	0	ERR	24	ERR	ERR			
					4.5	0	15	0	ERR	27	ERR	ERR			
					4.5	0		0	ERR		ERR	ERR			
					4.5	0	15	0	ERR		ERR	ERR			
					4.5	0	15	0	ERR		ERR	ERR			
					4.5	0	15	0	ERR		ERR	ERR			
					4.5	0	15	0	ERR		ERR	ERR			
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					4.5	0	15	0	ERR		ERR	ERR			
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					4.5	0	15	0	ERR		ERR	ERR			
					4.5	0	15	0	ERR		ERR	ERR			
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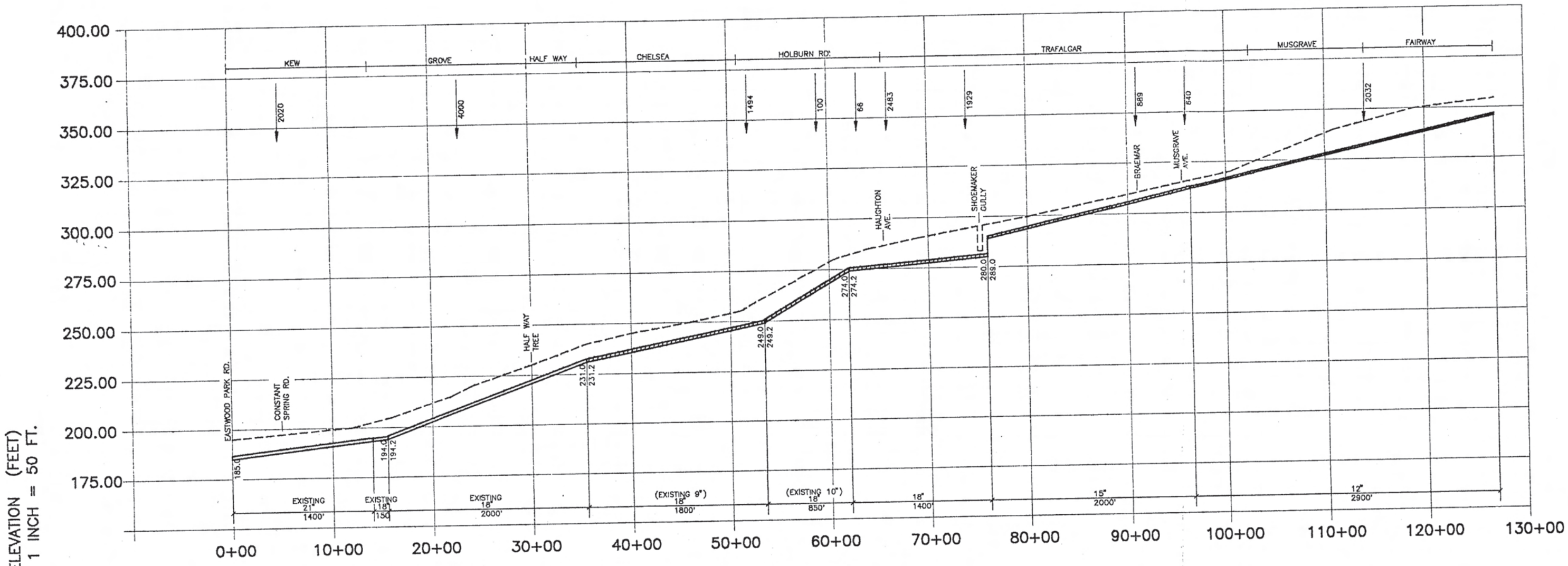
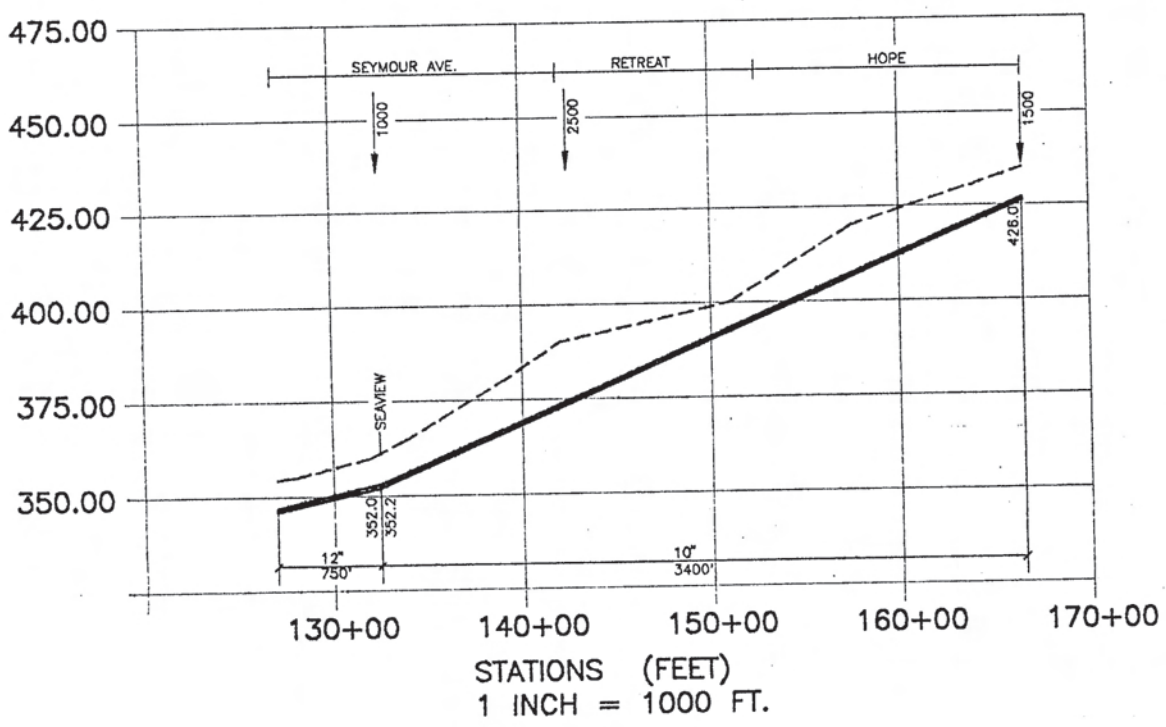
					4.5	0	15	0	ERR		ERR	ERR			
					4.5	0	15	0	ERR		ERR	ERR			



STATIONS (FEET)
1 INCH = 1000 FT.



STATIONS (FEET)
1 INCH = 1000 FT.

NOTE :
REPLACE EXISTING 9" ON CHELSEA AND
EXISTING 10" ON HOLBURN WITH NEW 18".

LEGEND :

— PROPOSED PIPE

— EXISTING PIPE

4743 DISTRIBUTED POPULATION

4743 CONCENTRATED POPULATION

TRUNK 17

NOVEMBER, 1993

						Trunk No. 16				DESIGN FLOW (igpd)			58		n=	0.013
LOCATION	STREET/ROAD		POPULATION		DESIGN FLOW				SEWER DESIGN				PROFILE			
			INDIVIDUAL	CUMMULATIVE	PEAK	SEWAGE	INFILTR.	TOTAL	SLOPE	DIAM.	Q	V	LENGTH		UPPER	LOWER
	FROM	TO	P	P	FACTOR	CFS	% OF FLOW	Q CFS	%	INCHES	CFS	FPS	FT.		INVERT	INVERT
SHORTWOOD			10000	10000	2.954685	3.182278	5	3.341392	2.485714	10	3.452609	6.333448	3500	*	386.2	299.2
SHORTWOOD			2500	12500	2.857864	3.847499	5	4.039874	2.485714	12	5.614323	7.152004	3500	*	386.2	299.2
SHORTWOOD			1254	13754	2.816144	4.171678	5	4.380262	2.485714	12	5.614323	7.152004	3500	*	386.2	299.2
SHORTWOOD			600	14354	2.797483	4.324813	5	4.541054	2.485714	12	5.614323	7.152004	3500	*	386.2	299.2
MYERS			0	14354	2.797483	4.324813	5	4.541054	1.921739	12	4.936498	6.288533	1150		299.1	277
					4.5	0	10	0	ERR	21	ERR	ERR				
					4.5	0	15	0	ERR	24	ERR	ERR				
					4.5	0	15	0	ERR	27	ERR	ERR				
					4.5	0		0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				
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					4.5	0	15	0	ERR		ERR	ERR				
					4.5	0	15	0	ERR		ERR	ERR				

NOTES: * 300 feet - 10 inch dia., and 3200 feet - 12 inch dia.

9. Duhaney Park

This plant has been dismantled and sewage is presently taken to Nanse Pen by the gravity collection system and the Duhaney Park Pump Station.

10. Calabar Mews

This plant has been dismantled and sewage is presently taken to the Greenwich Plant. The 5.4 acre area served by this plant will be picked up by the gravity sewage collection system.

11. Greenwich

This plant will be taken out of service. Only the sludge digester section of the existing plant will be used and it will be for hauled septage only.

12. Western

This plant, which is currently operable will not be needed as the area will be served by the gravity collection system.

Of the 12 plants listed, all of these with the exception of White Hall Avenue, Calabar Mews and Grove Manor are within the area which will be served as part of Phase I of the sewerage collection and transmission systems, and these plants will be taken out of service as soon as practical.

In taking a sewage treatment plant out of service there will be costs involved in diverting underground piping and connecting existing pipes to new collection mains. An allowance of 10,000 has been included for piping revisions at each station to be deleted from the system. The costs of dismantling and removal of existing plants have not been included.

Stage 2:

Labour & Material		9,200
Power Demand		11,600
Power Consumption		106,500
	Total	$127,300

3. Greenwich Sewage Treatment Plant

The existing Greenwich Sewage Treatment Plant which is presently in a limited operating condition will be taken out of service as a treatment plant, and will serve only as a transfer station to transfer sewage flows to the Soapberry site for treatment.

Greenwich peak sewage flows in gpm are summarized as follows:

1. High Level Trunk - Gravity Sewer

Stage 1 - 42" trunk	12,190
Stage 2	13,170

2. Darling Street Pump Station - Forcemains

Stage 1 - 21"/24" forcemain	5,020
Stage 2 - 24" forcemain	10,260

3. Central Pump Station - Forcemains

Stage 1 - 21" forcemain	2,730
Stage 2 - 24" forcemain	6,060
Total - Stage 1	19,940
Stage 2	29,490

The existing septage dumping and treatment facility at Greenwich will be taken out of service, and septage will be hauled to the Soapberry lagoons.

The Greenwich transfer system will then transfer the sewage received from the three sources listed to the sewage treatment lagoons at Soapberry. Two alternative systems were examined.

A. Greenwich Soapberry Syphon System

1. The existing 42" diameter High Level Trunk which now enters the plant influent channel, will be extended to the proposed syphon chamber and duplicated with an additional 1700 ft. of 42" at the lower end which will be connected to the syphon chamber.
2. The existing 21" force main from the Central Industrial Pump Station will be extended and connected to the syphon chamber. It presently enters the Greenwich Plant influent channel.
3. The existing 21" force main from the Darling Street pump station, which now enters Western Treatment Plant will be extended as 24" to enter the syphon chamber at Greenwich.
4. The proposed future 24" force main from Darling Street Pump Station will be constructed to enter the syphon chamber.
5. The proposed future 24" force main from Central Industrial Pump Station will enter the Greenwich System.
6. A 12" overflow connects to the Spanish Town Road Trunk Sewer.
7. An emergency overflow will run from the syphon chamber to the existing overflow system. This existing overflow extends from the Greenwich Plant primary clarifiers via overflow channel to a connection chamber and then to an outfall to Kingston Harbour. It will be necessary to connect the existing overflow system to the syphon chamber by an underground pipe.
8. The existing 30" pipeline that presently is a force main from Nanse Pen to Greenwich, will be extended to Soapberry lagoon, will be connected to the syphon chamber and will be used as a sewer syphon line. The extension will be 36" diameter.
9. New syphon pipes each sized at 48" diameter will extend from the syphon chamber to the inlet chamber of Soapberry lagoon.
10. The syphon chamber will include manually cleaned bar screens with bypass channel, so that all incoming sewage flows will pass through screens. See Figure 1-4.

11. It was considered that the Greenwich structure should include a horizontal flow grit removal structure designed to remove as much grit as possible ahead of the syphon pipes. Grit and debris removed can be loaded and hauled away by truck. Grit removal was deleted from the system as this could better be handled at the Soapberry site.

In this manner all flows from the Greenwich area will be transmitted directly to Soapberry.

The invert of the inlet to the syphon chamber will be dependent upon the new 48" diameter High Level Trunk, and will be approximately 43.6 feet. The invert of the two 48" syphon pipes and the 30" pipe will be approximately 43.2. The top of the chamber will be at elevation 52.0 feet. With allowance for freeboard in the chamber, the static head from the chamber to the Soapberry Lagoons is 29.5 feet.

The syphon chamber is a receiving chamber for the gravity sewer plus 4 forcemains, which directs outgoing flows to 3 - syphons (30", 48" and 48"). Each syphon line is equipped with a motorized sluice gate to be manually operated to provide as much head as practical for keeping the syphon lines flowing.

The proposed syphons are in the order of 22,000 feet long and must pass under existing gullies, including Sandy Gully and the Duhaney River before discharging at the Distribution Chambers of Soapberry lagoons. Inspection points and access chambers will be provided for routine inspections and for maintenance of the pipelines. Detailed survey work is necessary so that an accurate line profile can be plotted and pipeline obstructions located.

The syphon system must be designed so that minimum velocities in any of the syphon pipes are in excess of 3.0 feet per second which will require multiple pipes. The sewage will flow from Greenwich down to the Hunts Bay area, crossing Sandy Gully and the Duhaney River before entering the lagoon distribution chamber. The first several thousand feet of pipe carry sewage flows from Greenwich which are estimated to be:

Stage 1	Average Flows	11,800 gpm
	Peak Flows	19,900 gpm
	Minimum Flows	8,830 gpm
Stage 2	Average Flows	18,800 gpm
	Peak Flows	29,500 gpm
	Minimum Flows	14,100 gpm

In the Hunts Bay area, the Hunts Bay Sewage pumping station discharge to the syphon system (Stage 1) and also the Riverton sewage pumping station will discharge to the syphon system in Stage 2 so that flows from this area to the lagoons in the syphon system are projected to be:

Stage 1	Average Flow	12,700 gpm
	Peak Flow	22,250 gpm
	Minimum Flow	9,500 gpm
Stage 2	Average Flow	22,400 gpm
	Peak Flow	37,700 gpm
	Minimum Flow	16,750 gpm

For stage 1, peak flows a single 48" diameter pipe gives sufficient capacity and velocities, however, the minimum flows at the end of stage 1 are estimated to be 9,500 gpm and will be less than this during early years of operation. Ideally, a 36" pipeline should parallel the 48" pipeline so that the minimum flow velocity is 3.0 feet/second or more. The existing 30" pipeline which presently is a forcemain from Nanse Pen to Greenwich will no longer be a part of the Nanse Pen system. This line could be re-used as a syphon and could be extended at 36" diameter from the Hunts Bay area through which it passes to the lagoon. Minimum flows could be carried by this line, particularly in the early years of stage 1. For stage 2 flows, a second 48" line is necessary and at full development of stage 2 the 30" line may not be necessary as the stage 2 flow of 16,750 gpm can be carried by a single 48" pipe at velocities above 3.0 feet/second.

B. Greenwich Soapberry Pumping Station

The second alternative examined involved pumping the sewage collected at Greenwich to the Soapberry site.

The facilities at Greenwich would be the same as in the first alternative providing screening at Greenwich. The pipelines from Greenwich would be gravity sewer mains from Greenwich to a pump station location presently proposed in the Hunts Bay area.

This pump station would then pump sewage from the Hunts Bay area to Soapberry lagoons. The gravity sewer mains will be 2 - 48" diameter sewers from Greenwich to Hunts Bay, one in stage 1 and the second in stage 2. The sewage pumping station is proposed to be located near the site of the existing smaller Hunts Bay Pumping Station and, in this alternative, the renovations and/or new pump station proposed to replace the existing station will not be required since the Hunts Bay collection system will discharge to the New Hunts Bay station. Likewise, the Riverton trunk sewers can be designed to discharge to the New Hunts Bay station, eliminating the need for the proposed Riverton station, while increasing the capacity of the New Hunts Bay station. From the Hunts Bay, there will be 2 - 42" diameter forcemains to Soapberry lagoons.

The New Hunts Bay Pumping Station would be a wet well/dry well station using vertical dry pit non-clog type pumps. A divided wet well would be provided, part for Hunts Bay and Riverton sewage flows only and the remainder for Greenwich flows. The wet well for Greenwich flows would use the Greenwich gravity sewer lines as wet well storage. Pumping equipment would be:

Stage 1	19,940 gpm peak flow 4 - 175 horsepower pumps plus 1 - 175 horsepower standby pump 1 - 750 kW generator system
Stage 2	29,490 gpm peak flow add 3 - 175 horsepower pumps plus 1 - 175 horsepower standby pump Add 1 - 500 kW generator system

For stage 1, install one 42" forcemain and for stage 2, add a second 42" forcemain to Soapberry lagoons.

Comparison of Estimates of Cost:

The capital and operation/maintenance costs have been estimated for both alternatives to provide a means to compare these proposals which are based on:

Stage 1	Peak Flow	19,900 gpm
Stage 2	Peak Flow	29,500 gpm

Alternative 1 - Syphons

1. Greenwich Transfer Station

Renovate Greenwich site to provide control of flow to three syphon lines, and manually cleaned bar screens. Screening disposal is by excavation by loader and truck haul to a disposal site assumed to be near Soapberry lagoon.

Capital Cost

Stage 1	$240,000
Stage 2	35,000

2. Greenwich Syphons

In stage 1, extend existing 30" line and add 1 - 48" line. In stage 2, add a second 48" line.

Capital Cost

Stage 1	$6,670,000
Stage 2	5,540,000

3. Annual Operation and Maintenance Cost - Stage 1

Greenwich Transfer Station	
Labour and material	$ 8,800
Power demand and power consumption	400
Syphon Lines - 1 @ 48", 1 @ 30"	
Inspection, cleaning & maintenance	39,000
Total Stage 1	$48,200

4. Annual Operation and Maintenance Cost - Stage 2

Greenwich Transfer Station	
Labour and material	13,200
Power demand & power consumption	500
Syphon Lines - 2 @ 48", 1 @ 30"	59,000
Total Stage 2	72,700

Alternative 2 - Pump Stations

1. Sewage Pumping Station

New Hunts Bay Pumping Station to pump flows from Greenwich, Hunts Bay and Riverton.

Capital Cost

Stage 1	Pump Station with 5 pumps installed and standby generator for 5 pumps	$5,500,000
Stage 2	Addition of 4 pumps and a standby generator	1,640,000

2. Gravity Sewer and Forcemains

Gravity sewer from Greenwich to the sewage pumping station - one 48" sewer. Forcemain from the sewage pumping station to Soapberry - 1 - 42" pipeline.

Stage 1	$5,340,000
Stage 2	5,340,000

3. Greenwich Transfer Station

Capital Cost

Stage 1	240,000
Stage 2	35,000

4. Annual Operation and Maintenance Cost - Stage 1

Sewage Pumping Station	
Power demand	16,600
Power consumption	174,000
Material/personnel	20,000
Pipelines	
Maintenance/inspection and cleaning	17,500
Greenwich Transfer	
Total as in Alternative 1	9,200
Total Stage 1	237,300

5. Annual Operation and Maintenance Cost - Stage 2

Sewage Pumping Station	
Power demand	28,800
Power consumption	303,900
Material/personnel	34,000
Pipelines	
Maintenance/inspection and cleaning	35,000
Greenwich Transfer	
Total as in Alternative 1	13,700
Total Stage 1	415,400

Comparison of Alternatives

To effectively compare the syphon system with the pumped sewage system the total costs of serving all of Greenwich, Hunts Bay and the Riverton area are included. The following is a summary of the total costs:

1. Syphon System

Capital Costs

Stage 1	Greenwich	$ 240,000
	Syphons	6,670,000
	Hunts Bay Pump Station	598,000
	Hunts Bay Forcemain	92,100
	Total Stage 1	7,600,100
Stage 2	Greenwich	35,000
	Syphons	5,540,000
	Riverton Pump Station	1,150,000
	Riverton Forcemain	295,000
	Total Stage 2	7,020,000
	Total 2 Stages	14,620,100

O & M Costs

Stage 1	Greenwich	9,200
	Syphons	39,000
	Hunts Bay	11,500
	Total	59,700
Stage 2	Greenwich	13,700
	Syphons	59,000
	Hunts Bay	11,500
	Riverton	22,800
	Total	107,000

2. Pumped System

Capital Costs:

Stage 1	Greenwich	$ 240,000
	Pipelines	5,340,000
	Pump Station	5,500,000
	Total Stage 1	11,080,000
Stage 2	Greenwich	35,000
	Pipelines	5,340,000
	Pump Station	1,640,000
	Total Stage 2	7,015,000
	Total 2 Stages	18,095,000

O & M Costs

Stage 1	Greenwich	9,200
	Pipelines	17,500
	Pump Station	210,600
	Total Stage 1	337,300
Stage 2	Greenwich	13,700
	Pipelines	35,000
	Pump Station	366,700
	Total Stage 2	415,400

From this comparison, there are large cost savings in capital and operating costs if a syphon system is installed as opposed to a pumped system. The following costs are for the least cost system which is the syphon system:

Estimate of Cost - Syphon System

Note that the capital costs of the syphon pipes from Greenwich to the Soapberry Lagoon site are included in Sewage Collection System Costs - Table IV Forcemains and Syphons, and that the estimate for Greenwich in this section is for the Transfer Station only.

Stage 1	Peak Flow	19,900 gpm
Stage 2	Peak Flow	29,500 gpm

Capital Costs:

Stage 1	$ 240,000
Stage 2	35,000

Operation and Maintenance

Transfer Station and Syphon Pipelines

Stage 1	$48,200
Stage 2	72,700

4. Western Sewage Treatment Plant and Pumping Station

The Darling Street Pump Station pumps sewage to the Western Plant via an existing force main. This force main will be extended to Greenwich Plant and flows to Western Sewage Treatment Plant will cease. The force mains costs include the costs of connection and extension from the Western Plant and an allowance of $10,000 has been included for cleanup of the plant but does not allow for dismantling structures or reclaiming the site for other uses.

1.4 SEWAGE TREATMENT PLANTS

There are 13 sewage treatment plants within the sewage collection system area. Most of these are small plants serving an isolated area or development, and discharging effluent to nearby gullies. In general these stations will be taken out of service as the gravity collection system extends to take in the various area. The following is a list of several small plants.

1. Hughenden

The Hughenden sewage treatment plant treats domestic sewage and discharges effluent to a gully. Flows to this plant which are by gravity for approximately 58 acres and pumped by Glendale Pump Station from 48 acres, will be intercepted and diverted to the sewage collection system, if possible and the plant is to be abandoned. It may not be possible to pick up the entire area by gravity to the collection system. This will not be known until detailed surveys are completed.

2. Oakwood

The Oakwood sewage treatment plant will be phased out of operation when the gravity trunk sewers are extended to this area. The present plant has a service population of 528 and a service area of approximately 4 acres. It services an area of high rise and condominium development.

3. Barbican Mews

The Barbican Mews sewage treatment plant will be phased out after the gravity trunk sewers are installed to that location. This plant presently serves approximately 6 acres of condominium development.

4. Widcombe

This treatment plant will not be required after gravity sewers are extended to this area. There are 2 sewage pumps on the influent line to the plant which may be of use if there is a need to pump to the gravity sewage collection system.

This is at Barbican Road and Hope Road and serves an area of approximately 15 acres.

5. Bayfarm Villas

There are 2 sewage pumps on the influent to this treatment plant which may be of use when this station is not needed. The gravity sewer system will serve this area and the sewage treatment plant will not be needed. Presently the plant serves an area of approximately 10 acres.

6. White Hall Avenue

This sewage treatment plant will not be required although the influent sewage pumps may be needed to pump the sewage to the collection system. This is at Mannings Hill Road (off Constant Spring Road) at White Hall Avenue and the area served is approximately 5.5 acres.

7. Grove Manor

This treatment plant serves an area of approximately 5.5 acres near Mary Brown's Corner. This plant will be taken out of service when the area is served by the gravity sewer system.

8. Queensbury

This plant has been dismantled and sewage is presently diverted to Nanse Pen. This plant is within the Upper West Area.