City and County of San Francisco
2030 Sewer System Master Plan

TASK 500
TECHNICAL MEMORANDUM NO. 511
FLOOD CONTROL AND STORMWATER MANAGEMENT PROGRAM

FINAL DRAFT
December 2010

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CITY AND COUNTY OF SAN FRANCISCO
2030 SEWER SYSTEM MASTER PLAN

TASK 500

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FLOOD CONTROL AND STORMWATER MANAGEMENT PROGRAM

1.0 PURPOSE/GOALS OF FLOOD CONTROL AND STORMWATER MANAGEMENT PROGRAM

The Flood Control and Stormwater Management Program is designed to reduce flooding to the extent practicable by identifying and targeting problem areas, prioritizing flood relief projects, optimizing existing facilities and conditions, and supplementing and modifying existing facilities where needed. In addition to flood control, overall system improvement needs will be evaluated to optimize existing infrastructure conditions and use, but not limited to use of the ground mass for stormwater retention and storage using low impact design (LID) techniques where it is safe and practical. The purpose of this memorandum is to summarize key improvements by basin and to present estimated project costs. Low impact design approaches to stormwater management are discussed in detail in a companion technical memorandum entitled “Low Impact Design Implementation.”

Information contained within this document represents the results of the work completed during development of the SSMP and the DDMP. Many of the concepts and ideas have been further refined in developing the SSIP. Readers should reference the *Sewer System Improvement Program Report, DRAFT Report for SFPUC Commission Review (7/27/10) and the* Wastewater Enterprise Sewer System Improvement Program (SSIP) Level of Service (LOS) Flooding Analysis Support for July 27, 2010 SFPUC Commission Presentation (dated 8/10/10) for current recommendations on defining levels of service for flood control and projects that have been identified as necessary to maintain the proposed level of service.

2.0 DEFINITION OF FLOOD PROTECTION NEEDS

2.1 Current Standard

The stormwater and sewage collection and storage system in San Francisco has been designed to meet the requirements of a specified design storm by conveying and storing flow within the collection facilities prior to treatment, disinfection, and discharge. Excess storm flow that cannot enter the system is carried within the soil mass and on the street surfaces until the water level inside the collection system has receded and storage capacity has been restored. Increasing tide level, the amount of storage, and treatment capacity influence the effectiveness of the upstream collection system. It is recommended that the Wastewater Enterprise (WWE) review and modernize current design standards to establish flooding level of service and performance expectations.

2.2 Causes of Flooding Problems

Flooding problems in San Francisco fall into one of six basic root causes:

1. Changed land use conditions – San Francisco developed from the areas around the bay back up into the uplands. The early sewers that drained the bayside development received little runoff from the undeveloped upstream areas. However, as the city population grew, there are areas that have subsequently experienced intensive development. These developments, such as more roads and infilling of historical creek beds and the San Francisco Bay, resulted in more impervious areas and larger peak runoffs of stormwater that could increase the risk of surcharging the sewers in the lowlands and flooding during significant storm event conditions. Remedies to this problem include, but are not limited to, possible code changes, reducing the runoff coefficient to reduce flow, replacement of older sewers with larger sewers to reflect its current land use and development, and lowering of the friction factor in major concrete trunk sewers to increase functional capacity.

2. Subsidence – Properties in topographically low areas that are constructed on bay fill (China Basin, Bayview/Hunters Point) are experiencing subsidence to levels below both the city's official grade and the hydraulic grade of nearby sewers and are therefore more susceptible to flooding and drainage problems. Sewers supported by piles may not subside, but the surrounding soil can, resulting in a change of the elevation of the sewer relative to the Hydraulic Grade Line (HGL) of nearby surface runoff. Solutions include but not limited to the installation of small local pump stations to compensate for the disparity between the HGL and surrounding properties or raising grade of the affected area.

3. Reduction in pipe capacity – Grit and debris deposition and the accumulation of biological and chemical constituents on the pipe walls have lead to decreased capacity in localized areas. Other possible causes of lost pipe area include partially deteriorated pipe crowns that require repair or replacement. The resulting reduction in pipe capacity and conveyance of sewage may contribute to flooding events. Solutions include cleaning, inspection and repair of sewers to reclaim capacity.

4. Blockage of historical overland drainage – Historically, stormwater management in San Francisco consisted of managing drainage from moderate storms through a pipe drainage network. Larger storms that exceeded the capacity of the pipe network were managed by flow conveyance and volume storage within the roadway. Occasionally, the drainage functions of the roadways have been modified through paving, bus/rail public transport, and curb/gutter configuration changes. The risk of pooling stormwater and inundation of properties adjacent to roadways has increased. Solutions include changes to paving practices and ensuring design standards are followed for curb/gutter installations.

3.0 PROGRAMMATIC APPROACH

3.1 Phased program for Capital Improvement Program (CIP) Implementation (Immediate and Near-Term)

Areas known for flooding, either through customer complaints, historical data, or through use of the model, will be addressed through immediate projects. Examples of these projects include small pump stations to relieve flooding in low-lying areas and replacement of “bottle-necks” where the flow pattern is constricted due to damage, debris buildup, or requires upsizing.

3.2 On-Going Program

Implementation of a flooding hot-line to alert City staff of on-going and newly developed problem areas coupled with dynamic upgrading of the new modeling program will assist the City in identifying key improvement projects.

3.3 Program/Policy Changes (Official Grade, Subsidence Issues, New Development)

To ensure that future development (and redevelopment) does not exacerbate existing flooding problems either for the subject property or for downstream parcels, the SSMP proposes several key policy changes including defining “official grade” and ensuring that future development is built to prevent backflow and localized flooding. New development may also be subject to requirements to manage stormwater to minimize the impacts of added flow into the sewer system.

3.4 Implications of Climate Change

Some predictions of climate change indicate that storms may become more intense, even though overall annual rainfall is predicted to remain constant. For example, more intense rainfall could shift the “typical” storm return cycle, effectively turning an 8-year intensity storm into a 5-year intensity storm, which could result in increased localized flooding during the peak of a storm. The Wastewater Enterprise may decide to address this issue by advocating a change in the current service expectations.

3.5 Low Impact Design

Project areas identified as having a potential for flooding will be reviewed for the applicability of low impact design installations.

3.6 Enhancing System Capacity

One aspect to consider when identifying possible solutions to flooding is to maximize and improve existing collection system performance. Based on the city’s current land use, it may be easier to build storage facilities on the west side of the city versus on the east side

of the city. Concepts to develop extra storage via building additional facilities into the project and/or utilizing existing infrastructure can be looked into not only as a flood control option, but as gaining extra storage capacity and indirectly increasing the level of protection within the system (i.e. less frequent pumping for typical 1- or 2-year storm events, therefore less energy use).

3.7 Recommended Program, Policies, Projects

Recommended programs, policies, and project areas have been identified based on existing and predicted needs. They include but not limited to the following.

Flood Control/System Improvement Program	
Key Program Elements	Hydraulic Modeling, Assessment, and Project Development Flood Control Projects Improved maintenance Improve existing system capabilities Low Impact Design (LID) Emergency Response Team
Management Improvements for Flood Control and Stormwater Management	
Stormwater Capture and Harvesting - Support of LID Implementation	Incorporate guidelines and requirements for Low Impact Design for city projects. Ensure city codes are not a barrier to the storage/harvesting of stormwater.
Sewer Design Standards	Review and modernize current design standards.
New Standards and Review Process for Stormwater Management and Flood Controls	Establish new standards for stormwater management and flood control for new and redevelopment projects. Assessment of hydraulic grade for all new or redevelopment areas
Construction Site Runoff	Ensure that the City has the necessary authority to enforce: Erosion and sediment control Stormwater pollution prevention Waste control at construction sites
Design Storm Evaluation	To ensure the adequacy of the current design standard, WWE will continue modeling efforts to determine impact of climate change on storm patterns and intensities and sea level rise
Operations and maintenance/sewer cleaning	Cleaning of transport/storage structures, catchbasins, major sewers, force mains and easement sewers to restore collection system capacity. Street cleaning.

Flood Control/System Improvement Program (Continued)	
Projects	
Implementing Low Impact Design Projects	Effective implementation of low impact design to retain peak stormwater for flood control and local reuse.
Sunnydale/Visitacion Drainage Improvements	Series of large-size pipes and structures within the project area. A tunnel connecting basin to existing Sunnydale transport/storage structure.
Mission District Drainage Improvements	Construct/install a series of large-size pipes and structures within the project area. A tunnel may be necessary to complete the downstream connection at Marin St.
Channel Drainage Improvements	Series of five storage and pump station facilities.
Richmond Drainage Improvements	Improvements to the drainage system to alleviate, air/flow surcharging, including improvements to beach near shore discharges, and sewer pipes.
Upper Alemany Drainage Improvements	Construct various sized reinforced concrete boxes, a pump station and sump for the local system (Upper 'Alemany) and companion projects in Ingleside and Northwest Bayview.
Miscellaneous Flood Control	Improvements to address various flooding prevention issues presently not identified. Specific improvements include pump stations, upsizing pipes, LID methodology, etc.

Of the five specific project recommendations listed above, four were deemed for further study in the Detailed Drainage Amendment to the Master Plan (DDMP). Those continuing to be studied are:

- Richmond
- SoMa (Channel)
- Upper Alemany Drainage (Cayuga)
- Mission/Cesar Chavez

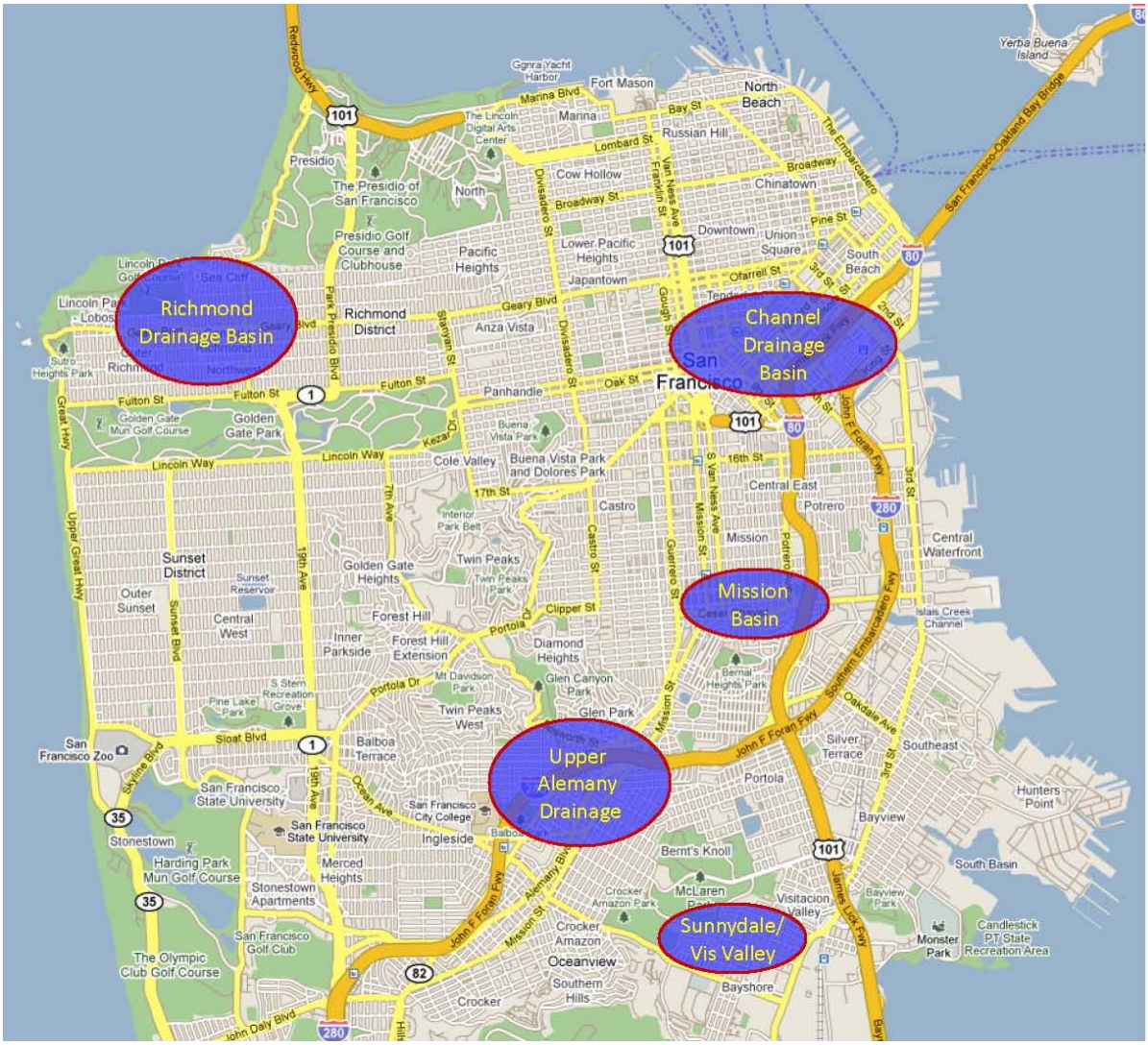


Figure 1 Flood Control System Improvement Project Areas

Sunnydale/Visitacion Valley had been the most studied and the construction project is in the most advanced phase; therefore it has been omitted from the follow-up study. Three additional areas were noted to also require attention in relation to flood control and deserved to be included in an analysis. In total, the Detailed Drainage Master Plan (DDMP) focused on seven areas, four with existing studies, and three without. They are:

- Lake Street/Richmond
- South of Market
- Cayuga

- Mission/Cesar Chavez
- Ingleside
- Northwest Bayview
- Panhandle/Upper Division

See DDMP reports for final results of analyses.

Included in this memorandum are summaries of some site specific locations with projects identified to meet proposed needs and preliminary costs. These sites include Sunnydale/Visitacion Valley Basin, Mission Drainage Basin, Channel Drainage Basin, and Richmond Drainage Basin.

APPENDIX - CAYUGA ALTERNATIVES EVALUATION

Includes:

- Cayuga Tunnel
- Channel Drainage Basin
- Mission Drainage Basin
- Sunnydale/Visitacion Valley Basin
- Richmond Drainage Basin
- PM - Cayuga Subdrainage Flooding Relief

Sewer System Master Plan
Flood Control/System Improvement Projects
Location: Cayuga Tunnel

Known Problems:

The Cayuga basin lies at the southwestern upstream end of the Islais Creek Major Drainage Basin.

It is known for serious flooding issues. The main causes of the flooding issues are downstream controls in the Alemany Blvd sewer and the topography of the area.

More specifically, the Alemany Blvd sewer cannot adequately handle all the flow coming from Cayuga and other areas. This causes surcharging and raises the hydraulic grade line (HGL). The rise of the HGL propagates upstream to the Cayuga vicinity and causes surcharging of the Cayuga sewer. When the HGL is significantly raised in the sewer system, overland flow runoffs cannot enter or re-enter the sewer system.

The topography of the area resembles that of valley, as the area is aligned with the historic Islais Creek. This means that any overland flow tends to follow the original creek route, which generally follows Cayuga Ave. However, because of the construction of Interstate Highway 280, the highway dams the overland flow at the intersection of Cayuga Ave and Milton St and causes a flooding at that area. The depth of this flooding was up to 6 feet during the February 25, 2004 storm. This particular storm event has a return period of at least 500 years.

Furthermore, there are a few properties that are below the Cayuga Ave street elevation. These properties are on Theresa St between San Jose Ave and Cayuga Ave. At that area the properties lie within the historic Islais Creek and therefore are lower than Cayuga Ave. This means that when the Cayuga sewer surcharges, even if there is no flooding on Cayuga St, the HGL may be higher than the ground on Theresa St, which in turn causes localized flooding.

Recommended Solution as of January 2008

There are two possible options; an eastward and a westward. Currently, staff is recommending the westward option.

The eastward solution would require improvements to the Alemany sewer with the addition of an auxiliary sewer. Furthermore it would require the construction of a pumping/storage system in the vicinity of the junction of Cayuga Ave and Milton St. This is necessary in order to force more flow out of the Cayuga area and into the improved Alemany sewer and to resolve the local flooding issues. Finally it would require some improvements in Theresa Street, so that a high HGL in the Cayuga sewer would not impact the low-lying properties. This could be achieved by either the separation of the sewer system in that particular area or by installing backflow

prevention devices and a small storage or pumping/storage system.

The recommended westward solution consists of a diversion tunnel and a series of drop-in shafts.

The tunnel, called the Cayuga Tunnel, starts at Alemany Blvd, a few feet east of the Mission Viaduct. This is where the Alemany sewer and the Cayuga sewer join together; therefore this point could be defined as the outlet of the Cayuga basin. It goes south and follows the Alemany Blvd right-of-way until the intersection of Alemany Blvd and Ocean Ave. Then it turns west and follows Ocean Ave. At the intersection of Ocean Ave and Sunset Blvd it goes below the underpass and "jumps" one block north to follow Sloat Blvd. It ends at the intersection of Sloat Blvd and the Great Hwy, where it connects to the West Side Transport box (WST).

From its start at Alemany Blvd until the intersection of Ocean Ave with Junipero Serra Blvd the tunnel will be bored in hard rock and it will have 14ft diameter. The length of this section will be approximately 15,600ft. The rest of the tunnel will be bored on softer rocks and soils and will have 14ft diameter. The length of this section will be approximately 10,400ft. The tunnel will be constructed in such a way that in the future it will be able to accommodate conduits in it. These may be used to pump effluent flow from SEP and discharge it through the SWOO or pump solids from OSP to be treated in the SEP or other uses that the City staff may consider in the future.

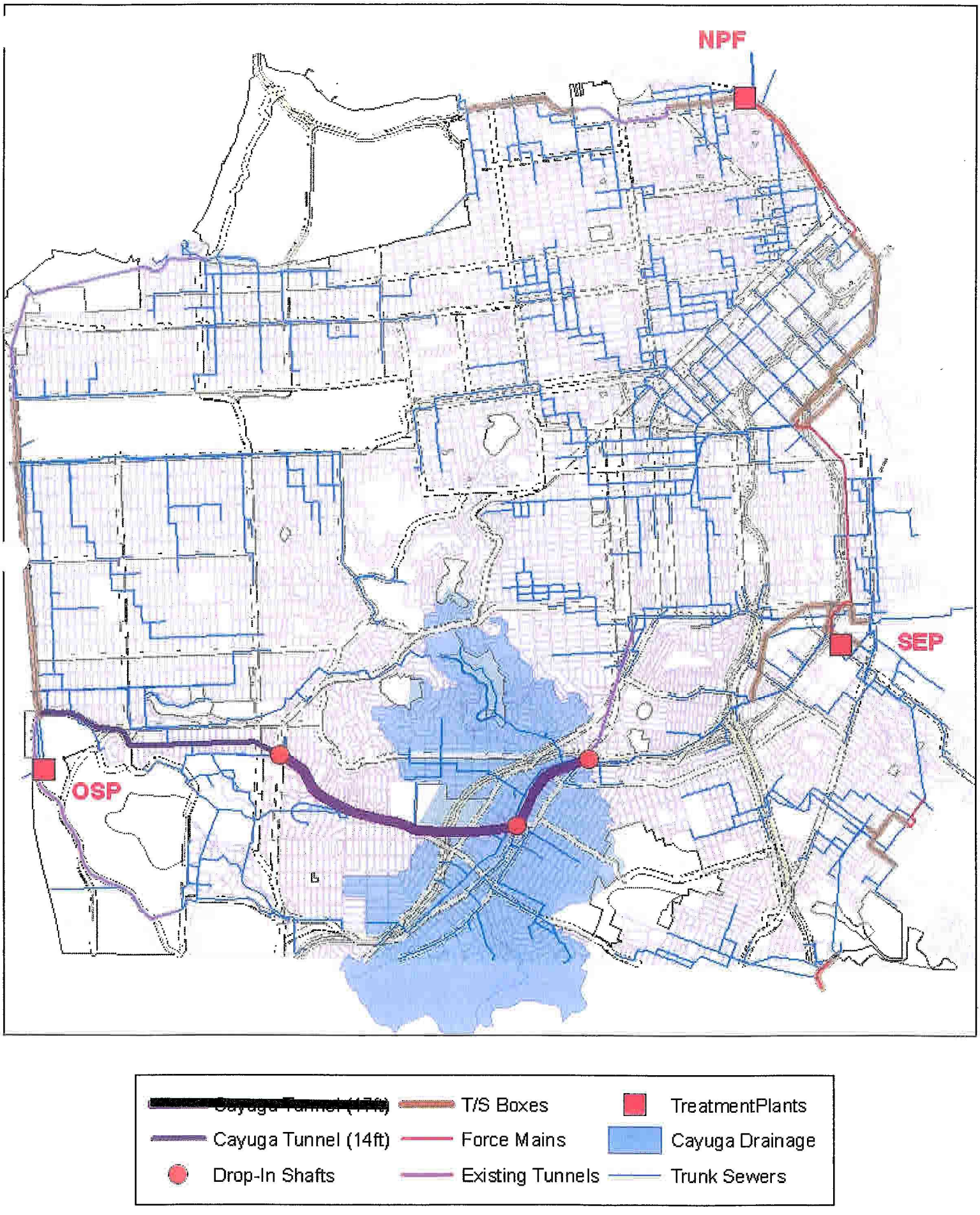
The tunnel will connect to the WST via a flow-limiting device. This device will force storage in the tunnel and reduce the risk of surcharging the local system close to the connection due to the additional flows.

Local flows will be intercepted and dropped in the tunnel via a series of shafts. The first shaft will be located at the start of the tunnel. It will be 80ft deep. The second shaft will be located at the intersection of Alemany Blvd and Ocean Ave. It will intercept all the flows of the Cayuga basin upstream of this location and eliminate any flooding issues in the downstream areas, as the ones described above. This will be achieved by significantly dropping the HGL and releasing volume for storage and capacity for flows in the downstream sewers. It will be 120ft deep. Finally the third shaft will be located at the intersection of Ocean Ave and Junipero Serra Blvd. It will be 250ft deep.

A distinct advantage of the recommended westward solution is that, in addition to reducing flooding risk, it also helps the City meet possible future regulatory requirements for CSO reduction.

The recommended tunnel and shaft alignment are as shown in Figure 1.

Figure 1: SFPUC SSMP - Proposed Cayuga Tunnel



Construction cost estimates carried forth is: $248 Million

Attachment: Engineer's Cost Estimate Calculation Sheets

Item	Description	Quantity	Units	Unit Cost	Total	Total (in $millions)
1	MINING SHAFT w/BACKFILL 30' DIAM			-	$ 7,182,838	$7.2
	Excavation and Backfill (appx 80 ft deep)	1	LS	$1,006,940	$ 1,006,940	$1.0
	Slurry Wall	1	LS	$3,356,466	$ 3,356,466	$3.4
	Concrete	1	LS	$2,685,173	$ 2,685,173	$2.7
	Dampproofing/waterproofing	1	LS	$134,259	$ 134,259	$0.1
2	CONSTRUCTION ACCESS SHAFT w/BACKFILL 30' DIAM			-	$ 8,619,406	$8.6
	Excavation and Backfill (appx 80 ft deep)	1	LS	$1,208,328	$ 1,208,328	$1.2
	Slurry Wall	1	LS	$4,027,760	$ 4,027,760	$4.0
	Concrete	1	LS	$3,222,208	$ 3,222,208	$3.2
	Dampproofing/waterproofing	1	LS	$161,110	$ 161,110	$0.2
3	TBM TUNNEL -14'	15600	LF	$3,932.77	$ 61,351,141	$61.4
4	EPBM TUNNEL -14'	10400	LF	$4,321.80	$ 44,946,670	$44.9
5	DIVERSION STRUCTURE/VENT				$ 17,000,000	$17.0
	Cayuga & Alemany (retrofit mining shaft for hydraulics)	1	ea	$ 3,000,000	$ 3,000,000	$3.0
	Ocean & Phelan (new hydraulic drop shaft - 250-ft deep)	1	ea	$ 8,000,000	$ 8,000,000	$8.0
	Cayuga Ave & Ocean Ave (new hydraulic drop shaft (120-ft deep)	1	ea	$ 6,000,000	$ 6,000,000	$6.0
6	REMOVAL OF CONTAMINATED SOILS				$ 2,550,000	$2.6
	Characterization	300	smp	$ 2,000	$ 600,000	$0.6
	Waste soil hauling	75,000	cy	$ 80	$ 6,000,000	$6.0
	Contaminated Groundwater Treatment	150,000	cf	$ 2	$ 300,000	$0.3
7	ODOR CONTROL FACILITY				$ 8,000,000	$8.0
	Calgon odor control unit(s)	8	ea	$ 1,000,000	$ 8,000,000	$8.0
8	CONDUIT DEWATERING PUMPS				$ 3,000,000	$3.0
	Pumps	10	ea	$ 150,000	$ 1,500,000	$1.5
	VFD's	10	ea	$ 150,000	$ 1,500,000	$1.5
9	OTHER COSTS (See Below Note 1)	26,000	LF	$ 500	$ 13,000,000	$13.0

TOTAL	$165,650,055	$165.7
Total with San Francisco Bay Area Construction (15%)	$190,497,563	$190.5
Estimating Contingency (30%)	$57,149,269	$57.1
Contstruction TOTAL	$247,646,832	$247.6

(Note 1) Other Costs Include:
- Grout at Tunnel and Shaft Junctions
- Instrumentation
- Relocate Utilities
- Pre-Construction Survey OF Structures
- Leak Mitigation Survey
- Traffic Control
- Site Restoration
- Disputes Review Board
- Obstructions
- Noisewall

HIDE THESE COLUMNS -
CLASS 4/5 ESTIMATE SHOULD NOT HAVE COSTS ROUNDED TO NEAREST $$$
BEST TO KEEP THEM AT NEAREST $100,000th
DOLLAR AMT IS ATTRIBUTED TO ESCALATION FACTORS

tunnel cost curves

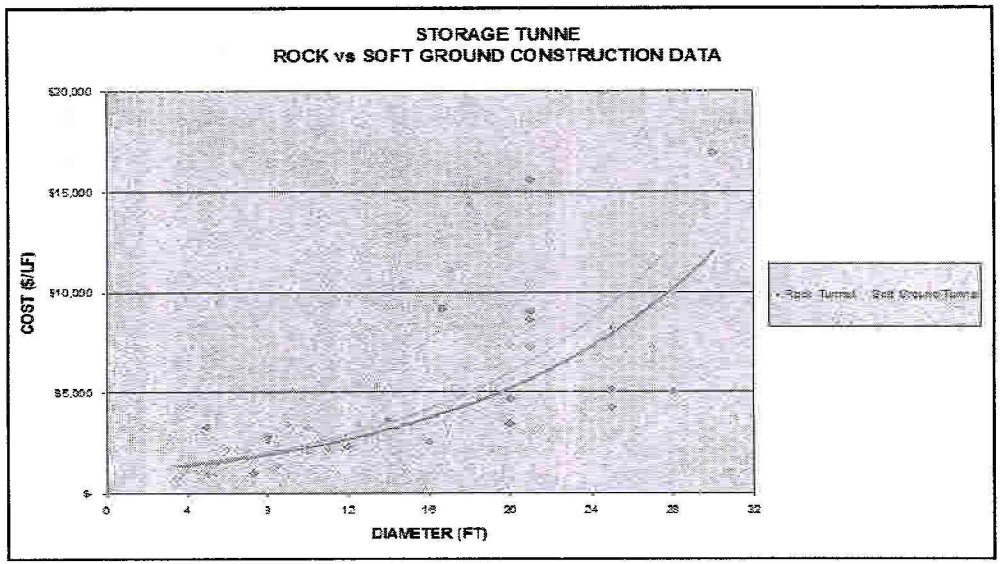
Rock: $y = 977.34e^{0.0836x}$

Soft Ground: $y = 968.32e^{0.091x}$

	rock	soft
6	$1,613.94	$1,671.64
10	$2,254.84	$2,405.62
14	$3,150.24	$3,461.86
17	$4,048.23	$4,548.54
curve enr:	7880	
project enr:	9837.4	
factor	1.248401015	
	rock	soft
6	$2,014.85	$2,086.88
10	$2,814.95	$3,003.18
14	$3,932.77	$4,321.80
17	$5,053.81	$5,678.41
difference	128.51%	131.39%

ocean ave 26000' alignment

			70%	30%	
14'	26000	$71,576,331.62	$33,710,002.74	$105,286,334.36	
17'	26000	$91,979,383.11	$44,291,580.85	$136,270,963.97	
					129.43%



Sewer System Master Plan
Flood Control/System Improvement Projects
Location: Channel Drainage Basin

Known Problems:

Low-lying, subsidence areas receiving high flows from higher elevation drainage areas.
Future sea level rise may exacerbate downstream hydraulic constraints.
Changed land usage from industrial to residential.

Recommendations as of January 2008

Currently, staff is recommending a series of storage & pump station facilities similar to the City's most recent storage & pump station facilities project entitled Shotwell & 18th Street Sewer Drainage Improvement Project constructed in areas all around low-lying subsidence areas that will protect the public from health and safety issues related to flooding from the City's combined system.

As an example of the construction cost of such storage & pump station facilities project, the Shotwell project bids resulted in a low bid of $3.9 Million to high bid of $6.5 Million construction cost. The average of the construction bids was $4.8 Million. These costs are in Year 2006 figures.

The area surrounding the project is a very tight urban environment with a mix of industrial and high residential occupancies and representative of the Channel Drainage basin. Soil conditions within this project are also representative of the Channel Drainage basin where micropiles were necessary to support the Shotwell facilities.

Staff estimates about a series of 5 storage/pump station facilities will be need in this location within the next 15 years unless other future recommendations are more suitable for the situation.

Construction cost estimates carried forth for the Flood Control/System Improvement – Channel Drainage is:

5 storage & pump station facilities X $4.8 Million = $24 Million (Construction)
Quantity of such storage & pump station facilities subject to change.

Attachment:

Shotwell & 18th Street Sewer Drainage Improvement Project Bid Results.

SF PUBLIC UTILITIES COMMISSION - Contract Administration
SCHEDULE OF BID PRICE

Bid Date: 11/10/2005
Contract No.: WW-406
Contract Title: Shotwell and 18th Street Sewer Drainage Improvement
Estimate Amount: $4,500,000
Subcontracting Goals: 15% DBE

					Engineer Estimate		JMB Construction		NTK Construction		Stacy and Witbeck
Item No.	Bid Description	Qty.	Unit	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
SW-1	Mobilization And Demobilization		LS		$ 87,500		$ 87,500		$ 87,500		$ 87,500
SW-2	Traffic Routing Work		LS		$ 125,000		$ 180,000		$ 200,000		$ 100,000
SW-3	Trench And Excavation Support Work And Dewatering		LS		$ 422,500		$ 330,000		$ 937,000		$ 2,552,000
SW-4	Concrete Manhole For Pipe Sewer 27" To 48" In Diameter With New Frame And Cover (Per Std. Plan 48,057 Ch.1)	2	EA	8000	$ 16,000	14000	$ 28,000	15000	$ 30,000	11400	$ 22,800
SW-5	Replace Concrete Manhole At 17th Street And Shotwell Street Intersection Per Structural Plan	1	EA	2000	$ 2,000	22000	$ 22,000	30000	$ 30,000	40200	$ 40,200
SW-6	15" Diameter VCP Sewer On Crushed Rock Bedding	43	LF	175	$ 7,525	300	$ 12,900	690	$ 29,670	400	$ 17,200
SW-7	36" Diameter RCP Sewer (Class V) on Crushed Rock Bedding	455	LF	380	$ 172,900	780	$ 354,900	435	$ 197,925	550	$ 250,250
SW-8	Concrete Manhole For Pipe Sewer 4'-3" To 10'-0" In Diameter With New Frame And Cover (Per Std. Plan A-19, 301.1)	1	EA	15000	$ 15,000	31000	$ 31,000	25000	$ 25,000	20600	$ 20,600
SW-9	Junction Structure No. 1 At 18th And Shotwell Streets		LS		$ 113,750		$ 160,000		$ 65,000		$ 139,000
SW-10	Junction Structure No. 2 At 18th Street and Treat Avenue		LS		$ 38,750		$ 90,000		$ 40,000		$ 79,000
SW-11	Junction Structure No. 3 At 18th Street and Treat Avenue		LS		$ 121,250		$ 190,000		$ 75,000		$ 156,000
SW-12	Furnish And Install Micropiles For Cast-In-Place Pipe Sewer And Junction Structures	850	LF	150	$ 127,500	200	$ 170,000	255	$ 216,750	300	$ 255,000
SW-13	NOT USED				$ -		$ -		$ -		$ -

				Engineer Estimate		JMB Construction		NTK Construction		Stacy and Witbeck	
Item No.	Bid Description	Qty.	Unit	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
SW-14	60" Diameter RCP Sewer (Class IV) on Crushed Rock Bedding	547	LF	510	$ 278,970	960	$ 525,120	995	$ 544,265	900	$ 492,300
SW-15	60" Diameter Cast-In-Place Reinforced Concrete Sewer On Micropiles	14	LF	1900	$ 26,600	2600	$ 36,400	2000	$ 28,000	2500	$ 35,000
SW-16	10" Diameter VCP Culvert	30	LF	100	$ 3,000	300	$ 9,000	262	$ 7,860	200	$ 6,000
SW-17	Core Drilling RCP and Making Connection of 10" Diameter Culvert to RCP	4	EA	500	$ 2,000	2000	$ 8,000	570	$ 2,280	400	$ 1,600
SW-18	Post Construction Television Inspection of Newly Constructed Main Sewers		LS		$ 5,000		$ 7,000		$ 5,600		$ 5,000
SW-19	6 or 8" Diameter Side Sewer TV Inspection (Contingency Bid Item)	28	EA	100	$ 2,800	500	$ 14,000	160	$ 4,480	150	$ 4,200
SW-20	Core Drilling RCP and Making 6" or 8" diameter side sewer connections to RCP (Contingency Bid Item)	28	EA	500	$ 14,000	1000	$ 28,000	265	$ 7,420	400	$ 11,200
SW-21	6 or 8" Diameter Side Sewer Repair or Replacement Or Construction (Contingnecy bid Item)	220	LF	80	$ 17,600	100	$ 22,000	255	$ 56,100	100	$ 22,000
SW-22	Cast Iron Water Trap For Existing Catchbasin Including Cleanout Cap (Contingency Bid Item)	21	EA	450	$ 9,450	500	$ 10,500	550	$ 11,550	550	$ 11,550
SW-23	Allowance For Hazardous / Contaminated Material Testing And To Perform Necessary Work Due To Unforeseen Conditions Related to The Sewer Work			Alwnc	$ 120,000		$ 120,000		$ 120,000		$ 120,000
SW-24	Imported Backfill Material	2,000	CY	30	$ 60,000	30	$ 60,000	20	$ 40,000	40	$ 80,000
SW-25	Hauling and Disposal of Non-Hazardous Material To Class III Disposal Site (Contingency Bid Item)	280	CY	30	$ 8,400	50	$ 14,000	44	$ 12,320	70	$ 19,600
SW-26	Handling, Transportation And Disposal of Class II (Daily cover) Non-Hazardous Wastes, Toxic Materials & Contaminated Soils (Contingency Bid Item)	950	Tons	30	$ 28,500	40	$ 38,000	40	$ 38,000	40	$ 38,000
SW-27	Handling, Transportation And Disposal of Class II (Non-Daily Cover) Non-Hazardous Wastes, Toxic Materials & Contaminated Soils (Contingency Bid Item)	3,600	Tons	50	$ 180,000	30	$ 108,000	41	$ 147,600	39	$ 140,400

Item No.	Bid Description	Qty.	Unit	Engineer Estimate Unit Price	Engineer Estimate Amount	JMB Construction Unit Price	JMB Construction Amount	NTK Construction Unit Price	NTK Construction Amount	Stacy and Witbeck Unit Price	Stacy and Witbeck Amount
SW-28	Full Depth Planing 2" Thick ACWS Outside The Sewer Trench Limit & Outside The Limits of Paving Work Under R-Drawings (Contingency Bid Item)	2,500	SF	1.50	$ 3,750	2.40	$ 6,000	3	$ 7,500	3	$ 7,500
SW-29	Reconstructing Pavement Outside The Sewer Trench Limit & Outside The Limits of Paving Work Under R-Drawings Per Excavation Code With 8" Thick Concrete Base (Contingency Bid Item)	1,500	SF	7	$ 10,500	10	$ 15,000	8	$ 12,000	11	$ 16,500
SW-30	Reconstructing Pavement Outside The Sewer Trench Limit & Outside The Limits of Paving Work Under R-Drawings Per Excavation Code With 2" Thick Asphalt Concrete Wearing Surface (Contingency Bid Item)	2,500	SF	2	$ 5,000	2	$ 5,000	2	$ 5,000	3	$ 7,500
SW-31	AWSS Relocation Work At 18th Street and Treat Avenue		LS		$ 125,000		$ 110,000		$ 135,000		$ 125,000
SW-32	AWSS Relocation Work At 18th Street and Folsom Streets		LS		$ 65,000		$ 105,000		$ 150,000		$ 135,000
SW-33	Exploratory Holes For Utility Information (Contingency Bid Item)	5	EA	1500	$ 7,500	2000	$ 10,000	700	$ 3,500	400	$ 2,000
SW-34	Excavation Permit Fee And Pavement Damage Fee Assessed By BSM Per Article 2.4 of The Public Work Code			Alwnc	$ 25,000		$ 25,000		$ 25,000		$ 25,000
SW-35	Field Office (Type "B") For Engineer, Equipments and Services		LS		$ 8,750		$ 45,000		$ 25,000		$ 9,000
SW-36	Ground Movement, Vibration Instrumentation and Monitoring			Alwnc	$ 150,000		$ 150,000		$ 150,000		$ 150,000
S-1	Cast-In-Place Structural Concrete	120	CY		$ 481,895	1800	$ 216,000	1000	$ 120,000	2000	$ 240,000
S-2	MIsc Cast-In-Place and Precast Concrete	5	CY		$ 50,000	3000	$ 15,000	700	$ 3,500	2500	$ 12,500
E-1	Main Switchboard & Control Enclosure		LS		$ 106,250		$ 100,000		$ 130,000		$ 145,000
E-2	Power Distribution System		LS		$ 62,500		$ 50,000		$ 61,000		$ 75,000
E-3	PG&E and SBC Service		LS		$ 12,500		$ 50,000		$ 34,000		$ 44,000
E-4	Miscellaneous Electrical Work		LS		$ 12,500		$ 20,000		$ 70,000		$ 79,000
E-5	Instrumentation & Control System		LS		$ 99,761		$ 100,000		$ 78,000		$ 93,000

				Engineer Estimate		JMB Construction		NTK Construction		Stacy and Witbeck	
Item No.	Bid Description	Qty.	Unit	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
M-1	Submersible Wastewater Pumps and Accessories	3	EA		$ 33,750	30000	$ 90,000	23000	$ 69,000	30000	$ 90,000
M-2	Manifold Piping, Valves, Fittings and Force Mains		LS		$ 111,741		$ 110,000		$ 80,000		$ 70,000
M-3	Dewatering Sump Pump & Accessories	1	EA		$ 7,500	30000	$ 30,000		$ 7,000	17000	$ 17,000
M-4	Back Flow Preventor Station		LS		$ 7,500		$ 12,000		$ 16,000		$ 9,000
R-1	Asphalt concrete (Type A, 1/2" Maximum with Medium Grading)	300	Ton	80	$ 24,000	140	$ 42,000	135	$ 40,500	130	$ 39,000
R-2	Full Depth Planing 2" depth of cut	5,000	SF	5	$ 25,000	3	$ 15,000	2	$ 10,000	3	$ 15,000
R-3	8" Thick Concrete Base	18,200	SF	10	$ 182,000	10	$ 182,000	8	$ 145,600	8	$ 145,600
R-4	8" Thick Concrete Gutter	650	SF	10	$ 6,500	14	$ 9,100	9	$ 5,850	15	$ 9,750
R-5	3 1/2" Concrete Sidewalk	3,000	SF	15	$ 45,000	9	$ 27,000	5	$ 15,000	9	$ 27,000
R-6	6" Wide Concrete Curb	1,100	LF	20	$ 22,000	35	$ 38,500	23	$ 25,300	32	$ 35,200
R-7	6" Wide Concrete Curb and 2' Wide Gutter	180	LF	40	$ 7,200	55	$ 9,900	32	$ 5,760	45	$ 8,100
R-8	Interlocking Concrete Pavers with 6" Thick Aggregate Base	1,000	SF	40	$ 40,000	25	$ 25,000	13	$ 13,000	30	$ 30,000
R-9	Adjust and Modify Catch Basins	2	EA	500	$ 1,000	3000	$ 6,000	450	$ 900	500	$ 1,000
R-10	Curb Ramps	6	EA	4500	$ 27,000	2500	$ 15,000	1910	$ 11,460	3000	$ 18,000
T-1	Off-Duty SF Uniformed Police Officer			Alwnc	$ 47,600		$ 47,600		$ 47,600		$ 46,700
T-2	Allowance For Deenergization and Reenergization of MUNI Overhead Electric Trolley Wires and Providing Services of MUNI Inspectors			Alwnc	$ 60,000		$ 60,000		$ 60,000		$ 60,000
	TOTAL FOR ALL BID ITEMS :				**$ 3,879,692**		**$ 4,397,420**		**$ 4,521,790**		**$ 6,493,750**

*Note: LS = Lump Sum, EA = Each, LF = Linear Feet, SF = Square Feet, CY = Cubic Yards, Allow = Allowance

For Contingency Bid Item, refer to Section 1.4.C.1 on Page 01025-2 in Specifications. Contingency Bid Item can not be used to fulfill the HRC subcontracting goals requirement.

Bidder acknowledges that quantities are not guaranteed and final payment will be based on the actual quantities determined as provided in the Contract Documents.

Bidder acknowledges and agrees that this Bid, if not withdrawn prior to the scheduled time for receipt of Bids, shall not be withdrawn for a period of 90 days thereafer.

Time allowed for completion of all Work shall be the number of calendar days specified in Document 00802, beginning with and including the official date of Notice to Proceed as established by the General Manager, San Francisco Public Utilities Commission.

Sewer System Master Plan
Flood Control / System Improvement Projects
Location: Mission Drainage Basin
As of August 2009

Known Problems:

Many of the combined sewers in the Mission Drainage Basin [mco1]project area were constructed over 100 years ago. A number of the sewers in the area are egg-shaped concrete sewers ranging in size from 2' x 3' to 3' x 4-6". In more recent years, development has changed the land usage from permeable surface to more impervious surfaces of rooftops, roadways, and sidewalks. The areas surrounding Cesar Chavez and Mission Streets are also in a topographic low point of the basin. Three major runoffs, Noe Valley, the higher elevations areas south of Cesar Chavez Street, and Mission Street commercial corridor, merge as one and flows discharge into the Islais Creek Contract "C" Transport/Storage Box east of Highway 101 and ultimately to the Southeast Water Pollution Control Plant. The hydraulic constraint between where the 3 major runoffs merge to the Islais Creek Contract "C" Transport/Storage Box needs to be relieved.
The objective of the project is to upgrade the system to provide adequate capacity during storm events, and to minimize flooding. Known locations of flooding to be addressed by the project include but not limited to the following locations detailed in **Figure 1: Flooding Locations**~~Figure 1: Flooding Locations~~.

1. Southeast corner – Cesar Chavez & Harrison Sts.
2. Northside Cesar Chavez St. – Harrison to Folsom Sts.
3. Southeast corner – Cesar Chavez & Mission Sts.
4. Southwest corner – Cesar Chavez & Mission Sts.
5. Southeast corner – Cesar Chavez & Valencia Sts.
6. Northwest corner – Cesar Chavez & Guerrero Sts

Figure 1: Flooding Locations

The occupancy make up of the project area is comprised of both residential and commercial establishments. The City's third heaviest transit line, Muni #14 Mission Line, serves the project area at select locations.

In addition to this Mission/Cesar Chavez Streets vicinity, another area along Mission Street was also studied previously that required sewer improvements. This area is in the Mission Street/Mt. Vernon Avenue vicinity. A 2006 project entitled Mission Street & Mt Vernon Avenue Sewer System Improvement Project (Contract No. WW-405, DPW JO 1184J) addressed a majority of the flooding issues in the downstream trunk sewers along Mission Street, but the sewers connecting to the downstream trunk sewers still require improvements.

Recommendations as of August 2009

Implementation of the recommended strategy for flood control and system improvements is currently being undertaken in two projects for the Mission/Cesar Chavez vicinity: one project east of Highway 101 and the other project west of Highway 101. The approximate combined construction cost of these two projects is approximately $24 million.

Project East of Highway 101:
The improvement project east of Highway 101 is in the planning stage. Multiple possible options exist for this project; this report details one such preliminary option. The cost estimate for the tunnel for the project east of Highway 101 is approximately $6.6 million. See attachment for preliminary cost estimate.[mco2]

Project West of Highway 101:
Currently, staff is recommending a series of small and large diameter pipes as well as structures within the project area. Recommended pipes include 12 to 36 inch vitrified clay pipe (VCP), 48 to 84 inch reinforced concrete pipe (RCP) on crushed rock bedding, and a 72-inch RCP sewer built using a trenchless method.

The recommended sewer alignment is on Cesar Chavez Street from Hampshire Street to San Jose Avenue, Harrison Street from 26th Street to Cesar Chavez Street, Valencia Street from Cesar Chavez Street to Mission Street, Fair Avenue from Mission Street to Coleridge Street, Coleridge Street from Fair Avenue to Coso Avenue and Coso Avenue from Coleridge Avenue to Mirabel Avenue. Construction cost estimates for the project west of Highway 101 are approximately $15.3 million. See attachment for preliminary cost estimate.

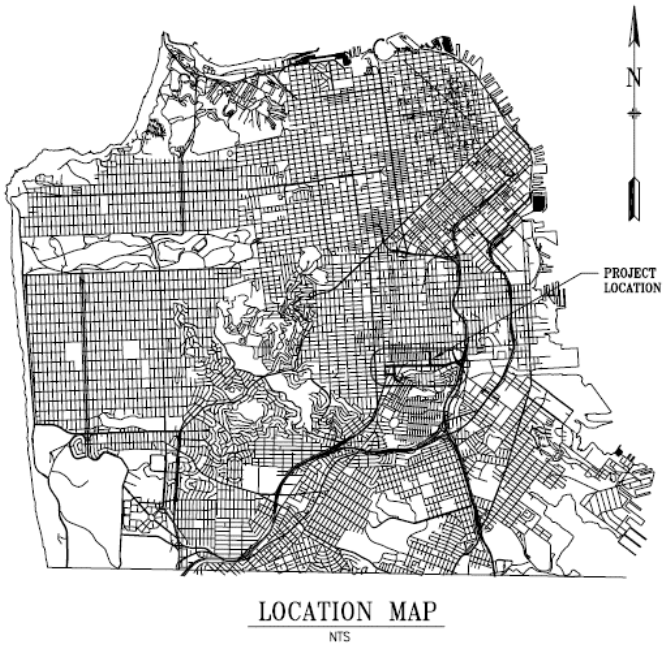


Figure 2: Location Map of Project Area, West of Highway 101

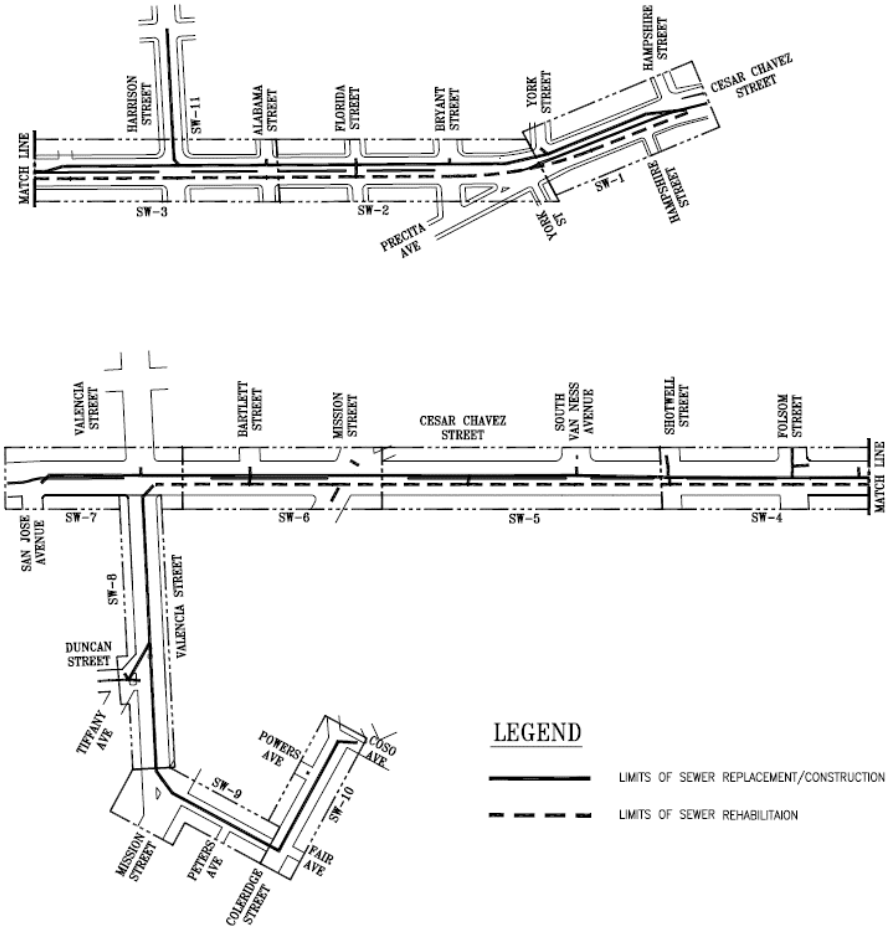
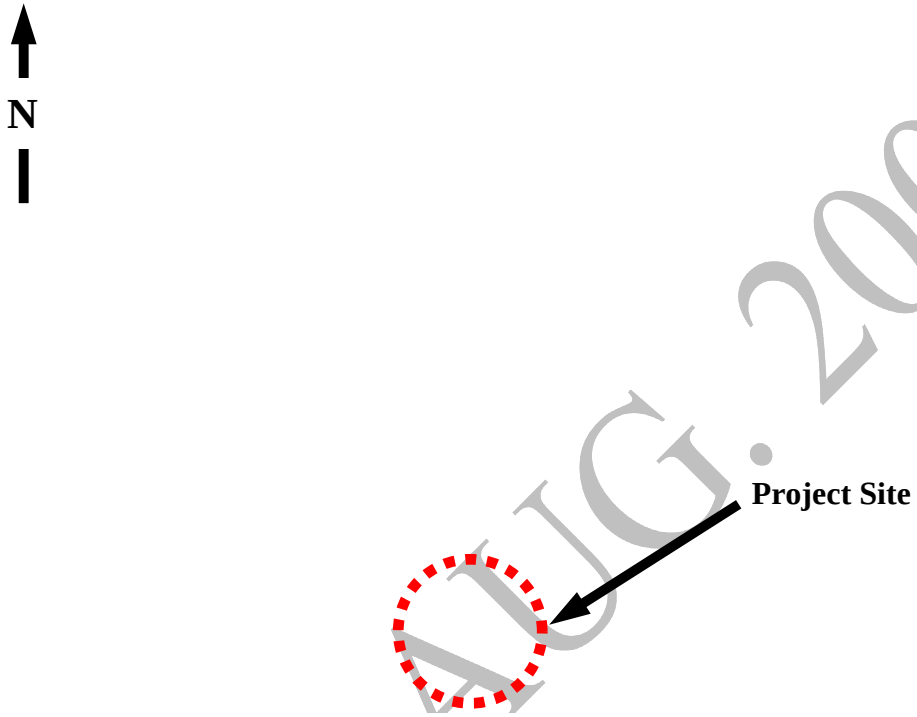
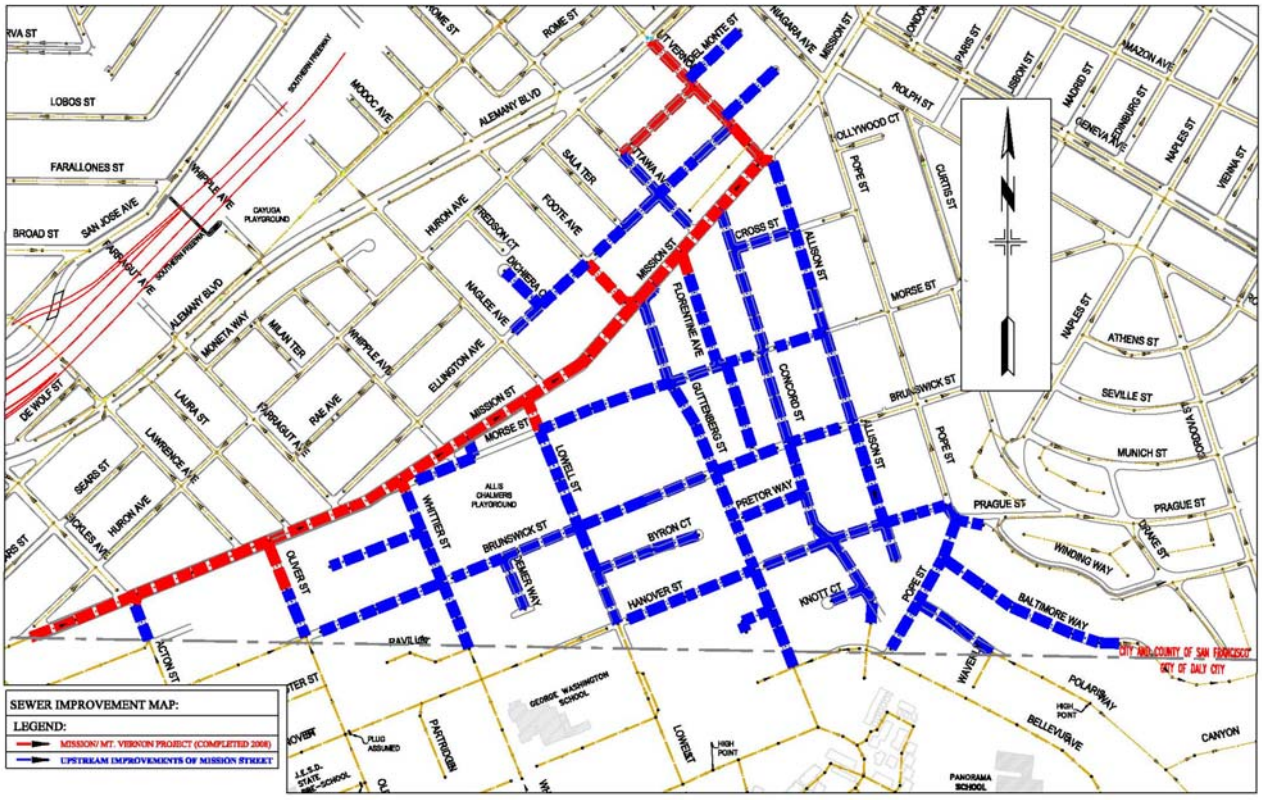


Figure 3: Key Plan of Project Area, West of Highway 101

Implementation of the recommended strategy for flood control and system improvements is for the Mission/Mt Vernon vicinity involves a series of upstream sewer improvements to the newer infrastructures built in Year 2006. The approximate construction cost of this is approximately $8.1 million.



VICINITY MAP
NTS



Project Vicinity	Estimated Construction Cost (2009)
East of Hwy 101	$6,600,000
10% Estimating Contingency	$660,000
West of 101	$15,300,000
10% Estimating Contingency	$1,530,000
Upstream Improvements of Mission/Mt Vernon Streets	$7,300,000
10% Estimating Contingency	$730,000
Total Construction	$32,120,000
Current & Supplemental CIP Funding	$28,000,000
Construction cost to carry forth under SSMP	$4,120,000

Construction cost estimates carried forth for the Flood Control/System Improvement – Mission Drainage is $4.1 Million, which excludes cost of possible construction easements. Part of this work in this drainage area will be supported with current CIP and supplemental CIP funding of approximately $28.0 Million.

Attachments: Preliminary Construction Cost Estimates for Mission / Cesar Chavez Sewer Drainage Improvement Project.

[mco3]

Preliminary Construction Cost Estimates for Cesar Chavez Improvement Project. East of Highway 101- Tunnel Option.

Preliminary Construction Cost Estimates for Mission/Mt Vernon Improvement Project. Upstream Improvements of Mission Street.

Reference: Cesar Chavez Street Sewer System Improvement Project - Initial Study / Mitigated Negative Declaration - Case No. 2009.0276E dated August 2009

BOE-Hydraulic Study Report –Mount Vernon Ave & Mission Street Sewer System Study dated March 10, 2005

Mission District –Flood Control / System Improvements Project
Construction Cost Estimate Summary – May 2009

ENGINEER'S ESTIMATE - 95% Design

Cesar Chavez Street Sewer System Improvement, Phase I
Contract No. WW-410
DPW Job Order No. 1201J

Date: 5/11/09

Note: LF = Linear Feet, LS = Lump Sum, SF = Square Feet, EA = Each, AL = Allowance

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Amount ($)
SW-1	Mobilization	---	LS	---	$250,000
SW-2	Traffic Routing Work	---	LS	---	$450,000
SW-3	Trench And Excavation Support Work and Dewatering	---	LS	---	$700,000
SW-4	Concrete Manhole For 12-Inch To 24-Inch Diameter Sewers With Frame And Cover Per SFDPW Standard Plan 87,181	11	EA	$4,500	$49,500
SW-5	Concrete Manhole For 27-Inch To 48-Inch Diameter Sewers With Frame And Cover Per SFDPW Standard Plan 87,182	7	EA	$22,500	$157,500
SW-6	Concrete Manhole For 51-Inch To 120-Inch Diameter Sewers With Frame And Cover Per SFDPW Standard Plan 87,183	17	EA	$32,500	$552,500
SW-7	Angled Concrete Manhole For 51-Inch To 120-Inch Diameter Sewers With Frame And Cover	7	EA	$40,000	$280,000
SW-8	12-Inch Diameter VCP Sewer On Crushed Rock Bedding	25	LF	$220	$5,500
SW-9	15-Inch Diameter VCP Sewer On Crushed Rock Bedding	106	LF	$275	$29,150
SW-10	18-Inch Diameter VCP Sewer On Crushed Rock Bedding	241	LF	$325	$78,325
SW-11	21-Inch Diameter VCP Sewer On Crushed Rock Bedding	342	LF	$350	$119,700
SW-12	24-Inch Diameter VCP Sewer On Crushed Rock Bedding	356	LF	$400	$142,400
SW-13	30-Inch Diameter VCP Sewer On Crushed Rock Bedding	55	LF	$450	$24,750
SW-14	33-Inch Diameter VCP Sewer On Crushed Rock Bedding	435	LF	$475	$206,625
SW-15	36-Inch Diameter RCP Sewer On Crushed Rock Bedding	60	L.F.	$550	$33,000
SW-16	48-Inch Diameter RCP Sewer On Crushed Rock Bedding	194	L.F.	$650	$126,100

SW-17	54-Inch Diameter RCP Sewer On Crushed Rock Bedding	445	L.F.	$700	$311,500
Item No.	**Item**	**Estimated Quantity**	**Unit**	**Unit Price ($)**	**Amount ($)**
SW-18	72-Inch Diameter RCP Sewer On Crushed Rock Bedding	1,407	L.F.	$950	$1,336,650
SW-19	84-Inch Diameter RCP Sewer On Crushed Rock Bedding	2,412	L.F.	$1,150	$2,773,800
SW-20	Pipe Jack 72-Inch Diameter RCP Sewer	360	L.F.	$2,000	$720,000
SW-21	Line 72-Inch Diameter Brick Sewer With Cured-In-Place-Liner (CIPL)	550	L.F.	$525	$288,750
SW-22	Line 78-Inch Diameter Brick Sewer With Cured-In-Place-Liner (CIPL)	960	L.F.	$550	$528,000
SW-23	Line 84-Inch Diameter Brick Sewer With Cured-In-Place-Liner (CIPL)	360	L.F.	$600	$216,000
SW-24	Line 8'-6" x 7' Brick Sewer With Cured-In-Place- Liner (CIPL)	2,165	L.F.	$650	$1,407,250
SW-25	Internally Reinstate Side Sewers In Lined Main Sewers*	48	EA	$500	$24,000
SW-26	Spray Mortar Existing Manhole	10	EA	$5,000	$50,000
SW-27	Televise of Existing Main Sewer Prior to Lining to Locate Active Side Sewer Connections	---	L.S.	---	$5,000
SW-28	Cast-In-Place RC Junction Struction at the Intersection of Valencia Street and Tiffany Avenue	---	L.S.	$100,000	$100,000
SW-29	Connect to Existing RC Junction Structure at the intersection of Cesar Chavez and Hampshire Streets	---	L.S.	$200,000	$200,000
SW-30	Connect to existing Junction Structure at the intersection of Cesar Chavez and Valencia Streets	---	L.S.	$100,000	$100,000
SW-31	Connect to existing Junction Structure at the intersection of Cesar Chavez Street and San Jose Avenue	---	L.S.	$100,000	$100,000
SW-32	10-Inch Diameter VCP Culvert	76	LF	$225	$17,100
SW-33	Television Inspection Of Existing 6-Inch Or 8-Inch Diameter Side Sewers and 10-Inch Diameter Culverts (1)	134	EA	$100	$13,400
SW-34	6-Inch Or 8-Inch Diameter Side Sewer Connection (1)	107	EA	$300	$32,100
SW-35	6-Inch Or 8-Inch Diameter Side Sewer Repair, Replacement Or Construction (1)	142	LF	$100	$14,190
SW-36	Post-Construction Television Inspection Of Newly Constructed Main Sewers	---	LS	---	$20,000

SW-37	Post-Construction Television Inspection Of Newly Constructed Side Sewers & Culverts [1]	134	EA	$150	$20,100
Item No.	**Item**	**Estimated Quantity**	**Unit**	**Unit Price ($)**	**Amount ($)**
SW-38	Cast Iron Water Trap For Catch Basin Including Cleanout Cap Per SFDPW Standard Plan 87,194 [1]	6	EA	$450	$2,700
SW-39	Reconstruct Pavement Inside And Outside Of Sewer T-Trench Limit With 2-Inch Thick Asphalt Concrete Wearing Surface Per Excavation Code As Directed By The Engineer	137,000	SF	$2	$274,000
SW-40	Reconstruct Pavement Outside Of Sewer T-Trench Limit With 8-Inch Thick Concrete Base Per Excavation Code As Directed By The Engineer [1]	24,656	SF	$10	$246,560
SW-41	Full Depth Planing Per 2-Inch Depth Of Cut Outside The Sewer T-trench Limit Per Excavation Code [1]	85,000	SF	$2	$170,000
SW-42	Reconstruct Pavement Outside Of Sewer Trench Limit With 10-Inch Thick Concrete Pavement Per Excavation Code As Directed By The Engineer	2,924	SF	$10	$29,240
SW-43	Construct 6" Traffic Islands	3,200	LF	$150	$480,000
SW-44	Handling of Class I Serpentine Soils (Conditional Item) [1]	6,116	TON	$70	$428,106
SW-45	Handling of Class II Serpentine Soils (Conditional Item) [1]	25,544	TON	$20	$510,872
SW-46	Transportation and Disposal of Class I Serpentine Soils (Conditional Item) [1]	6,116	TON	$50	$305,790
SW-47	Transportation and Disposal of Class II Serpentine Soils (Conditional Item) [1]	25,544	TON	$20	$510,872
SW-48	Plug and Fill Existing Sewers with Slurry Grout	201	C.Y.	$200	$40,200
SW-49	Perform Necessary Work Due To Unforeseen Conditions Related To Sewer Work	---	AL	---	$250,000
SW-50	Excavation Permit Fee Assessed By BSM (Per Article 2.4 Of the Public Works Code)	---	AL	---	$5,000
SW-51	Field Office Type "B" For Engineer, Equipment And Services	---	AL	---	$15,000

SW-52	Removal and Replacement of Existing Street Lights/Temporary Street Lights On Cesar Chavez Street	---	AL	---	$150,000
SW-53	Offsetting and/or De-energizing And Re-energizing MUNI Overhead Wires And MUNI Inspectors	---	AL	---	$150,000
Item No.	**Item**	**Estimated Quantity**	**Unit**	**Unit Price ($)**	**Amount ($)**
SW-54	Supporting and Relocation of San Francisco Water Department (SFWD) Facilities Located Within The Sewer T-trench	---	AL	---	$250,000
SW-55	Allowance for Off-Duty SFPD Officers	---	AL	---	$15,000
				TOTAL COST FOR SEWER WORK --->	**$15,316,231**

(1) This is a conditional unit price bid item. It is possible that none, some, all or more of the estimated quantity provided on the Schedule of Bid Prices will be used. No adjustment in unit price will made, and article 7.06 B&C of General Conditions Document 0700 do not apply regardless of actual quantities encountered. Conditional Bid Items can not be used to fulfill HRC LBE subcontracting goal(s) for this contract as stated in Document 00821. Refer to HRC Attachment appended to Document 00821 for details as to what may be used for meeting the goal(s).

ENGINEER'S ESTIMATE

Cesar Chavez Sewer Improvement Project

Contract No. WW-410 (Hyd. Job Order No. 1201J)

East of Highway 101 - Tunnel Option

Computed by: LD Checked by: Date:8/24/2009

Note: L.F. = Linear Feet S.F. = Square Feet EA.=Each
C.Y. = Cubic Yard L.S. = Lump Sum AL.=Allowance

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Extension ($)
SW-1	Mobilization for Sewer Work	---	L.S.	---	$50,000
SW-2	Trench And Excavation Support Work	---	L.S.	---	$220,000
SW-4	Microtunnel New 96"-Inch Diameter RCP Sewer	900	L.F.	$3,000	$2,700,000
SW-5	Construct New Junction Structure and Connect to Existing 8'6"x10'6" Marin Street Sewer at the intersection of Kansas and Marin Streets	---	L.S.	$100,000	$100,000
SW-6	Connect to Existing 20' Wide Contract "C" Box Sewer	---	L.S.	$50,000	$50,000
SW-7	Post Construction Television Inspection Of Newly Constructed Main Sewers	---	L.S.	---	$5,000
SW-8	Reconstruct Pavement With Final 2-Inch Thick Asphalt Concrete Wearing Surface Inside and Outside of Sewer Trench As Necessary Per Excavation Code	27,000	S.F.	$2	$54,000
SW-10	Exploratory Holes (Conditional Item) (1)	4	EA	$1,750	$7,000
SW-12	Handling of Class I Serpentine Soils (Conditional Item) (1)	2,327	TON	$70	$162,897
SW-14	Transportation and Disposal of Class I Serpentine Soils (Conditional Item) (1)	2,327	TON	$50	$116,355
SW-16	Testing of Hazardous Excavated Materials Prior to Sewer Work	---	AL.	---	$20,000
SW-17	Perform Work Necessary Due to Unforeseen Conditions Related to Sewer Work	---	AL.	---	$50,000
SW-18	Field Office Standard Type "B", Equipments And Services	---	L.S.	---	$10,000
SW-19	Acquisition of Private Property Easement (30' Wide Permanent)	24,000	S.F.	$125	$3,000,000
				TOTAL	**$6,545,253**

The allowed completion time for the sewer work is xxx consecutive calendar days including 30 days of notification.

ENGINEER'S ESTIMATE - Preliminary
Mission and Mount Vernon Avenue Sewer Improvement - Phase II
Upstream Improvements of Mission Street

Prepared By: LD
Checked By:

File:
Date:8/24/09

Note: LF = Linear Feet, LS = Lump Sum, SF = Square Feet, EA = Each, AL= Allowance

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Amount ($)
SW-1	Mobilization	---	LS	---	$50,000
SW-2	Traffic Routing Work	---	LS	---	$150,000
SW-3	Trench And Excavation Support Work and Dewatering	---	LS	---	$1,170,000
SW-4	Concrete Manhole For 12-Inch To 24-Inch Diameter Sewers With Frame And Cover Per SFDPW Standard Plan 87,181	44	EA	$3,500	$154,000
SW-5	Concrete Manhole For 27-Inch To 48-Inch Diameter Sewers With Frame And Cover Per SFDPW Standard Plan 87,182	2	EA	$17,500	$35,000
SW-6	12-Inch Diameter VCP Sewer On Crushed Rock Bedding	11082	LF	$220	$2,438,040
SW-7	15-Inch Diameter VCP Sewer On Crushed Rock Bedding	526	LF	$275	$144,650
SW-8	18-Inch Diameter VCP Sewer On Crushed Rock Bedding	475	LF	$325	$154,375
SW-9	21-Inch Diameter VCP Sewer On Crushed Rock Bedding	1478	LF	$350	$517,300
SW-10	24-Inch Diameter VCP Sewer On Crushed Rock Bedding	1747	LF	$400	$698,800
SW-11	27-Inch Diameter VCP Sewer On Crushed Rock Bedding	242	LF	$425	$102,850
SW-12	10-Inch Diameter VCP Culvert	200	LF	$225	$45,000
SW-13	Television Inspection Of Existing 6-Inch Or 8-Inch Diameter Side Sewers and 10-Inch Diameter Culverts (1)	600	EA	$100	$60,000
SW-14	6-Inch Or 8-Inch Diameter Side Sewer Connection (1)	600	EA	$300	$180,000
SW-15	6-Inch Or 8-Inch Diameter Side Sewer Repair, Replacement Or Construction (1)	200	LF	$100	$20,000
SW-16	Post-Construction Television Inspection Of Newly Constructed Main Sewers	---	LS	---	$20,000

SW-17	Post-Construction Television Inspection Of Newly Constructed Side Sewers & Culverts [1]	600	EA	$150	$90,000
Item No.	**Item**	**Estimated Quantity**	**Unit**	**Unit Price ($)**	**Amount ($)**
SW-18	Cast Iron Water Trap For Catch Basin Including Cleanout Cap Per SFDPW Standard Plan 87,194 [1]	6	EA	$450	$2,700
SW-19	Reconstruct Pavement Inside And Outside Of Sewer T-Trench Limit With 2-Inch Thick Asphalt Concrete Wearing Surface Per Excavation Code As Directed By The Engineer	202,150	SF	$2	$404,300
SW-20	Reconstruct Pavement Outside Of Sewer T-Trench Limit With 8-Inch Thick Concrete Base Per Excavation Code As Directed By The Engineer [1]	62,200	SF	$10	$622,000
SW-21	Full Depth Planing Per 2-Inch Depth Of Cut Outside The Sewer T-trench Limit Per Excavation Code [1]	85,000	SF	$2	$170,000
SW-22	Handling of Class I Serpentine Soils (Conditional Item) [1]	18	TON	$70	$1,286
SW-23	Handling of Class II Serpentine Soils (Conditional Item) [1]	900	TON	$20	$18,003
SW-24	Transportation and Disposal of Class I Serpentine Soils (Conditional Item) [1]	18	TON	$50	$919
SW-25	Transportation and Disposal of Class II Serpentine Soils (Conditional Item) [1]	900	TON	$20	$18,003
SW-26	Perform Necessary Work Due To Unforeseen Conditions Related To Sewer Work	---	AL	---	$25,000
SW-27	Excavation Permit Fee Assessed By BSM (Per Article 2.4 Of the Public Works Code)	---	AL	---	$5,000
SW-28	Field Office Type "B" For Engineer, Equipment And Services	---	AL	---	$15,000
SW-29	Supporting and Relocation of San Francisco Water Department (SFWD) Facilities Located Within The Sewer T-trench	---	AL	---	$25,000
				TOTAL COST FOR SEWER WORK --->	**$7,337,226**

Notes:

[1] This is a conditional unit price bid item. It is possible that none, some, all or more of the estimated quantity provided on the Schedule of Bid Prices will be used. No adjustment in unit price will made, and article 7.06 B&C of General Conditions Document 0700 do not apply regardless of actual quantities encountered. Conditional Bid Items cannot be used to fulfill HRC LBE subcontracting goal(s) for this contract as stated in Document 00821. Refer to HRC Attachment

appended to Document 00821 for details as to what may be used for meeting the goal(s).

Sewer System Master Plan
Flood Control / System Improvement Projects
Location: Sunnydale / Visitacion Valley Basin
As of August 2009

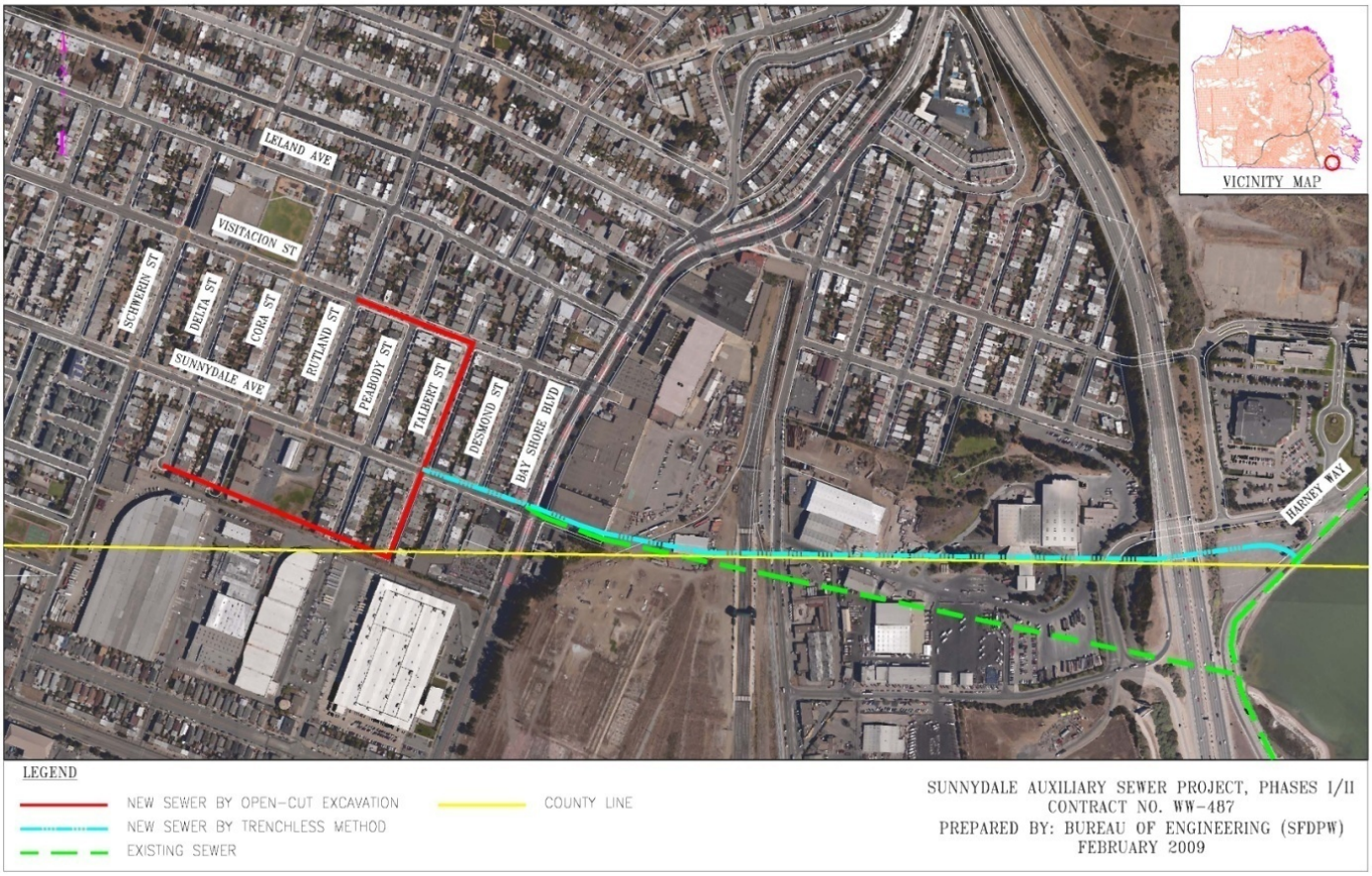
Known Problems:

Most of the combined sewers in the project area were constructed within the past 80 to 100 years. A number of the sewers in the area consist of 8- to 12-inch diameter pipes empty into a 6' diameter sewer along Sunnydale Avenue. This 6.0' diameter sewer crosses under the MUNI light-rail system on Bay Shore Blvd. continues across the county line until it intercepts into the Sunnydale T/S Box facilities that was built under the Clean Water Program in the 1980's.

This area has experienced recurrent flooding problems during heavy rain periods particularly along Talbert Street, Peabody Street, the industrial vicinity of Allan Street / Sherwin Street, and Bay Shore Blvd. The sewers in the surrounding area and the existing 6' diameter sewer that empties into the Sunnydale T/S Box facilities require upsizing to meet the changes in land usage from permeable surface to more impervious surfaces of rooftops, roadways, and sidewalks.

Recommendations as of August 2009

Currently, staff is recommending a series of large size pipes/tunnels and structures within the project area ranging from 5' to 8' diameter RCP to several large size underground RC structures varying in size from 10' X 10' to 20' X 15'. An 8' and 9.5' minimum inside diameter tunnels will be constructed from the end of Sunnydale Avenue and Bay Shore Blvd. to another opening inside the existing Sunnydale T/S. box. Above the tunnel are private properties where staff is currently negotiating easement agreements, CALTRAIN commuter train, and Hwy 101 Freeway.



Staff estimates a construction cost estimate of $37.5 Million for the work east of Bay Shore Blvd and $8.5 Million for the work west of Bay Shore Blvd.

Project Vicinity	**Estimated Construction Cost (2009)**
East of Talbert Street	$37,500,000
10% Estimating Contingency	$3,750,000
West of Talbert Street	$8,500,000
10% Estimating Contingency	$850,000
Total Construction	$50,600,000
Current & Supplemental CIP Funding	$39,600,000
Construction cost to carry forth under SSMP	$11,000,000

Construction cost estimates carried forth for the Flood Control / System Improvement – Sunnydale / Visitacion Drainage is estimated at $11.0 Million, which excludes cost for easements. Part of this work is supported with current CIP and upcoming CIP supplemental funding of approximately $39.6 Million.

Attachment: Preliminary Construction Cost Estimates for Sunnydale / Visitacion Sewer Drainage Improvements Project

Reference: San Francisco Public Utilities Commission-Sunnydale Auxiliary Sewer Project Initial Study / Mitigated Negative Declaration - Case No. 2009.0311E

Sunnydale/Visitacion Valley Drainage – Flood Control / System Improvements Project
Construction Cost Estimate Summary (Eastside of Bay Shore Blvd)

Jacobs Associates ♦ Engineers/Consultants
San Francisco ♦ San Diego ♦ Pasadena ♦ Seattle ♦ Portland ♦ Boston ♦ New York ♦ Melbourne

Project	Client	Job No.	Estimator	Rev	Computed on
Contract WW-487, Sunnydale Auxiliary Sewer	SFPUC	4065.0	TLP/JMS	0	07/16/2009
100% Estimate - 114-in EPBM (Harney to Bayshore), Micro-Tunnel (Bayshore to Talbert), & Pipe Jack (Harney Way					8:57 AM

RESOURCE RATE AND USAGE DETAIL

DIRECT LABOR

Basis: California prevailing wage rates thru 6/30/2009 San Francisco County — http://www.dir.ca.gov/dlsr/PWD/index.htm

Employer Insurance Add-ons	Ind. Rate	Exp. Mod	Eff Rate	*Memo: Estimate Total*
Workers' Compensation	30.0%		30.0%	*$913,152*
Commercial General Liability	10.0%		10.0%	*$304,384*
CIGA/Terrorism/Other Add-ons	1.0%		1.0%	*$30,438*

Overtime	Rate	
General/Saturday overtime	1.5x	
Sunday/Holiday overtime	2.0x	
Misc. General overtime	2.0% built in rates	*$90,238*

Employer Payroll Tax Add-ons	Tax Rate	Annual Inc. Cap
Fed. Social Security Tax	6.200%	$106,800
Fed. Medicaid Tax	1.450%	
Fed. Unemployment Tax	0.800%	$7,000
CA Unemployment Tax	4.800%	$7,000
CA SDI	1.100%	$90,669

48.3% average base+vac to total rate. 9.3% average payroll tax on $33.47/hr average base+vac rate. 34.7% average labor burden.

Code	Resource/Group Description	Hourly Base+Vac	Hourly Fringes	Daily Subsistance/Travel	Insurance & Taxes	Misc. Gen'l OT	Adjusted Rate/mhr	Total mhrs	Total Cost
	Laborers								
lfm	Labor FM	$29.52	$14.26	$24.00	$14.88	$0.94	$62.61	2,366	$148,127
lab	General Labor (Grp 1)	$26.84	$14.26	$24.00	$13.55	$0.88	$58.53	11,700	$684,842
flag	Flagman (Grp 3)	$25.89	$14.26	$24.00	$13.08	$0.87	$57.09	984	$56,178
btm	Bottomlander (Grp 1)	$26.84	$14.26	$24.00	$13.55	$0.88	$58.53	2,684	$157,104
	Operating Engineers								
mfm	Master Mechanic	$41.42	$21.22	$0.00	$20.80	$1.25	$84.69	1,540	$130,422
c100+	Crane oper. >100t (Grp 1A)	$37.65	$21.22	$0.00	$18.93	$1.18	$78.98	4,578	$361,586
c45-	Crane oper. <45t (Grp 3A)	$34.15	$21.22	$0.00	$17.19	$1.11	$73.67	454	$33,444
eo3-	Excavator <3.5cy (Grp 3)	$33.76	$21.22	$0.00	$16.99	$1.10	$73.07	1,092	$79,796
lo4-	Loader oper. <4cy (Grp 4)	$32.38	$21.22	$0.00	$16.31	$1.07	$70.98	4,660	$330,793
mw	HD Mech/Welder (Grp 4)	$32.38	$21.22	$0.00	$16.31	$1.07	$70.98	5,710	$405,321
conc	Concrete equip.oper. (Grp 5)	$33.98	$16.40	$0.00	$17.10	$1.01	$68.49	32	$2,192
oil	Oiler/Toplander (Grp 8)	$27.51	$21.22	$0.00	$13.88	$0.98	$63.59	4,660	$296,327
	Tunnel Labors/Operators								
sh	Tunnel shifter	$33.42	$14.26	$30.00	$16.82	$1.03	$69.28	3,838	$265,937
min	Tunnel miner	$31.42	$14.26	$30.00	$15.83	$0.99	$66.25	11,662	$772,562
lead	Lead miner	$32.42	$14.26	$30.00	$16.32	$1.01	$67.77	2,980	$201,942
bfm	Bullgang foreman	$33.42	$14.26	$30.00	$16.82	$1.03	$69.28	1,378	$95,472
bjm	Bullgang labor	$31.42	$14.26	$30.00	$15.83	$0.99	$66.25	2,396	$158,731
sm	Shift mechanic (Grp 1)	$32.77	$21.22	$0.00	$16.50	$1.08	$71.57	3,588	$256,798
loci	Loci Operater (Grp 4)	$29.04	$21.22	$0.00	$14.64	$1.01	$65.91	4,456	$293,700
epbm	EPBM Operator (Grp 1)	$36.77	$21.22	$0.00	$18.49	$1.16	$77.64	2,788	$216,463
gs	Grade Setter	$32.38	$21.22	$0.00	$16.31	$1.07	$70.98	116	$8,234
	Electricians								
ejm	Electrician JM	$53.05	$20.42	$40.00	$26.50	$1.57	$106.54	3,219	$342,960
	Carpenters								
cfm	Carpenter FM	$39.92	$15.51	$0.00	$20.06	$1.11	$76.60	632	$48,408
cjm	Carpenter JM	$36.29	$15.51	$0.00	$18.25	$1.04	$71.09	1,896	$134,784
	Ironworkers								
ifm	Ironworker FM	$35.01	$22.73	$12.00	$17.61	$1.19	$78.04	656	$51,198
ijm	Ironworker JM	$31.83	$22.73	$12.00	$16.03	$1.12	$73.21	1,486	$108,797
	Pilebucks								
pfm	Pilebuck FM	$41.79	$23.18	$30.00	$20.99	$1.38	$91.08	992	$90,316
p100+	Pilebuck 100t+Crane (Grp 1)	$37.99	$23.18	$30.00	$19.10	$1.30	$85.32	640	$54,568
pjm	Pilebuck JM/MW (Grp 4)	$33.90	$23.18	$30.00	$17.06	$1.22	$79.11	2,670	$211,224
lp	Labor premium					Overall average	6.9% of labor		$457,621
Mobilization Labor		$30.72	$15.24	$10.17	$15.45	$0.95	$63.63	2,140	$136,161
Demobilization Labor		$30.52	$15.14	$10.10	$15.36	$0.94	$63.23	692	$43,752
GP Operation/Maintenance Labor		$27.77	$13.78	$9.19	$13.97	$0.86	$57.52	2,249	$129,362
Craft Labor Escalation									$260,869
Total Craft Labor		**$4,529,875 escalated payroll**				**90,934 mhrs**			**$7,025,992**

Project	Client	Job No.	Estimator	Rev	Computed on
Contract WW-487, Sunnydale Auxiliary Sewer	SFPUC	4065.0	TLP/JMS	0	07/16/2009
100% Estimate - 114-in EPBM (Harney to Bayshore), Micro-Tunnel (Bayshore to Talbert), & Pipe Jack (Harney Way					8:57 AM

RESOURCE RATE AND USAGE DETAIL

FIELD SUPERVISORY LABOR (see cost item 058)

Employer Insurance Add-ons	Ind. Rate	Exp. Mod	Eff. Rate	*Memo: Estimate Total*
Workers' Compensation	1.8%		1.8%	*$33,755*
Commercial Gen'l Liability	5.0%		5.0%	*$93,763*

Permanent Employee Benefits	Rate	Applied to classifications
Key empl. bonus plan	8.0%	KP
Employee medical plan	10.0%	KP, EP, EL, NP, NL
Retirement/Pension plan	5.0%	KP, EP, NP
Non-exempt salaried OT	2.0%	NP, NL

Employer Payroll Tax Add-ons

8.9% payroll tax rate based on $8,994/mmo weighted base salary.

Field Supervisory Labor Classification	Class	Total Burden
Key permanent employee	KP	38.7%
Exempt permanent employee	EP	30.7%
Exempt local hire employee	EL	25.7%
Non-exempt permanent employee	NP	32.7%
Non-exempt local hire employee	NL	27.7%

			Total mmos	Total Cost
Supervisory Salaries			209	$2,497,119
Supervisory Labor Escalation				$93,151
Total Supervisory Labor	**$1,945,203 escalated payroll**	**209 mmos**		**$2,590,270**

RESOURCE RATE AND USAGE DETAIL

EQUIPMENT

Basis: COE Rates, Year 2007 — Unit Cost — *Memo: Estimate Total including General Plant Mob/O&M*

Region 7			Electricity	$0.20 /kWh			*2,886,710 kWh*		*$577,342*		
Fuel/Power Factor Normal			Diesel	$3.00 /gal			*105,799 gal*		*$317,398*		
			Gas	$3.00 /gal			*22,002 gal*		*$66,005*		
Code	Resource/Group Description	Air Diesel Elec Gas	HP/CFM	HPF	Equipment Value	Parts Cost/hr	Elec/Fuel Cost/hr		Operating Cost/hr	Total hrs	Total Operating Cost
	Excavators/Muckers/TBMs										
b301	Cat 301 mini-backhoe	D	50	50	$36,486	$4.22	$3.86		$8.08	194	$1,567
b325	Hyd. Exc. 250, 55k/1.9cy	D	176	65	$257,035	$25.06	$17.65		$42.71	90	$3,844
b345	Hyd. Exc. 400, 102k/3.1cy	D	306	65	$455,914	$39.11	$30.69		$69.80	360	$25,127
b436	Backhoe/Ldr Cat 436, 1.4cy	D	93	50	$100,377	$11.80	$7.17		$18.97	712	$13,502
epbm	14'-6" EPBM/Backup	E	2100	70	$6,000,000	$200.00	$223.44		$423.44	881	$372,934
mtb96	9'-6" MTBM	E	1500	70	$3,000,000	$100.00	$159.60		$259.60	472	$122,531
slsp	Slurry Separation Plant	E	750		$1,250,000	$25.00	$0.00		$25.00	472	$11,800
digr	10-ft Digger Shield	E	1000	70	$1,500,000	$50.00	$106.40		$156.40	218	$34,158
	Loaders										
bob	Bobcat Loader	D	54	70	$30,675	$5.23	$5.83		$11.06	144	$1,593
L950	Wheel Loader Cat 950/3.5cy	D	180	65	$225,869	$28.18	$18.05		$46.23	4,497	$207,921
	Lift Units										
cc100	Crawler Crane 100ton/200'	D	265	40	$934,132	$54.06	$16.35		$70.41	5,042	$355,029
hc40	Hydraulic Crane 40ton/105'	D	250	65	$520,881	$35.12	$25.07		$60.19	630	$37,921
fl4	Forklift, 4.0ton/30' mast	D	75	65	$71,635	$8.46	$7.52		$15.98	352	$5,619
	Haul Units										
dl12	Locomotive 12ton/120hp	D	120	50	$180,000	$7.70	$9.26		$16.96	4,456	$75,561
man	Mantrip, rail				$22,000	$0.70			$0.70	2,036	$1,425
scar	Supply car, rail				$14,000	$0.70			$0.70	2,036	$1,425
flat	Flat car, rail				$12,000	$0.60			$0.60	560	$336
mcar	Muck car, rail				$20,000	$1.00			$1.00	16,288	$16,288
vcar	Fanline car, rail				$22,000	$2.00			$2.00	2,148	$4,296
	Concrete Equipment										
cb120	Conc. pump, truck 120cy/hr	D	210	80	$328,318	$51.72	$25.92		$77.64	32	$2,484
vib2	Conc. vibrator, internal, 1.75"	E	3	70	$1,319	$1.22	$0.32		$1.54	112	$172
grt	Grout Pump-Moyno/Mixer	A	600	50	$40,000	$10.00			$10.00	114	$1,144
gp12	Grout plant, skid 12cy/hr	E	80	75	$52,467	$10.00	$9.12		$19.12	2,132	$40,754
	Air/Power Tools										
spad	Spader, 35cfm	A	35	65	$1,800	$0.55			$0.55	745	$410
leg	Jackleg drill, 100cfm	A	100	65	$2,500	$0.60			$0.60	200	$120
	Compactors										
c10	Compactor, BW9AS, 10t/50"	D	83	80	$86,858	$10.00	$10.24		$20.24	128	$2,591
	Plant Equipment										
cp185	Compressor, trailer 185cfm	D	80	75	$22,711	$3.22	$9.26		$12.48	656	$8,190
cs12	Compressor, stationary 1200c	E	350	75	$134,139	$19.50	$39.90		$59.40	2,706	$160,736
g10	Generator, trailer 10kW	G	23	65	$10,206	$1.24	$2.31		$3.55	456	$1,617
g725	Generator, skid 725kW	D	1089	65	$142,286	$23.12	$109.21		$132.33	472	$62,460
p850	Pump, subm. 850gpm/40ft he:	E	25	90	$14,183	$2.76	$3.42		$6.18	6,178	$38,180
vf40	Ventilation fan 40hp	E	40	90	$6,000	$3.00	$5.47		$8.47	2,418	$20,485
vf100	Ventilation fan 100hp	E	100	90	$15,000	$4.00	$13.68		$17.68	2,036	$35,996
wd4	Welder 400A, trailer D	D	48	30	$15,415	$2.46	$2.22		$4.68	360	$1,685
wtp	Water Treatment Plant	E	15	90	$250,000	$15.00	$2.05		$17.05	2,418	$41,232
	Attachments										
vh	Vibratory sheet pile driver	E	80	80	$85,000	$10.00	$9.73		$19.73	640	$12,618
hr	Hoe-Ram attachment		50	50	$30,000	$5.00			$5.00	540	$2,698
clam	Clamshell 5cy			80	$25,000	$2.00			$2.00	96	$192
Equipment Ownership											$4,011,451
Mobilization Equipment										480	$32,222
Demobilization Equipment										173	$11,613
General Plant Operation/Maintenance Equipment										1,125	$6,567
Overhead Maintenance/Service Equipment										3,461	$92,700
Equipment Escalation											$221,520
					Total Equipment			**69,265 hrs**			**$6,102,719**

Project	Client	Job No.	Estimator	Rev	Computed on
Contract WW-487, Sunnydale Auxiliary Sewer	SFPUC	4065.0	TLP/JMS	0	07/16/2009
100% Estimate - 114-in EPBM (Harney to Bayshore), Micro-Tunnel (Bayshore to Talbert), & Pipe Jack (Harney Way					8:57 AM

RESOURCE RATE AND USAGE DETAIL

MATERIALS

Code	Resource/Group Description	Unit Cost/Measure	Notes	Add Tax (-/N)?	Unit Cost F.O.B Job	Total Quantity	Total Cost
	Add-ons						
tax	San Francisco County Sales Tax	9.500%	*Memo: Tax on Material* *$514,754*				
			...and Equipment Purchases *$70,504*				
sts	Small tools and supplies	$3.00 mhr	(6.0% of raw direct labor rate)		$3.00	90,934	$272,803
	Concrete/Cement						
cb	Cement, bulk	$110.00 ton	Hanson - 04/09		$120.45	482	$58,078
aggf	Fine aggregate	$35.10 cy	Hanson - Sunol 04/09		$38.43	1,952	$75,038
bs	Sacked bentonite 2800lb	$240.00 sack	Wyo-Bentonite 04/09		$262.80	19	$5,107
clsm	Controlled low-strength 1ksi	$110.00 cy	Hanson - Sunol 04/09		$120.45	1,990	$239,696
c4	Concrete, 4000psi mix	$120.00 cy	CEMEX - 04/09		$131.40	1,062	$139,557
xc	Concrete consumables	$10.00 cy		n	$10.00	1,012	$10,115
bgs	114" ID One-Pass Segments	$898.00 lf	TS Precast 04/09 Modified 9'-6"		$983.31	3,085	$3,033,450
exygt	Epoxy Patching Grout	$15.00 cf	plug		$16.43	495	$8,131
	Lumber/Formwork						
ply1	Plywood MDO 1"	$1.50 sf			$1.64	8,134	$13,359
xf	Misc form supplies/fasteners	$1.00 sf		n	$1.00	8,134	$8,134
	Metals/Steel						
rp	Reinforcing steel, plain	$0.88 lb	Alamillo Rebar 04/09		$0.96	176,600	$170,172
wale	W30-W36 Wales	$0.48 lb	PDM 04/09		$0.53	96,300	$50,615
strut	HP14x89 struts/cap beams	$0.48 lb	PDM 04/09		$0.53	42,700	$22,443
sht2	AZ 28 sheet piles	$25.75 sf	04/09 Skyline		$28.20	5,710	$161,001
sheet	AZ 39-700 sheet piles	$30.87 sf	04/09 Skyline		$33.80	17,119	$578,674
rod	Welding rod	$1.50 lb	Plug price		$1.64	740	$1,215
stl	Steel shapes	$1.00 lb			$1.10	61,436	$67,272
pl	Steel plate	$0.80 lb			$0.88	110,442	$96,748
	EPBM-Related						
wr90	Heavy Tail Seal Grease	$1.70 lb	Condat Products 06/08		$1.86	5,525	$10,285
cut	Slurry TBM disc cutters	$4.00 bcy	Plug Price		$4.38	12,859	$56,320
teeth	Slurry TBM drag teeth	$2.00 bcy	Plug Price		$2.19	13,727	$30,061
clb	CLB F4 L/M Conditioner	$2.00 bcy	About $8/gal x 0.2gal/cy		$2.19	5,352	$11,720
exsl	Exit seal	$2,500 ea	Plug		$2,738	2	$5,475
	Pipe						
r96	96" RCP, Flush Jt/Gasket	$974.60 lf	Ameron 06/09		$1,067	644	$687,076
r114	114" RCP, Bell Jt/Gasket	$1,502 lf	Ameron 06/09		$1,644	250	$411,720
xmisc	Miscellaneous material	$1,000 lot		n	$1,000	348	$348,000
ai	Allowance Item	$1.00 LS		n	$1.00	494,000	$494,000
Equipment Ownership Materials and Taxes							$391,624
Mobilization Freight and Materials (Adjusted)							$2,920,261
Demobilization Freight and Materials (Adjusted)							$358,775
General Plant Operation/Maintenance Materials							$372,343
Overhead Maintenance/Service Materials (Adjusted)							-$1,026,274
Bonds, Insurance, and Taxes not in General M	(unclassified)						$880,250
Contractor Markup	(unclassified)						$4,677,652
Financing Charges	(unclassified)						$102,100
Contractor Contingency	(unclassified)						$1,640,589
Material Escalation							$318,488
					Total Material		**$17,702,074**

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100% Estimate - 114-in EPBM (Harney to Bayshore), Micro-Tunnel (Bayshore to Talbert), & Pipe Jack (Harney Way					8:57 AM

RESOURCE RATE AND USAGE DETAIL

SUBCONTRACTS

Code	Resource/Group Description	Unit Cost/Measure	Notes		Total Quantity	Total Cost
	Sitework					
sr	Site restoration	$10,000.00 acre		$10,000	4	$35,006
ap	Asphaltic paving	$12.00 sy		$12.00	4,224	$50,689
sc4	Sawcut 4" reinf. conc. pavemt	$2.80 lf	Means 02220-360-0420	$2.80	430	$1,203
grind	Asphalt Grinding	$3.04 sy	Means	$3.04	3,644	$11,065
	Muck Disposal					
m2	Class II muck disposal	$20.00 lcy	$20/cy fee	$20.00	30,980	$619,602
mc1	Cont. Class I muck disposal	$111.00 lcy	$33/tn dump fee, 8 hr trucking	$111.00	152	$16,859
mc2	Cont. Class II muck disposal	$74.25 lcy	$55/tn dump fee	$74.25	5,704	$423,522
mc	Concrete/Asphalt disposal	$60.00 lcy		$60.00	149	$8,959
mktrk	Muck disposal Trucking	$100.00 hr		$100.00	4,025	$402,500
	Slurry/Secant/SM Walls					
jgs	Jet Grouting surface	$300.00 cy	Hayward-Baker 04/09	$300.00	1,100	$330,000
jgl	Jet Grout low headroom	$340.00 cy	Hayward-Baker 04/09	$340.00	3,580	$1,217,200
jgm	Jet Grout Mobe	$10,000.00 LS	Hayward-Baker 04/09	$10,000	5	$50,000
	Pipe-jACK Equipment					
pjack	96" Pipe-Jacks/Genset	$3,500.00 day		$3,500	47	$165,900
incln	Inclinometer Installation	$10,000.00 ea	Applied Geomechanics	$10,000	2	$20,000
vid	Video inspection of sewer	$5,000.00 ea	plug	$5,000	2	$10,000
div	Divers for Shaft Tremie Work	$5,475.00 hr	Vortex Dec 08	$5,475	16	$87,600
Mobilization Subcontracts						$127,400
General Plant Operation/Maintenance Subcontracts						$71,500
Overhead Maintenance/Service Subcontracts						$210,080
Subcontract Escalation						$121,151
				Total Subcontract		**$3,980,235**
				Escalated Construction Bid		**$37,401,290**

ENGINEER'S ESTIMATE

Sunnydale Sewer Improvement Project (Westside of Bay Shore Blvd.)

Contract No. Cs-860 (Hyd. Job Order No. 0541J)

Computed by: LD Checked by: Date:8/20/2009

Note: L.F. = Linear Feet S.F. = Square Feet EA.=Each
C.Y. = Cubic Yard L.S. = Lump Sum AL.=Allowance

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Extension ($)
SW-1	Mobilization for Sewer Work	---	L.S.	---	$50,000
SW-2	Traffic Routing Work for Sewer Work	---	L.S.	---	$300,000
SW-4	Trench And Excavation Support Work	---	L.S.	---	$140,000
SW-5	Concrete Manhole For Pipe Size 51" To 120" In Diameter With New Frame And Cover (Per SFDPW Std. Plan 87,183)	11	EA.	$32,500	$357,500
	60"-Inch Diameter RCP Sewer On Crushed Rock Bedding	1,175	L.F.	$1,099	$1,291,325
SW-6	72"-Inch Diameter RCP Sewer On Crushed Rock Bedding	830	L.F.	$1,100	$913,000
SW-7	78"-Inch Diameter RCP Sewer On Crushed Rock Bedding	710	L.F.	$1,200	$852,000
SW-8	96"-Inch Diameter RCP Sewer On Crushed Rock Bedding	500	L.F.	$1,350	$675,000
SW-10	Construct New Junction Structure at the intersection of Rutland Ave. and Visitacion Street	---	L.S.	$50,000	$50,000
SW-11	Construct New Junction Structure at the intersection of Sunnydale Ave and Bayshore Blvd.	---	L.S.	$150,000	$150,000
SW-12	Construct New Junction Structure at the intersection of Sunnydale Ave and Talbert Street	---	L.S.	$150,000	$150,000
SW-13	Television Inspection of 6 or 8-Inch Diameter Side Sewer and 10-Inch Diameter Culvert (Conditional Item)		EA.	$100	$0
SW-14	6 or 8-Inch Diameter Side Sewer Connection (Conditional Item) [(1)]	25	EA.	$250	$6,250
SW-15	6 or 8-Inch Diameter Side Sewer Replacement (Conditional Item)	10	L.F.	$100	$1,000
SW-16	Post Construction Television Inspection Of Newly Constructed Main Sewers		L.S.	---	$15,000
SW-17	10-Inch Diameter VCP Culvert (Conditional Item)	300	L.F.	$150	$45,000
SW-18	Reconstruct Pavement With Final 2-Inch Thick Asphalt Concrete Wearing Surface Outside of Sewer Trench As Necessary Per Excavation Code		S.F.	$2	$0
SW-19	Reconstruct Pavement With 8-Inch Thick Concrete Base Outside The Sewer T-Trench Limit As Necessary Per Excavation Code (Conditional Item)		S.F.	$9	$0
SW-20	Full Depth Planing 2-Inch Thick A.C.W.S. Outside The Sewer T-Trench Limit and As Necessary Per Excavation Code (Conditional Item)		S.F.	$2	$0

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Extension ($)
SW-22	Imported Backfill Material (Conditional Item) (1)		CY	$30	$0
SW-23	Handling of Class I Serpentine Soils (Conditional Item) (1)	0	TON	$70	$0
SW-24	Handling of Class II Serpentine Soils (Conditional Item) (1)	21,094	TON	$20	$421,880
SW-25	Transportation and Disposal of Class I Serpentine Soils (Conditional Item) (1)	0	TON	$50	$0
SW-26	Transportation and Disposal of Class II Serpentine Soils (Conditional Item) (1)	21,094	TON	$20	$421,880
SW-28	Perform Work Necessary Due to Unforeseen Conditions Related to Sewer Work	---	AL.	---	$100,000
SW-30	Supporting SFWD Facilities Within the Sewer Trench	---	AL.	---	$100,000
SW-31	Field Office Standard Type "B", Equipments And Services	---	L.S.	---	$20,000
SW-32	MUNI Coordination	---	AL.	---	$150,000
SW-33	Clean and Rehabilitate 6.5' Sunnydale Tunnel	3,500	L.F.	$650	$2,275,000
				TOTAL	**$8,484,834**
				SAY	**$8,500,000**

Sewer System Master Plan
Flood Control / System Improvement Projects
Location: Richmond Drainage Basin
As of August 2009

Known Problems:

The flooding related problems in the Richmond Drainage Basin are many-fold. They can be broken down to local isolated drainage issues and system-wide issues.

The local issues, with initial focus at 17th Avenue and Lake Street, but may also be evident at other spot locations, can be summarized as follows:

- The street surface at the end of 17th Avenue, next to the Presidio Trust, is built up higher than the crest elevation; flow will go down towards the low-lying garage area.
- Surface flow, not necessarily related to the existing flow at 17th and Lake, is flooding the property at the end of 17th Ave; house address is 10-17th Avenue.
- Surface flow that does not enter the property at 10-17th Avenue or cannot enter the sewer system will enter the Presidio Trust, possibly contaminating their source for drinking water.

The system wide issues, located throughout the Richmond Basin Drainage, are as follows:

- Air entrapment within the Richmond Transport, reducing the amount of storage available for flows
- Surcharging air and flow leading to expulsions in upstream areas
- Sewer improvements along Lake Street, Fulton Street, and of the Richmond Transport outlet
- Discharge improvements at Lincoln, Vicente and Mile Rock outfalls

Recommendations as of August 2009

The following Phase 1 work, focusing on the local drainage issues at 17th Avenue and Lake Street, has already been completed at a cost of $890,000 under Contract No. WW-476, DPW JO 1163J.

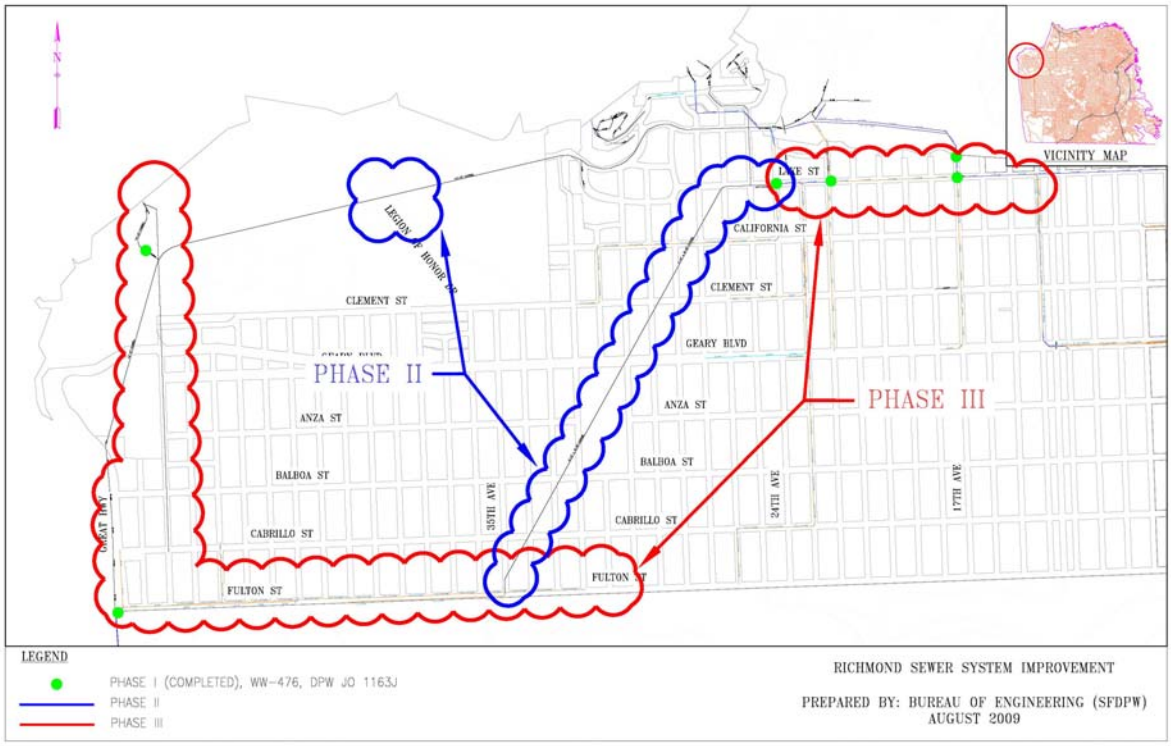
- Regrade of North End of 17th Avenue
- Regrade of intersection at 17th/Lake to divert surface flow
- Installation of backflow prevention devices on 17th Avenue
- Seal specified manholes around intersection of 17th/Lake
- Reactivate Old Richmond Tunnel
- Seal leaks in Old Richmond Tunnel (specified locations)
- Remove 22”Ø constriction at 17th/Lake and replace with 4'2"x6'9" sewer
- Remove energy dissipaters from 42" diameter downstream of Richmond Tunnel
- Lower Mile Rock Weir to elevation of 33'
- Raise weir on 22nd Avenue

The following Phase 2 work is immediate additional preliminary recommendations for improvements to the Richmond Drainage Basin.

- Cleaning Old Richmond Tunnel (~630 CY of debris) to provide alternate flow path should the normal facilities get inundated,
- Lining/Rehabilitation of Old Richmond Tunnel to provide alternate flow path should the normal facilities get inundated,
- Additional venting for 14' Richmond Transport, to provide relief for air entrapment and air/flow surcharges,
- Physical and numerical modeling of sewer system to determine extent of internal air surge issues in the Richmond T/S system and recommend proper remediation design and construction efforts.

The following Phase 3 work is further recommendations for improvements to the Richmond Drainage Basin in the future.

- Replace inadequate and aging sewers on Fulton Street (31st Avenue to 41st Avenue),
- Construct Lake Street Box Sewer (14th Avenue to 24th Avenue) to replace inadequate and aging infrastructure,
- New sewer on Fulton (41st to Great Highway) to accept additional flows from activation of Old Richmond Tunnel,
- Rehabilitate Mile Rock Tunnel to provide alternate flow path and to relieve overflows at Lincoln and Vicente outfalls,
- New decant facilities to improve quality of discharge between Lincoln, Vicente, and Mile Rock outfalls (possibly 70 MGD) to be explored further.
-



Project Vicinity	Estimated Construction Cost (2009)
Phase 1 (Contract No. WW-476)	$890,000 (COMPLETED)
Phase 2	$6,250,000
10% Estimating Contingency	$6,250,00
Phase 3	$31,700,000
10% Estimating Contingency	$3,170,000
Current & Supplemental CIP Funding	$0
Construction cost to carry forth under SSMP	$41,745,000

Construction cost estimates, in 2009 dollars, carried forth for the Flood Control / System Improvement – Richmond Drainage is:

Immediate: $6,875,000
Future: $34,870,000
Total Construction: $41,745,000

Attachment:

Richmond Project Cost Estimate 8-12-09.xls

Reference:

Lake St/Upper Richmond Transport - Final Summary Report (DRAFT) dated February 26, 2008 by HCE

Preliminary Construction Cost Estimate Summary

	Estimated Construction Cost
Phase 1 - 17th/Lake Drainage Improvements	
o Regrade of North End of 17th Avenue	---
o Regrade of intersection at 17th/Lake to divert surface flow	---
o Installation of backflow prevention devices on 17th Avenue	---
o Seal specified manholes around intersection of 17th/Lake	---
o Reactivate Old Richmond Tunnel	---
o Seal leaks in Old Richmond Tunnel (specified locations)	---
o Remove 22"Ø constriction at 17th/Lake and replace with 4'2"x6'9" sewer	---
o Remove energy dissipaters from 42" dia downstream of Richmond Tunnel	---
o Lower Mile Rock Weir to elevation of 33'	---
o Raise weir on 22nd Avenue	---
Subtotal	**$888,851 (Completed)**
Phase 2 (SSMP + Supplemental CIP)	
Clean Old Richmond Tunnel (~630 CY)	$400,000
Line/Rehabilitate Old Richmond Tunnel	$5,100,000
Additional 36" venting for 14' tunnel (via phone conversation with various drilling contractors)	$350,000
Physical and numerical modeling of sewer system (current cost proposal from AECOM as needed)	$400,000
Subtotal	**$6,250,000**
10% Contingency	**$625,000**
Phase 3 (SSMP)	
Sewer Improvements on Fulton Street (31st Ave to 41st Ave)	$4,600,000
Rehabilitate Mile Rock Tunnel	$6,500,000
Lake Street Box Sewer (14th Ave to 24th Ave)	$13,700,000
New Decant Facilities	$6,900,000
Subtotal	**$31,700,000**
10% Contingency	**$3,170,000**
Total	**$41,745,000**

All estimates in 2009 dollars. **IMMEDIATE WORK**

PRELIMINARY ENGINEER'S ESTIMATE

Clean Old Richmond Tunnel

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Extension ($)
SW-1	Labor & Equipment per day 8 hour shift * includes traffic control	20	Day	12,455	$249,100

SW-2	Sonar Inspection labor & equipment including (1) report on DVD & hard copy	6,000	LF	9	$54,000
SW-3	Transportation & Disposal of debris as class II waste at:	1,100	Ton	82	$90,200
				Total	**$400,000**

IMMEDIATE WORK
PRELIMINARY ENGINEER'S ESTIMATE
Rehabilitate Old Richmond Tunnel

Note: L.F. = Linear Feet S.F. = Square Feet EA.=Each
C.Y. = Cubic Yard L.S. = Lump Sum AL.=Allowance

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Extension ($)
SW-1	Mobilization for Sewer Work	---	L.S.	---	$50,000
SW-2	Traffic Routing Work for Sewer Work	---	L.S.	---	$25,000
SW-3	Uniformed Off-Duty San Francisco Police Officers As Required for Sewer Work	---	AL.	---	$5,000
SW-4	Rehabilitate 4'6x6'6 Tunnel	6,000	L.F.	$750	$4,500,000
SW-5	Post Construction Television Inspection Of Newly Constructed Main Sewers	---	L.S.	---	$10,000
SW-6	Perform Work Necessary Due to Unforeseen Conditions Related to Sewer Work	---	AL.	---	$454,000
SW-7	Field Office Standard Type "B", Equipments And Services	---	L.S.	---	$5,000
				TOTAL	**$5,100,000**

FUTURE WORK

PRELIMINARY ENGINEER'S ESTIMATE

Sewer Improvement on Fulton Street

Fulton - 31st Avenue to 41st Avenue

Note: L.F. = Linear Feet S.F. = Square Feet EA.=Each
C.Y. = Cubic Yard L.S. = Lump Sum AL.=Allowance

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Extension ($)
SW-1	Mobilization for Sewer Work	---	L.S.	---	$50,000
SW-2	Traffic Routing Work for Sewer Work	---	L.S.	---	$150,000
SW-3	Uniformed Off-Duty San Francisco Police Officers As Required for Sewer Work	---	AL.	---	$5,440
SW-4	Trench And Excavation Support Work	---	L.S.	---	$55,000
SW-5	Concrete Manhole For Pipe Size Larger than 30" In Diameter With New Frame And Cover (Per SFDPW Std. Plan 87,181)	11	EA.	$12,000	$132,000
SW-6	Concrete Catchbasin With New Frame And Grating (Per SFDPW Std. Plan 87,188)	20	EA.	$4,000	$80,000
SW-7	48-Inch Diameter RC Sewer On Crushed Rock Bedding	3,100	L.F.	$750	$2,325,000
SW-8	Television Inspection of 6 or 8-Inch Diameter Side Sewer and 10-Inch Diameter Culvert (Conditional Item) (1)	200	EA.	$100	$20,000
SW-9	6 or 8-Inch Diameter Side Sewer Connection (Conditional Item) (1)	200	EA.	$250	$50,000
SW-10	6 or 8-Inch Diameter Side Sewer Replacement (Conditional Item) (1)	1,500	L.F.	$100	$150,000
SW-11	Post Construction Television Inspection Of Newly Constructed Main Sewers	---	L.S.	---	$10,000
SW-12	Cast Iron Water Trap For Catchbasin Including Cleanout Cap (Conditional Item) (1)	20	EA.	$450	$9,000
SW-13	10-Inch Diameter VCP Culvert (Conditional Item) (1)	100	L.F.	$150	$15,000

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Extension ($)
SW-14	Reconstruct Pavement With Final 2-Inch Thick Asphalt Concrete Wearing Surface Inside and Outside of Sewer Trench As Necessary Per Excavation Code	93,000	S.F.	$2	$186,000
SW-15	Reconstruct Pavement With 8-Inch Thick Concrete Base Outside The Sewer T-Trench Limit As Necessary Per Excavation Code (Conditional Item) (1)	5,000	S.F.	$9	$45,000
SW-16	Full Depth Planing 2-Inch Thick A.C.W.S. Outside The Sewer T-Trench Limit and As Necessary Per Excavation Code (Conditional Item) (1)	65,000	S.F.	$2	$130,000
SW-17	Exploratory Holes (Conditional Item) (1)	10	EA	$1,750	$17,500
SW-18	Imported Backfill Material (Conditional Item) (1)	1,141	CY	$30	$35,000
SW-19	Handling of Class I Serpentine Soils (Conditional Item) (1)	500	TON	$62	$31,050
SW-20	Handling of Class II Serpentine Soils (Conditional Item) (1)	2,000	TON	$40	$80,500
SW-21	Transportation and Disposal of Class I Serpentine Soils (Conditional Item) (1)	500	TON	$51	$25,300
SW-22	Transportation and Disposal of Class II Serpentine Soils (Conditional Item) (1)	2,000	TON	$30	$59,800
SW-23	Testing of Hazardous Excavated Materials Prior to Sewer Work	---	AL.	---	$40,000
SW-24	Perform Work Necessary Due to Unforeseen Conditions Related to Sewer Work	---	AL.	---	$731,000
SW-25	Permit Fee Assessed By BSM Per Article 2.4 Of The Public Works Code	---	AL.	---	$5,000
SW-26	Supporting SFWD Facilities Within the Sewer Trench	---	AL.	---	$45,000
SW-27	Field Office Standard Type "B", Equipments And Services	---	L.S.	---	$5,000
SW-28	De-energizing and Re-energizing MUNI Overhead Wires.	---	AL.	---	$50,000

TOTAL	**$4,600,000**

FUTURE WORK
PRELIMINARY ENGINEER'S ESTIMATE
Rehabilitate Mile Rock Tunnel

Note: L.F. = Linear Feet S.F. = Square Feet EA.=Each
C.Y. = Cubic Yard L.S. = Lump Sum AL.=Allowance

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Extension ($)
SW-1	Mobilization for Sewer Work	---	L.S.	---	$50,000
SW-2	Traffic Routing Work for Sewer Work	---	L.S.	---	$25,000
SW-3	Uniformed Off-Duty San Francisco Police Officers As Required for Sewer Work	---	AL.	---	$5,000
SW-4	Rehabilitate 9'x11' Tunnel	4,650	L.F.	$1,250	$5,812,500
SW-5	Post Construction Television Inspection Of Newly Constructed Main Sewers	---	L.S.	---	$10,000
SW-6	Perform Work Necessary Due to Unforeseen Conditions Related to Sewer Work	---	AL.	---	$586,000
SW-7	Field Office Standard Type "B", Equipments And Services	---	L.S.	---	$5,000
				TOTAL	**$6,500,000**

FUTURE WORK

Preliminary Engineer's Estimate

Lake Street Box Sewer

Bid Item No.	Item	Estimated Quantity	Unit	Unit Price	Amount
SW-1	Mobilization And Demobilization For Sewer Work	---	Lump Sum	---	$300,000
SW-2	Traffic Routing Work For Sewer Work	---	Lump Sum	---	$250,000
SW-3	Off-Duty S.F. Police Officer	---	Lump Sum	---	$75,000
SW-4	Excavation For Box Sewer And Structures (Backfill, Bedding, Pavement & Grading)	26,000	C.Y.	$20	$520,000
SW-5	Hauling Of Excavated Material - Box Sewer (Normal & Non-Hazardous Material)	20,800	C.Y.	$10	$208,000
SW-6	Hauling Of Excavated Material - Box Sewer (Class I Landfill)	5,200	C.Y.	$95	$494,000
SW-7	Disposal Of Excavated Box Sewer Material (Normal & Non-Hazardous Material)	20,800	C.Y.	$7	$145,600
SW-8	Disposal Of Excavated Material - Box Sewer (Class I Landfill)	5,200	C.Y.	$250	$1,300,000
SW-9	Trench Support For Box Sewer	93,000	S.F.	$7	$651,000
SW-10	Excavation Dewatering - Box Sewer	---	Lump Sum	---	$100,000
SW-11	12-Foot Inside Width Cast-In-Place Reinforced Concrete Box Sewer	3,100	L.F.	$2,000	$6,200,000
SW-12	Cast-In-Place Reinforced Concrete Access Openings With Removable Slabs	4	EA	$50,000	$200,000
SW-13	Excavation Permit Fee And Pavement Damage Fee Assessed By BSM Per Article 2.4 Of The Public Works Code	---	Allowance	---	$50,000
SW-14	2-Inch Thick Asphalt Concrete Wearing Surface Outside The Sewer Trench As Per Excavation Code (Deletable Bid Item)	46,500	S.F.	$4	$186,000

Bid Item No.	Item	Estimated Quantity	Unit	Unit Price	Amount
SW-15	8-Inch Thick Concrete Base Outside The Sewer Trench As Per Excavation Code(Deletable Bid Item)	15,500	S.F.	$12	$186,000
SW-16	Field Office For Engineer Standard Type "B"	---	Allowance	---	$25,000
SW-17	Allowance For Work Due to Unforeseen Conditions Related To The Sewer Work	---	Allowance	---	$2,119,000
U-1	Utility Relocation	---	Lump Sum	---	$651,000
				TOTAL	**$13,700,000**

FUTURE WORK
PRELIMINARY ENGINEER'S ESTIMATE
New Decant Facilities

Note: L.F. = Linear Feet S.F. = Square Feet EA.=Each
C.Y. = Cubic Yard L.S. = Lump Sum AL.=Allowance

Item No.	Item	Estimated Quantity	Unit	Unit Price ($)	Extension ($)
SW-1	Mobilization for Sewer Work	---	L.S.	---	$300,000
SW-2	Traffic Routing Work for Sewer Work	---	L.S.	---	$100,000
SW-3	Trench And Excavation Support Work	---	L.S.	---	$500,000
SW-4	Decant Chamber/Weir Structure	2	EA.	$500,000	$1,000,000
SW-5	12-Foot Inside Width Cast-In-Place Reinforced Concrete Box Sewer	750	L.F.	$2,500	$1,875,000
SW-6	54-Inch Diameter RC Sewer On Crushed Rock Bedding	1,250	L.F.	$900	$1,125,000
SW-7	Perform Other Related Work	---	AL.	---	$1,960,000
				TOTAL	**$6,900,000**

PROJECT MEMORANDUM

Project Name:	SFPUC Sewer Master Plan	**Date:**	2/21/09
Client:	City and County of San Francisco	**Project Number:**	128680
Prepared By:	Pete Bellows		
Reviewed By:	Denis O'Malley, Lloyd Slezak, Wallis Lee, Greg Braswell, Jon Loiacano, Bonnie Jones, Carolyn Chiu and Nikos Theodoratos		
Subject:	Cayuga Subdrainage Flooding Relief Alternatives Analysis		
Distribution:	<Distribution>		

INTRODUCTION

The San Francisco Public Utilities Commission (SFPUC) has developed a Sewer System Master Plan (SSMP) to establish a vision, strategy, and financial plan for the management of its combined wastewater and storm water handling systems for the next 30 years. The SSMP determined that the basic configuration of the wastewater collection system and locations of the wastewater treatment facilities will remain unchanged at this time. The SSMP also identified potential future configurations for the wastewater system that could be implemented in the future if conditions or requirements change.

The SSMP process also considered flood protection within the service area. Flood protection is typically provided by the collection system for up to the 5-year design storm condition. Portions of study area, including the Cayuga area, experience flooding under conditions less than the 5-year design storm. Flood protection for Cayuga can be improved by constructing a relief sewer along Alemany Avenue and other improvements within Cayuga. This project is known as the Alemany Auxiliary Sewer (AAS). The approximate location of AAS is shown on Figure 1. With AAS, Cayuga would continue to drain eastward towards the Bay. An alternative project, known as the Upper Alemany Diversion (UAD), would also provide flood protection but would divert flow westward towards the ocean. The approximate location of UAD is shown on Figure 2 and includes facilities that could become integral parts of two of the potential future configurations for the wastewater system identified in the SSMP.

The purpose of this project memorandum is to further develop and evaluate these two alternatives considering current and potential future changes in conditions and requirements for the wastewater system. The analysis is based on the following assumptions:

- The existing collection system will remain a combined system.
- The existing wastewater system performance meets current discharge requirements regarding combined sewer discharges (CSDs).
- The collection system should convey runoff under 5-year design storm conditions.
- Runoff under 100-year design storm conditions is preferably conveyed within roadways, curb-to-curb.

Figure 1. Alemany Auxiliary Sewer Alternative (From SSMP)

Figure 2. Upper Alemany Diversion Alternative (From SSMP)

Previous Reports

Information on the Cayuga alternatives is available in the SSMP and the Detailed Drainage Modeling Plan (DDMP).

SSMP. As part of considering alternatives for future major system-wide changes, four basic operational configurations were developed and evaluated for the SSMP. These configurations include improvements throughout the San Francisco Sewer System including treatment plant and collections system improvements.

- In Configuration 1, all existing facilities are retained at their current capacities with upgrades and improvements to existing infrastructure.
- The projects in Configuration 2 allow for redistribution of wastewater treatment and reduction of the wastewater loads at the Southeast Treatment Plant (SEP). In this

configuration, the UAD tunnel would convey dry (~10 mgd) and wet weather (~110 mgd) flows from the Cayuga Drainage Area to Westside Transport/Storage (WTS).

- In Configuration 3, all dry weather treatment is transferred from SEP to Oceanside Treatment Plant (OSP) to minimize community impacts from treatment facilities and provide flexibility in responding to future regulations. While Configuration 3 includes a force main from SEP to OSP, additional analysis indicates that the UAD tunnel could be used as part of the dry weather conveyance system from SEP to OSP, as well as, conveying some wet weather flows.
- Configuration 4 addresses neighborhood impacts from SEP by relocating the entire treatment plant.

The SSMP Scope C collection system team developed a hydraulic model to evaluate the four configurations. The model includes major components of the collection system and sewer pipes 30 inches or greater in diameter. This model was used to evaluate CSDs and collection system hydraulics under design 5-year conditions. CSD evaluation was performed with a "typical" year precipitation and the results were evaluated to project the average number, volume, and locations of CSDs per year.

DDMP. The DDMP was developed to identify typical San Francisco drainage issues that, under certain conditions may cause various types of flooding; to analyze alternatives; and to suggest improvements. The DDMP focuses on seven areas including Cayuga, Ingleside, and Northwest Bayview. Flooding in Ingleside and Northwest Bayview is potentially affected by the Cayuga alternatives.

The DDMP increased the resolution of the hydraulic model in the focus areas by including more sewer pipes, subdividing the existing subcatchments and delineating smaller ones, and routing storm flows overland. Additional calibration of the model was performed to ensure accurate results.

The DDMP further evaluated Cayuga flooding under conditions created by a storm occurring at a 5-year recurrence interval, referred to as 5-year design storm conditions, and the UAD and AAS alternatives. A comparison of these alternatives was performed although a construction cost estimate was not prepared. The comparison scored the alternatives in six major categories and UAD had the better score. As noted in the DDMP, this comparison should not be considered definitive.

FLOODING

This section presents a summary of the collection systems and flooding in, and related to, Cayuga, Ingleside, and Northwest Bayview areas. These approximate areas are shown on Figure 3. Ingleside and Northwest Bayview are included because of the potential effect of a tunnel on flooding in these areas. This summary is based on the DDMP and additional analysis performed for this study. Figures that show more detail on the location of historical flooding and model predicted flooding for these areas can be found in Appendix A.

Figure 3. Cayuga, Ingleside and Northwest Bayview Drainage Areas

Cayuga

The Cayuga area is shown in more detail on Figure 4 and straddles the old Islais Creek. The collection system within Cayuga drains to two major trunk sewers on Cayuga Avenue and on Alemany Boulevard. These trunk sewers converge just below the Cayuga area and convey flow along Alemany Boulevard and Industrial Street to the Islais Creek Transport and Storage (ICTS) system and Selby Outfall. Dry weather flows are conveyed to SEP for treatment and disposal.

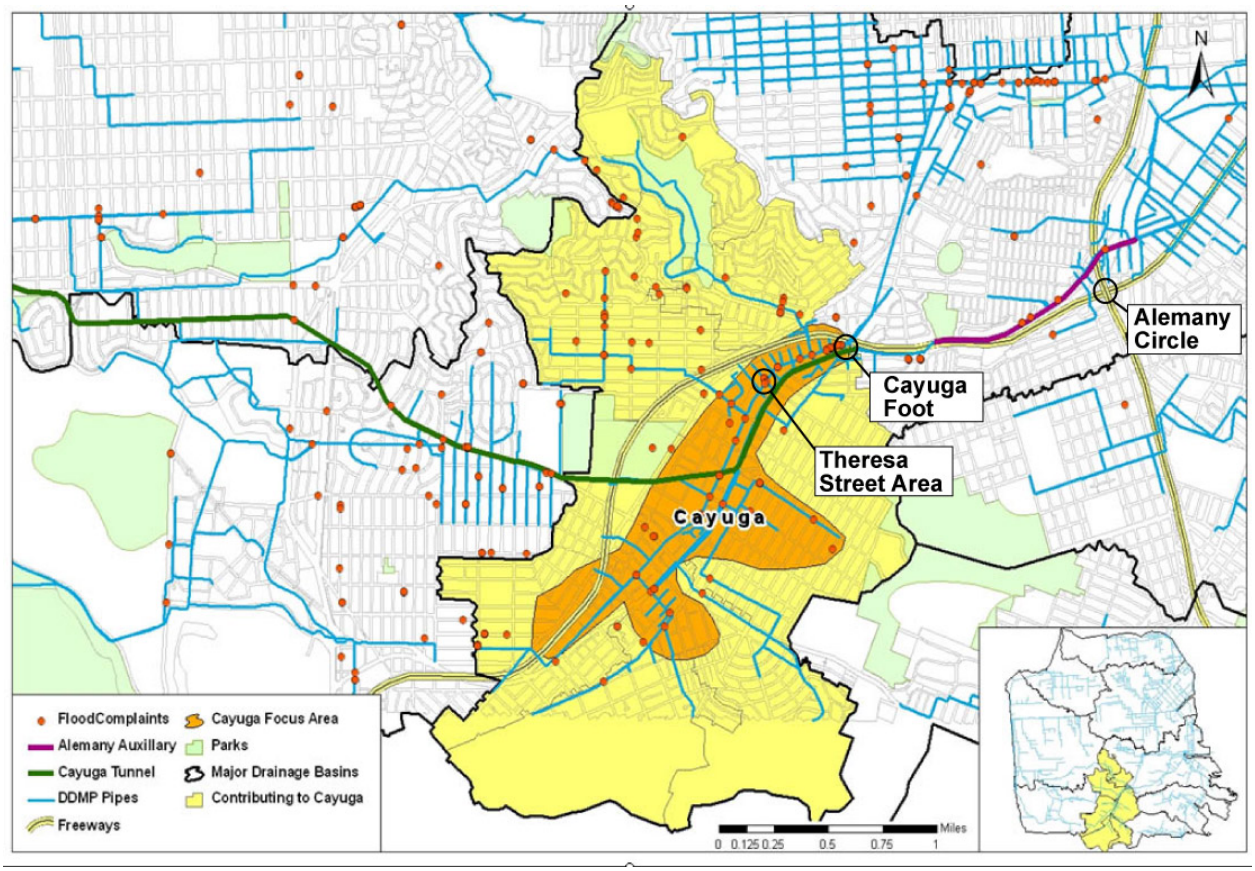


Figure 4. Cayuga Area (From DDMP)

Under typical year conditions, no flooding occurs in Cayuga or downstream. Wet weather flows are handled by the ICTS and Selby Outfall and CSD requirements are met.

The Cayuga area has a history of flooding under conditions less than the 5-year design storm. During 5-year design storm conditions, the HGL within the collection system in Cayuga rises above ground surface resulting in localized flooding – particularly near Theresa Street and Cayuga Avenue. This area is a low point that exacerbates flooding.

Under 5-year design storm conditions, flooding also occurs downstream from Cayuga along the Alemany trunk sewer and at Alemany Circle. This flooding is a direct result of constrictions in the Alemany sewer in the area of the Farmers Market and wet weather flows from Cayuga. Solutions to resolve flooding within Cayuga also must address the downstream flooding at Alemany Circle.

Under conditions greater than the 5-year design storm, water begins to back up at constrictions in more portions of the existing Alemany trunk sewer downstream from Cayuga. This limits the amount of flow in the existing Alemany trunk sewer and causes the HGL to rise in the Cayuga foot area, which floods. The Cayuga foot is located at the lower portion of Cayuga near Interstate 280 (I-280). Construction of the interstate blocked overland runoff in local streets and that exacerbates flooding. A very large storm in 2004 resulted in ponding that was approximately six feet deep.

The DDMP evaluated UAD and AAS alternatives to address the flooding in Cayuga and along Alemany Boulevard under 5-year design storm conditions. Flooding resulting from larger storms was not evaluated in the DDMP.

Ingleside

The Ingleside area is located directly west of Cayuga and is shown on Figure 5. Ingleside experiences localized flooding under 5-year design storm conditions with most of the flooding located near Ocean Avenue. The DDMP identified six alternatives to address flooding in Ingleside. The most viable alternatives were, utilizing the tunnel developed for UAD or constructing a series of relief sewers.

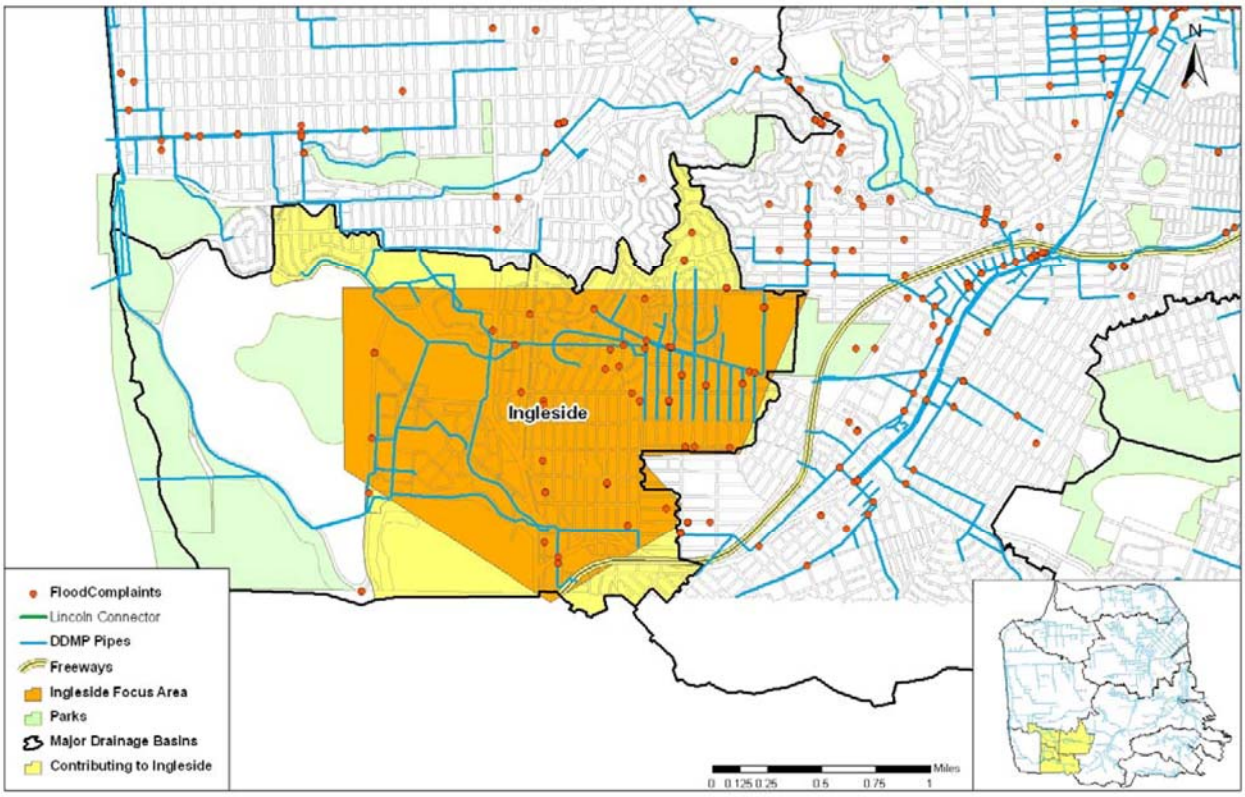


Figure 5. Ingleside Area (From DDMP)

Part of the route of the UAD tunnel is along Ocean Avenue, which facilitates using the tunnel to intercept a portion of the flows in this area that contribute to flooding along Ocean Avenue. This alternative implements a drop shaft at the intersections of Ocean and Lee avenues. The location of this dropout is considered to be the most feasible in terms of constructability and land availability. It also provides a site for venting the tunnel. Figure 6 shows the location of the UAD drop shaft along Ocean Avenue. The drop shaft would convey about 45 million gallons per day (mgd) of wet weather flows from Phelam Street to the tunnel. This would resolve flooding in most of Ingleside so other collection system improvements would not be needed.

Dry weather flow would be configured to continue along Ocean Avenue.

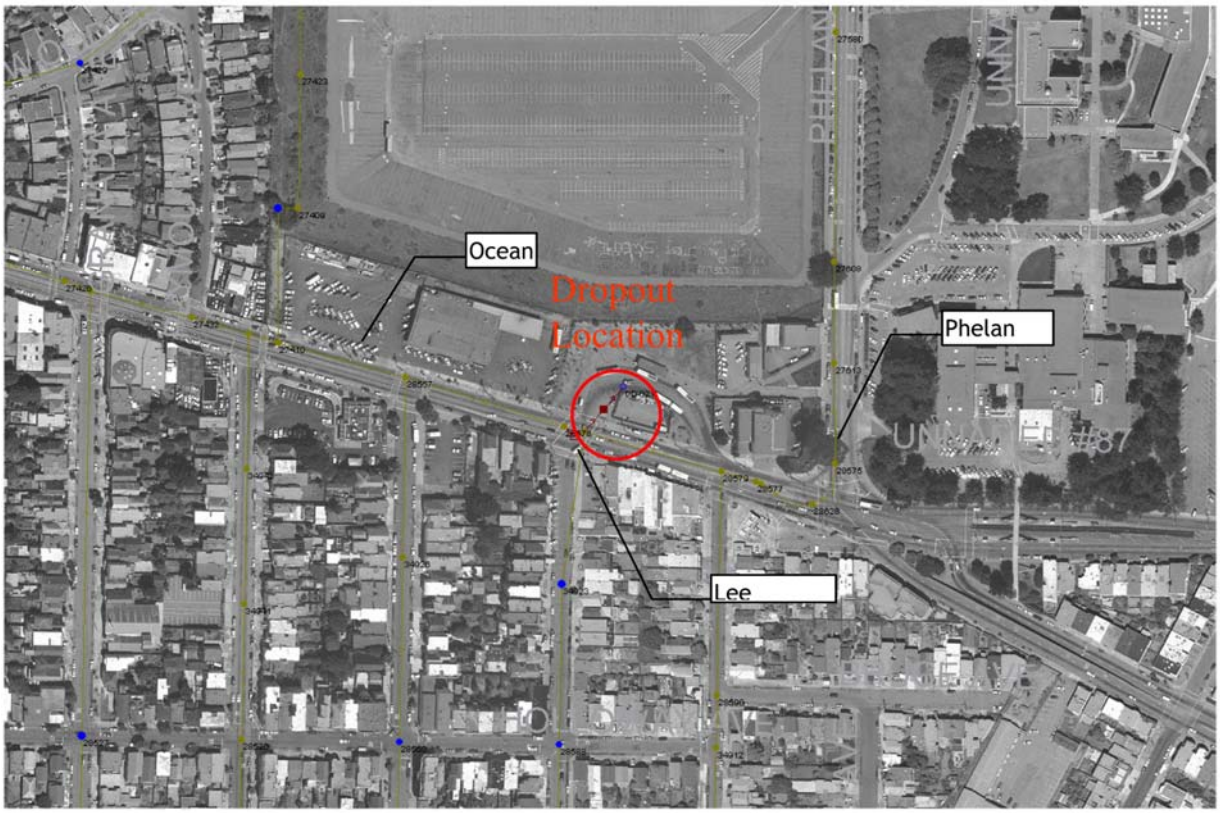


Figure 6. Upper Alemany Diversion Drop Out (From DDMP)

The AAS would have no direct impact on flooding in Ingleside.

Northwest Bayview

Northwest Bayview is located east of and downstream from Cayuga and is shown on Figure 7. Both UAD and AAS would affect localized flooding in Northwest Bayview under 5-year design storm conditions. According to the DDMP, the Cayuga area is the source of almost 40 percent of the total flow that drains to Northwest Bayview.

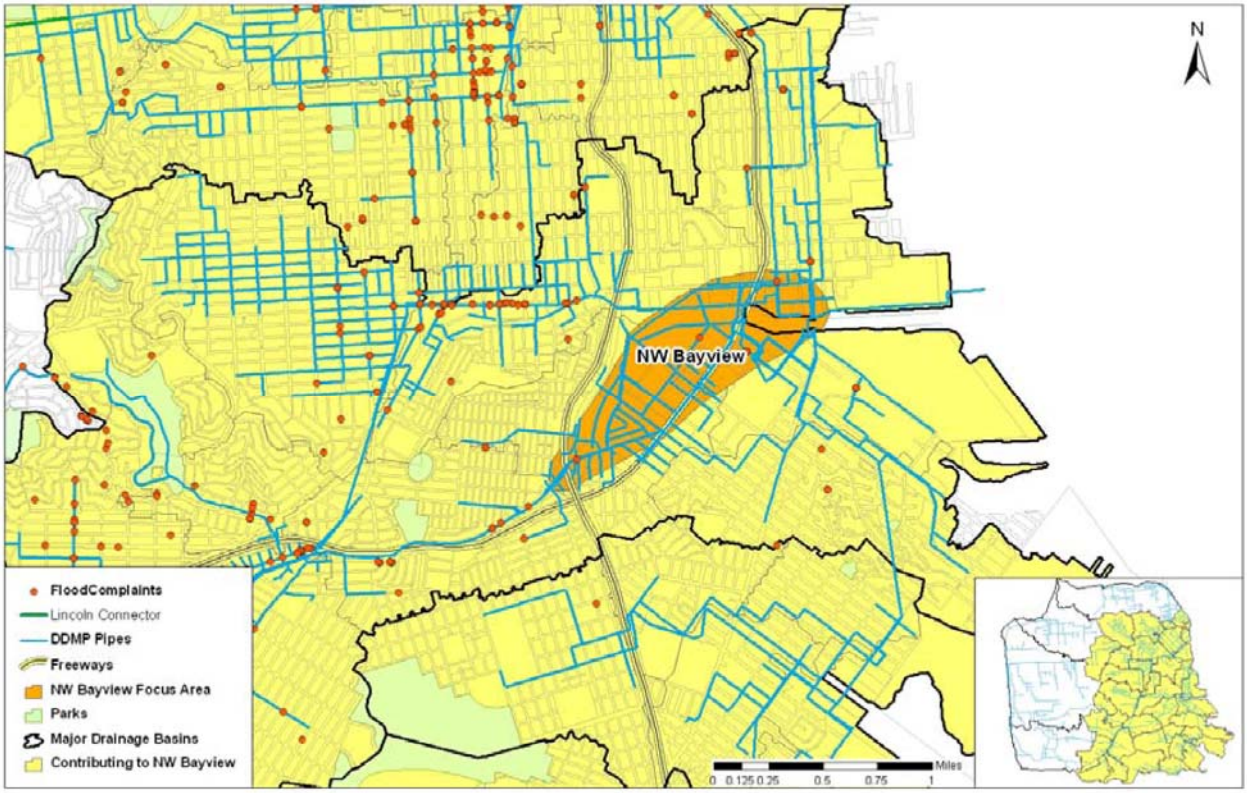


Figure 7. Northwest Bayview (From DDMP)

Northwest Bayview consists mostly of warehouses and other industrial type facilities. The land in this area is mostly fill. Local flooding is caused by surface subsidence. As noted above, the existing Alemany sewer cannot convey the 5-year design storm flows without overflowing at Alemany Circle. The overflows reduce the current flows in the Selby sewer. If the overflows at the Alemany sewer are eliminated by construction of AAS, the wet weather flows in Selby would increase, aggravating flooding on Toland Street. Conversely, construction of UAD would reduce the flow in the Alemany and Selby sewers and reduce flooding on Toland Street.

Additional hydraulic analysis was performed for the DDMP to evaluate the effects of UAD and AAS on the HGL along Selby Street. It was found that UAD would lower the peak HGL elevation by 1.0 foot compared to the existing condition and AAS would raised the peak HGL elevation by 0.8 feet compared to the existing condition. The two alternatives showed a net result difference of 1.8 feet in HGL elevation.

The DDMP evaluated two alternatives for controlling flooding in the Northwest Bayview area. A storage and pumping facility could be used to isolate the Toland sewer from the Selby and Napoleon sewers. This would eliminate flooding under 5-year design storm conditions. These facilities would be designed to allow dry weather flows to continue to flow by gravity. The size of the storage facility is dependent on whether AAS or UAD is constructed. With AAS, more storage would be required than with UAD.

ALTERNATIVES

AAS was developed to resolve flooding problems associated with Cayuga including flooding at the Alemany Circle under 5-year design storm conditions. As identified above, UAD would provide wider flood protection including 5-year flood protection in Ingleside and allow for smaller

flood protection facilities in Northwest Bayview. In order to perform a full analysis of these alternatives, both alternatives are further developed to include all facilities needed to provide equivalent protection under 5-year design flow conditions in the Cayuga, Ingleside, and Northwest Bayview areas.

Additional hydraulic analysis determined that UAD can provide flood protection in Cayuga for conditions greater than the 5-year design storm. For most areas, drainage from storms larger than the 5-year event is conveyed by the collection system and by streets as gutter flow. This method of flood routing for the Cayuga basin was precluded by construction of I-280 which blocks runoff and prevents it from leaving the Cayuga area. Consequently, improvements in the collection system that can convey flows resulting from storms larger than the 5-year design storm could be very beneficial to Cayuga. The hydraulic analysis concluded that UAD can effectively protect the Cayuga from flooding for up to 10-year storm events.

AAS and UAD alternatives, with the additional facilities to provide equivalent flood protection for the 5-year and 10-year design storm conditions, are described below.

Upper Alemany Diversion Alternative

The UAD tunnel was initially developed for Configuration 2 in the SSMP and was further refined by San Francisco Bureau of Engineering (BOE). It has also been recognized that the tunnel could serve well for Configuration 3, although initial definition of this configuration assumed an underground force main for conveying bay side dry weather flows to the west side. Consideration was given to several potential uses of the tunnel including:

1. Convey wastewater flow by gravity from Cayuga to OSP, including wet weather flows.
2. Convey additional wastewater flow by gravity from north of Cayuga to OSP by extending the tunnel to Delores Park. The tunnel would convey dry weather and some wet weather flows.
3. Convey dry weather wastewater flow from SEP to OSP. Connecting a force main to the tunnel instead of constructing a longer force main by the open trench method would reduce the static head from over 200 feet to about 70 feet. This would result in a large savings in energy and would negate the need for a second-stage pumping station.
4. Convey wet weather flows in Ingleside to alleviate local flooding under 5-year design storm conditions.

Several alignments were evaluated for the tunnel. The preferred alignment was selected based on several factors including being located within existing city street right-of-ways, the location of the Ingleside vent and ability to best intercept Ingleside flows. This alignment is shown on Figure 8.

The portion of the tunnel that would be constructed as UAD extends westward from the Cayuga area to the WTS. It would include two drop structures in Cayuga to divert wet weather, and possibly dry weather, flows to OSP. This would lower the HGL in Cayuga and prevent flooding under the 5-year design storm condition. The tunnel would also have a drop structure in Ingleside to vent air and to relieve flooding in the Ingleside area. Other options and uses of the tunnel in the future are also shown on Figure 8. The proposed alignment is consistent with these optional uses.

Figure 8. Tunnel Options and Uses in the Future

The tunnel size was based on an evaluation of tunneling equipment and tunnel construction costs and then optimized with respect to cost and capacity. Larger diameter tunnels would cost substantially more and smaller tunnels would have much less capacity without significant cost savings. With this approach, the tunnel was not sized to provide a specific hydraulic conveyance capacity or storage volume. Instead, the tunnel is viewed as a significant resource for the collection system to relieve flooding in Cayuga while having the potential for conveying future flows westward. The proposed size of the tunnel for the UAD portion is 10,500 linear feet (lf) of 14-foot and 15,500 lf of 17-foot diameter tunnel.

The components of the UAD alternative are shown on Figure 9 and are listed in Table 1 and further described below.

Figure 9. Upper Alemany Diversion Alternative Components

Table 1. UAD Alternative Summary		
Alternative Elements	**5-Year Design Storm Protection**	**10-year Design Storm Protection** [1]
Tunnel[2]	From Cayuga to WTS 15,500 lf of 17 ft diameter (rock) and 10,500 lf of 14 ft diameter (soft soil)	From Cayuga to WTS 15,500 lf of 17 ft diameter (rock) and 10,500 lf of 14 ft diameter (soft soil)
Drop structures	2 located in Cayuga 1 in Ingleside	2 located in Cayuga 1 in Ingleside
Decant PS	125 mgd expansion (300 mgd total discharge through SWOO)	125 mgd expansion (300 mgd total discharge through SWOO)
Existing Alemany Trunk Sewer	Not modified (780 mgd)	Not modified (780 mgd)
Limit flow from tunnel to WTS	110 mgd flow limiter	200 mgd flow limiter[3]
Lower Islais Creek Sewers (Toland projects)	1700 lf of 24-inch diameter pipe 8.6 mgd pumping	1700 lf of 24-inch diameter pipe 8.6 mgd pumping

[1]Modeling runs determined that maximum flow delivered by the UAD tunnel should not exceed 200 mgd so as to prevent flooding in the Sunset area. This flow corresponds to the 10 year storm in the Cayuga Area. If further flooding capacity is desired, the UAD tunnel can convey the flow but other modifications will need to be made on the West side. Therefore, the 10 year storm was selected as the storm to evaluate in the Additional Flooding Protection Alternative.
[2]Tunnel sizing was based on optimization of tunneling equipment and construction costs.
[3]Flow limitation will be set at 110 mgd for standard operation. In the event of a large storm or rising volume of water the limitation can be adjusted to allow up to 200 mgd.

5-Year Flood Protection

The UAD alternative consists of a tunnel from the Cayuga area to the WTS and includes the following features.

- 14-foot and 17-foot diameter tunnel 10,500 lf and 15,500 lf long. Flow from the tunnel to the WTS is restricted to 110 mgd to prevent an increase in CSDs on the west side.
- Two drop structures in Cayuga that will lower HGL so no local flooding will occur under 5-year design storm condition in subsidence area.
- One drop structure in Ingleside to vent air from the tunnel and to relieve flooding in the Ingleside area.
- Decant Pump Station expansion by 125 mgd, for a total capacity of 235 mgd, to accommodate flow from tunnel.

The tunnel would serve as the primary conveyance facility for Cayuga and could potentially carry dry weather flow (10 mgd) from Cayuga to OSP. The tunnel could also carry initial wet weather flows resulting from precipitation in a typical year. Under these smaller storm conditions, wet weather flow would be conveyed by the tunnel to WTS, which would reduce the number of CSDs to the bay. In order to prevent an increase in the number of CSDs to the ocean, the discharge of the tunnel to WTS would be limited to 110 mgd and some of the tunnel's volume would be used for storage. Additionally, the Decant Pump Station would be expanded by 125 mgd to 235 mgd. This increased decant flow along with the secondary effluent flow from OSP would total 300 mgd, which is the gravity capacity of SWOO. As wet weather flows increases to the 5-year design storm condition, the exiting Alemany Trunk sewer would also convey wet weather flows up to its capacity of about 780 mgd. These flows would be conveyed to Selby sewer and ICTS system.

The tunnel would also provide flooding relief in Ingleside by intercepting about 44 mgd of wet

weather flow under 5-year design storm conditions at the drop inlet/vent at Ocean near Phelam.

Subsequent hydraulic analysis by BOE identified an additional benefit associated with UAD. UAD would reduce the HGL in the Northwest Bayview area by about 1 foot under 5-year design storm conditions. The DDMP identified new storage and pumping facilities to control flooding under the 5-year design storm conditions. Lowering the HGL would reduce the size of those new facilities.

The following storage and pumping improvements would be needed on Toland Street in Northwest Bayview:

- Pipe storage in 1700 lf of 24-inch diameter pipe
- 8.6 mgd wet weather pump station.

Additional Flood Protection

The City's flood protection goal is to convey 5-year design storm flows in the collection system and 100-year design storm flows on the streets, curb-to-curb. As noted previously, surface flow from large storms cannot be conveyed by streets out of Cayuga because of I-280. A simple culvert under I-280 would alleviate flooding in Cayuga but exacerbate the existing flooding in Northwest Bayview bringing excess overland flow down Alemany to the Farmers Market and interchange where I-280 and US 101 meet.

Flooding in Cayuga under some storms larger than 5-year design storm conditions could be reduced by increasing the amount of flow conveyed by the collection system. This would be a departure from with City's goal but may be the most direct method of reducing flooding risk in this special case.

UAD has potential for providing flood protection within Cayuga under storms that are larger than 5-year design storm at little, if any, additional cost because the tunnel's hydraulic capacity is greater than the 5-year design storm flows. As noted previously, the size of UAD was based on construction considerations and not a specific hydraulic capacity. Additional hydraulic analysis was performed to determine the actual hydraulic capacity of the proposed 14-foot and 17-foot tunnel. The analysis was based on several conditions.

1. Flow from Ingleside would be limited to excess flow under 5-year design storm conditions. The purpose of this analysis is to investigate additional flood protection in Cayuga because of the unique conditions that prevent surface runoff. Ingleside does not have the same unique conditions and, therefore, flood protection provided by the collection system for larger storm conditions was not considered.
2. Flow from the tunnel into WTS would not be limited to 110 mgd. This limit was set to prevent additional CSDs on the west side under typical year conditions. A storm with a recurrence interval greater than 5-years will cause a CSD regardless of the limits on tunnel flows into WTS. Instead, flow from the tunnel into WTS would need to be limited so as not to aggravate flooding in the Sunset district under this condition. The hydraulic model was used to determine the maximum flow from the tunnel into WTS that did not cause flooding in the Sunset under 5-year design storm conditions. The controlling collection system facilities are the Vicente and Lincoln Outfalls and the lengths of the corresponding weirs. Flow from the tunnel would cause the HGL in WTS to rise resulting in the HGL in the collections system to rise. A tenth of a foot is the maximum allowable increase in HGL to minimize the potential for increased flooding in the Sunset. The hydraulic analysis determined that 200 mgd of flow from the tunnel could be added to WTS before the HGL increased above this level.

3. The Decant Pump Station will not be further expanded beyond 235 mgd. This is the maximum capacity that will allow SWOO to operate under gravity mode. The Decant Pump Station could be increased to 525 mgd, which when added to the 65 mgd of treated effluent from OSP would match the ultimate hydraulic capacity of SWOO of 590 mgd. However, a new effluent pumping station would be needed to pump treated effluent from OSP into SWOO. This would be a new major facility and would not be consistent with the basic premise of this analysis, which is to determine the maximum flood protection potential of UAD with only minor modifications
4. The model was run with the discharge to WTS limited to 200 mgd to determine the maximum design storm condition before flooding occurred at Alemany Circle. Alemany Circle was the critical location where flooding would first occur. The maximum design storm was found to be a 10-year design storm.

As with the 5-year alternative, improvements would be needed to prevent flooding on Toland Street. The Toland Street improvements are sized to accommodate the 5-year design storm flows in Northwest Bayview and not the 10-year design storm flows because the purpose of this alternative is to investigate providing 10-year flood protection only in Cayuga. The Toland Street improvements include pipe storage in 1700 lf of 24-inch diameter pipe and an 8.6 mgd pumping station.

The flow restriction at the downstream end of the tunnel would be set to limit flows to 110 mgd during typical operation. As the level in the tunnel begins to rise and the restriction can be adjusted manually or through automation to allow 200 mgd through the tunnel to provide flooding protection during the 10-year storm.

As with the 5-year design storm protection, the existing Alemany trunk sewer would convey up to 780 mgd of wet weather flow. Any additional flow in the Alemany trunk sewer would result in flooding on Toland Street. The HGL in the Northwest Bayview area would be lowered by about 1 foot under 5-year design storm conditions.

Alemany Auxiliary Sewer Alternative

AAS was initially developed as an alternative for alleviating flooding in Cayuga. Additional facilities are needed so that the AAS alternative would provide the same level of flood protection in Ingleside and Northwest Bayview as would the UAD alternative. The AAS alternative is shown on Figure 10 and summarized in Table 2.

Figure 10. Alemany Auxiliary Sewer Alternative Components

Table 2. AAS Alternative Summary		
Alternative Elements	**5-Year Design Storm Protection**	**10-year Design Storm Protection** [1]
Existing Alemany Trunk Sewer	Not modified (780 mgd capacity)	Not modified (780 mgd capacity)
Box Culvert Parallel to Existing Alemany Sewer	8.5 ft x 11 ft [2] 6,050 lf	9 ft x 13 ft [2] 6,050 lf
Theresa Street	2300 lf of 24-inch diameter pipe 5 mgd of pumping 450 lf of 12" force main	2300 lf of 24-inch diameter pipe 5 mgd of pumping 450 lf of 12-inch force main
Ingleside improvements	Ocean Avenue between Harold to Pico – 900 lf of 42-inch, 600 lf of 48-inch, 300 lf of 54-inch, 1100 lf of 60-inch, 320 lf of 63-inch and 70 lf of 66-inch pipe City Easement through Urbano and SFSU – 5800 lf of 60-inch pipe Horseshoe Sewer – 5200 lf of 11.5 ft pipe Lake Merced 3-Compartment – 3000 lf of 93-inch auxiliary	Ocean Avenue between Harold to Pico – 900 lf of 42-inch, 600 lf of 48-inch, 300 lf of 54-inch, 1100 lf of 60-inch, 320 lf of 63-inch and 70 lf of 66-inch pipe City Easement through Urbano and SFSU – 5800 lf of 60-inch pipe Horseshoe Sewer – 5200 lf of 11.5 ft pipe Lake Merced 3-Compartment – 3000 lf of 93-inch auxiliary
Lower Islais Creek Sewers (Toland projects)	50 lf of 18-inch force main 10 ft x10 ft box culvert, 200 lf[2] 8.6 mgd of pumping	50 lf of 18-inch force main 10 ft x10 ft box culvert, 200 lf[2] 8.6 mgd of pumping

[1]Modeling runs determined that maximum flow delivered by the UAD tunnel should not exceed 200 mgd so as to prevent flooding in the Sunset area. This flow corresponds to the 10 year storm in the Cayuga Area. If further flooding capacity is desired, the UAD tunnel can convey the flow but other modifications will need to be made on the West side. Therefore, the 10 year storm was selected as the storm to evaluate in the Additional Flooding Protection Alternative.

[2]Box walls and top will be 12 ft thick; the bottom will be 24 in thick. Piles will be needed for this structure. Two piles, 12 inx12 in prestressed, 10 ft o.c., 70 ft depth.

5-Year Flood Protection

The AAS Alternative consists of a relief sewer along Alemany and storage and pumping facilities within Cayuga to address localized flooding in the subsidence area. Features include:

- The existing Alemany trunk sewer needs a parallel relief sewer that is 6,050 lf of 8.5 ft x 11 ft. This facility would be located downstream of Cayuga to prevent flooding near the Alemany Circle and Farmers Market.
- Localized flooding within Cayuga in the vicinity of Theresa Street would be controlled by isolating a portion of the existing sewer on Cayuga Street with the construction of 2,300 lf of 24-inch pipeline and a 5 mgd pump station.

The existing Alemany sewer would continue to convey dry weather flow and wet weather flow up to 780 mgd under the 5-year design storm condition. Additional wet weather flow would be diverted to AAS. Dry weather flow would continue to be treated at SEP.

No expansion of the Decant Pump Station would be needed because the west side collection system meets current discharge requirements.

The AAS alternative would increase the HGL on Toland Street in Northwest Bayview by 0.8 feet. In order to provide flood protection for the 5-year design storm condition, the following improvements would be needed:

- 200 lf of 10 ft x 10 ft culvert to provide storage.
- 8.6 mgd wet weather pumping station.

AAS would have no impact on flooding in Ingleside. Therefore, additional collection system improvements would be needed in Ingleside to provide 5-year flood protection. These facilities are identified in the DDMP and include:

- A total of 17,000 lf of relief sewers ranging in size from 42 inches to 138 inches would be needed to convey flows to the Lake Merced Transport/Storage facility, The DDMP divided the improvements into three projects.

Additional Flooding Protection

The AAS alternative can be modified to provide 10-year design storm flood protection on a comparable basis with UAD. The primary issues that need to be addressed are flooding at Alemany Circle and at Theresa Street. Flood protection on Toland Street and Ingleside would be limited to 5-year design storms as with the UAD Alternative:

- The AAS would need to be expanded from to 9 ft x 13 ft to have sufficient capacity. The length would remain at 6,050 lf.
- Improvements to prevent flooding at Theresa Street would remain a 24-inch pipeline and 5 mgd pump station.

Constructing a new outfall to the Bay for the Cayuga flow could be very difficult and costly so the conduit would need to tie into ICTS system and the Selby Outfall. The hydraulic model revealed that the 10-year design storm flow would cause an increase in the HGL in sewers connecting to ICTS of only about 0.1 feet. As with the west side of the City, this is considered an acceptable rise in HGL so no other facilities are needed.

ALTERNATIVES EVALUATION

This section presents the evaluation of the alternatives. The alternatives evaluation is based on cost, DDMP evaluation, and compatibility with potential future changes in the wastewater system.

Costs

Opinions of probable construction cost were developed using the same basis as for the SSMP. The basis of the cost estimates are summarized in PMA 15 – Basis of Cost Evaluation dated August 8, 2006. Detailed construction cost estimates are located in Attachment A and are summarized in Table 3.

Table 3. Alternatives Cost Summary[1]		
Alternative Elements	**5-year Flood Protection**	**10-year Flood Protection**
UAD Alternative		
UAD Elements		
Tunnel	277	277
Drop structures	3	3
UAD Subtotal	**280**	**280**
Additional Projects		
Decant PS	19	19
Lower Islais Creek Sewers (Toland projects)	2	2
UAD Alternative Total	**301**	**301**
AAS Alternative		
AAS Elements		
Box Culvert Parallel to Existing Alemany Sewer	85	96
Theresa Street	2	2
AAS Subtotal	**87**	**98**
Additional Projects		
Ingleside improvements	26	26
Lower Islais Creek Sewers (Toland projects)	4	4
AAS Alternative Total	**117**	**126**

[1]All numbers are presented in 2007 million dollars

The UAD Alternative has substantially higher estimated construction costs.

DDMP Analysis.

The DDMP included an alternative evaluation based on six categories. The purpose of the evaluation is to consider alternatives relative to each other. The evaluation did not include construction costs and was not considered definitive. Weighting factors were not developed for the criteria. Information on the criteria used in the evaluation is contained in the DDMP.

The DDMP analysis found UAD to be favorable to AAS for three reasons. First, the tunnel would provide additional storage in the collection system and would delay the timing of peak flows. While these factors were included in the 5-year design storm hydraulic analysis used to develop the alternatives, actual storms are much more variable and additional storage and delay of peak flows could be beneficial to the operation of the collection system.

Second, UAD was considered to have less odor potential because the tunnel would have only one vent. However, if land use by the vent changes in the future, odor complaints could arise from nearby residents.

Third, construction of the tunnel would have less impact on residents and businesses than construction of the AAS Alternative. The AAS alternative would include construction activities spread across large areas while construction of the tunnel would be centralized at the drop structures and downstream portal.

The DDMP analysis identifies important issues that would need to be addressed during design and construction. None of the issues is considered to be a fatal flaw for either alternative.

Compatibility with Potential Future Changes

As noted earlier, the SSMP is providing a 30-year vision for the wastewater system and four long-term operating configurations were analyzed to meet potential future conditions. While a decision was made to remain with the existing wastewater system configuration for this planning period, other configurations remain potentially viable for the future. Consideration of how today's choice of Cayuga flood relief is accomplished should still be weighed against what could happen in the future planning periods. This section discusses the compatibility of UAD and AAS with the potential other future operating configurations and with other long-term concerns.

Future Operating Configurations. UAD would be an integral part of Configurations 2 and 3 and AAS would be an integral part of Configurations 1 and 4. It is important to note that investment in AAS to solve flooding in Cayuga now, does not preclude future investment in UAD or vice versa. If one alternative is constructed now and future conditions lead to building the other alternative, the combination of UAD and AAS would provide flood protection in Cayuga beyond the 10-year design storm condition.

Sea Level Rise. The City is anticipating a rise in Mean Higher High Water Elevation of anywhere from 14 to 41 inches over the next 100 years. The collection system is essentially permanent infrastructure and therefore, it is appropriate to consider sea level rise. A rise in sea level would have more affect on the bay side discharges than on the ocean side discharges because of the elevations of the overflow weirs in the transport and storage system. The overflow weirs on the bay side could be submerged under some situations, which would disrupt the current operations. New large pumping facilities would likely be required. The ocean side weirs are set 9 feet higher than the bay side weirs and would still be above sea level even with a 2-foot rise.

UAD would divert wet weather flow to the ocean side thus reducing the amount of potential future pumping. AAS would result in more future pumping. Thus, UAD is considered to be more compatible with sea level rise.

Regulatory Changes. Regulatory changes that are anticipated in the future include requirements for increased levels of treatment on dry weather discharges to the bay. Future Total Maximum Daily Loading (TMDL) allocations for priority pollutants may cause re-evaluation of the number of allowable CSDs on the bay side or the total volume thereof. Should discharge requirements change for bay side dry weather flows, the City can either invest in process upgrades at SEP or treat all dry weather flows at OSP and discharge effluent to the ocean. Similarly, bay side CSDs can be decreased by either increasing process and outfall capacity at SEP or by moving the flows over to the ocean side. The UAD alternative provides the flexibility to shift flows from the bay side to the ocean side, either for dry weather treatment at OSP or wet weather discharge through SWOO.

Public Aspect. UAD could shift some wastewater away from SEP. Shifting flows away from SEP helps alleviate the burden of one community in San Francisco receiving the majority of the flows for the entire city. There is public support for minimizing the impacts from treatment at SEP to the surrounding community. On the other hand, there may be public concern about potential odors emanating from a tunnel transporting wastewater to OSP. At this time, neither alternative can be identified as being more or less favorable to the public.

APPENDIX A

This Appendix contains figures from the DDMP that show historical flood and model predicted flooding in the three focus areas of Cayuga, Ingleside and Northwest Bayview.

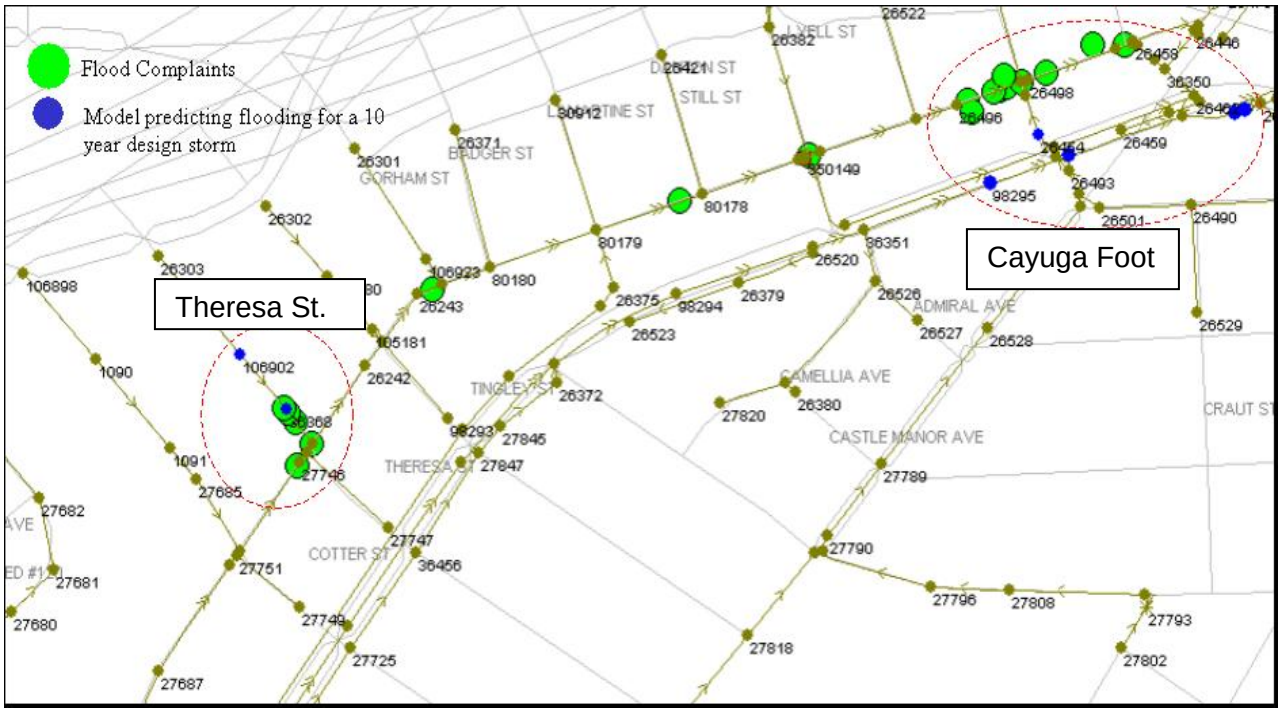


Figure A-1. Flooding Areas within Cayuga

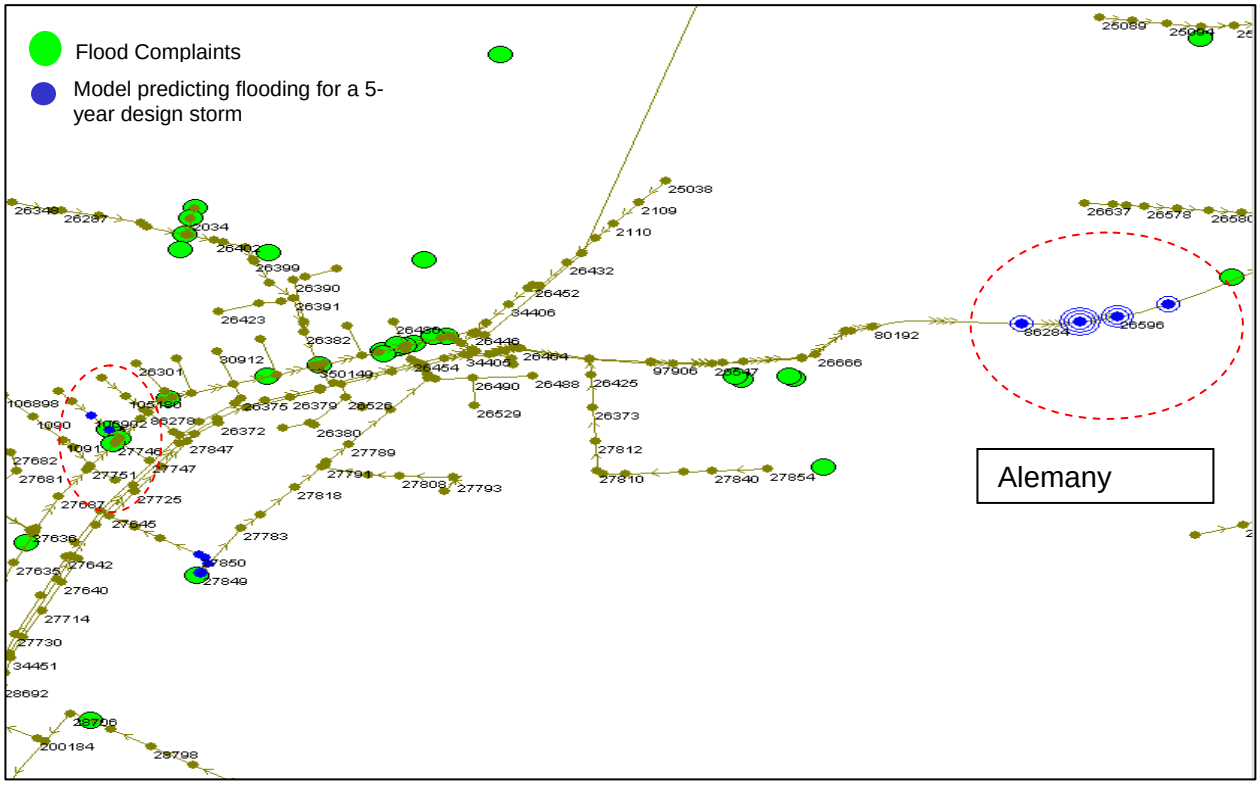


Figure A-2. Flooding within and Downstream from Cayuga

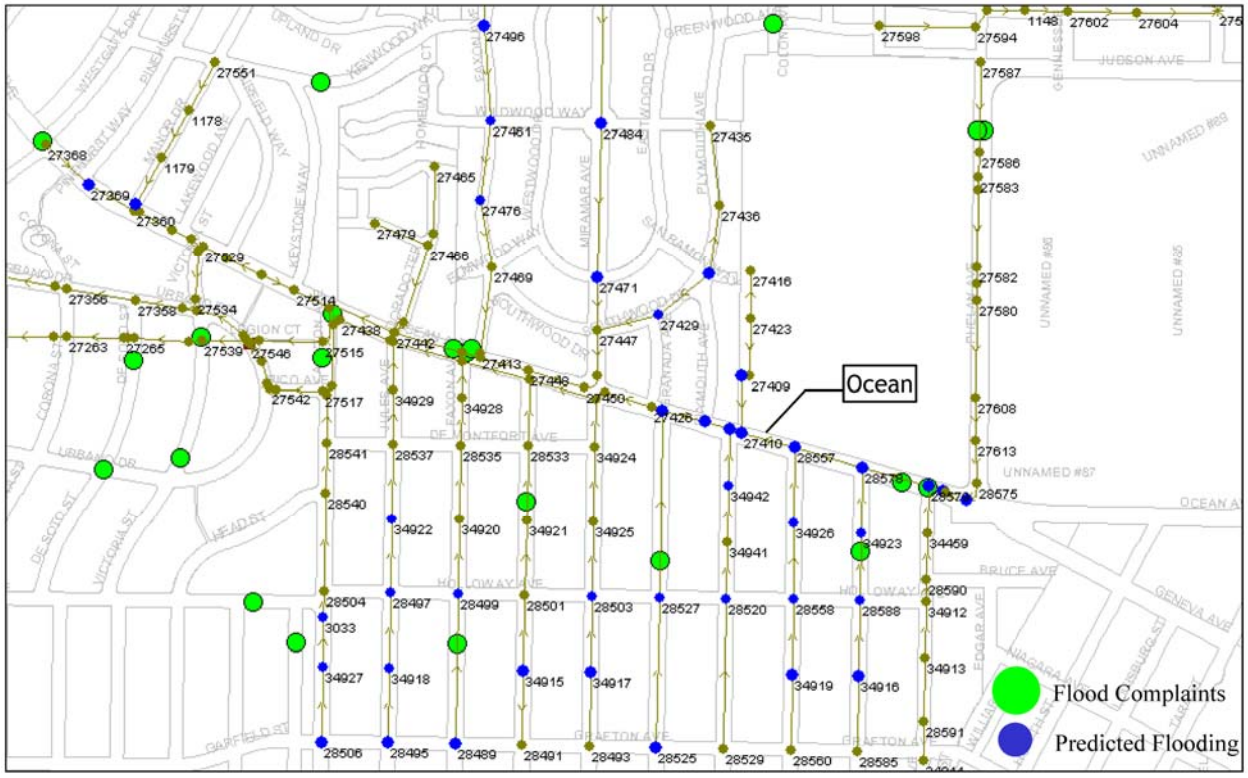


Figure A-3. Ingleside Existing Conditions Model Compared to Flood Complaint Records

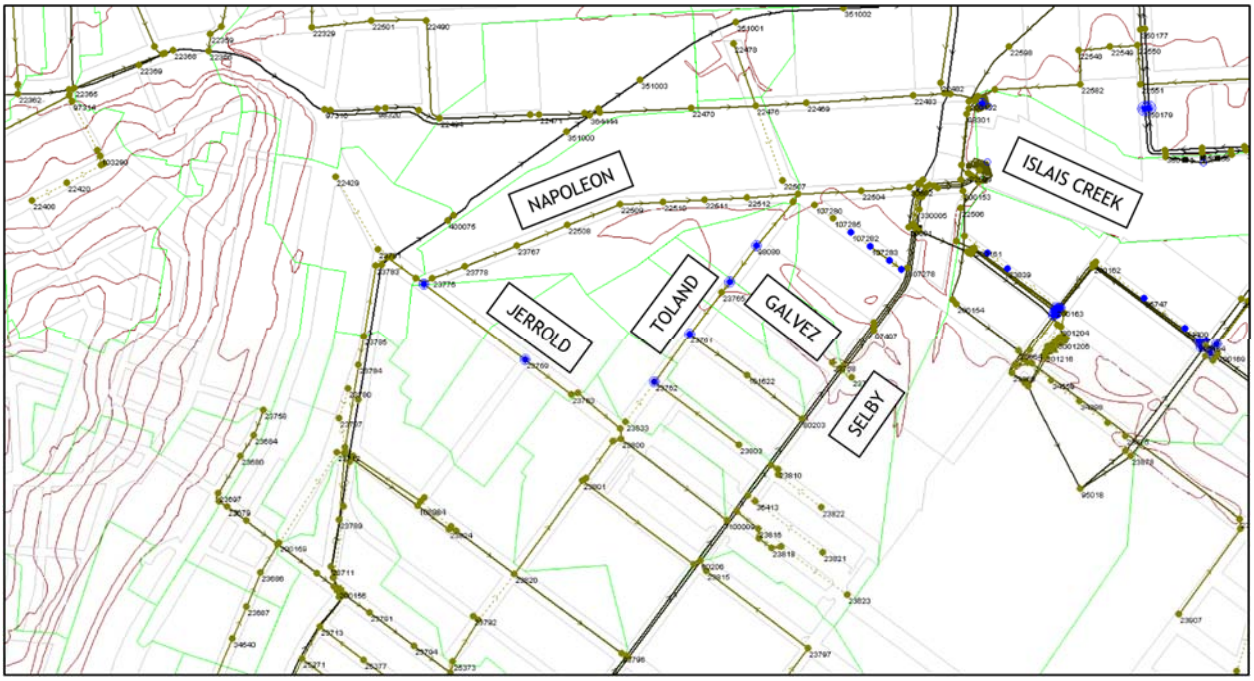


Figure A-4. Flooding Locations in Northwest Bayview