Draft Final Technical Memorandum CIP-4

RVSD Sewer System Assessment and Capital Improvement Planning

Subject: **Capital Improvement Strategic Plan**

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1 Introduction

RMC is completing a comprehensive Sewer System Assessment and Capital Improvement Planning (SSACIP) effort for Ross Valley Sanitary District (District). The purpose of this project is to evaluate existing pump stations, force mains, and gravity sewers, and establish requirements and develop a plan for continued rehabilitation or replacement of these facilities. Facility rehabilitation plans have been summarized in the Sewer System Replacement Master Plan dated January 2007. The SSACIP effort incorporates information from other work recently completed by the District, including the Sanitary Sewer Hydraulic Evaluation and Capacity Assurance Plan (SHECAP) and development of the District's inventory, maintenance, and condition assessment database (called HIMCAD), as well as on-going sewer rehabilitation projects.[1]

The purpose of this Technical Memorandum (TM) is to present a 10-year Capital Improvement Strategic Plan (CIP). The CIP includes projects that were identified in the Sewer System Replacement Master Plan, prioritized using a weighted decision model, and phased to provide a balanced approach to meeting the District's objectives for safety, environmental responsiveness, and financial responsibility.

The CIP presents a summary of projects that are recommended to begin during each fiscal year, from Fiscal Year (FY) 2006-07 through FY 2015-16, and supporting tables showing detailed subprojects, schedules, and cash flows. This CIP integrates information developed in July 2006 for the District's FY 2006-07 CIP.

This TM is organized as follows:

- Introduction
- Summary of project drivers
- Capital Improvement Strategic Plan
- Next steps

[1] A separate component of the SSACIP that is not discussed in this memorandum is development of a Sewer System Management Plan (SSMP) in accordance with guidelines published by the San Francisco Bay Regional Water Quality Control Board.

2 Summary of Project Drivers

2.1 Decision Model

In July 2006, RMC completed an initial assessment of project needs and developed a Fiscal Year (FY) 2006-07 Capital Improvement Plan. This plan, which presented a schedule and estimated cash flow for implementation of seven priority projects, is discussed in Technical Memorandum CIP-2. Priority projects were comprised of gravity sewer and force main improvements only; no pump station improvements were identified as requiring implementation in FY 2006-07. The list of priority projects was developed using a weighted decision analysis model that is described further in Technical Memorandum CIP-1. Both TM CIP-1 and TM CIP-2 are included in the Appendix.

Since this time, the decision analysis model has been modified to reflect project attributes for long-term gravity sewer, force main, and pump station improvements. The modified model and preliminary project priorities resulting from application of this model are described in TM CIP-3, also included in the Appendix.

Although the decision model captures the most significant project drivers, one component of CIP development cannot be mechanized. This component relies on the facility knowledge of operations and technical staff, and the relationships between various projects (e.g., in general, downstream capacity improvements should be completed before upstream improvements). Therefore, after an initial prioritized project list was developed using the decision model, results were reviewed by the project team and discussed with District operations staff and the District's historical engineering consultant firm, Nute Engineering, to ensure that overriding criteria driving project development were addressed.

2.2 Additional Project Drivers

Additional project drivers that were considered in the final list of priority projects include:

- **Need for accelerated sewer rehabilitation**. By consent decree, the District is committed to rehabilitating at least two miles of sewer pipe every fiscal year and inspecting at least four miles of sewer pipe annually.
- **Proximity of priority and non-priority projects**. Projects located in the same general area and involving similar types of construction were combined to minimize construction impacts and optimize costs.
- **Interface with other agencies and negotiations with property owners**. Several projects are located adjacent to other utilities (e.g., water pipelines) with planned construction schedules that conflicted with initially proposed priorities, or require extended negotiations with property owners. Project phasing was adjusted to minimize conflicts and facilitate coordination.
- **Need for balanced replacement program.** A strategic long-term replacement plan includes rehabilitation of sewer, force main, and pump station components, and strives to include both design and construction activities in every year.

3 Capital Improvement Strategic Plan

3.1 Objectives

The following objectives were developed in collaboration with District staff to help guide development of the CIP. These objectives are listed in order of decreasing priority.

1. Meet or exceed legal requirements for pipeline inspection (4 miles annually) and replacement (2 miles per fiscal year).
2. Address the most critical projects early.
3. Target a $5 to $6 million annual capital improvement program. This amount will be refined further by District staff, in coordination with its financial advisement team.
4. Address a combination of sewer, force main, and pump station needs each year, in a manner that optimizes overall cost and coordinates with other infrastructure projects within District boundaries.
5. Balance pipeline inspection, design, and construction activities through each fiscal year.

3.2 Master Plan Supplemental Recommendations

In addition to the objectives listed above, the Sewer Replacement Master Plan (RMC, January 2007) recommends that the District strive to achieve a 50-year replacement cycle (approximately 3.8 miles of pipeline replacement per year, plus associated lower laterals) and to establish a baseline closed circuit television (CCTV) inspection record of the entire sewer system by inspecting approximately 38 miles per year of pipe through FY2011-12. Further, District staff has established a goal of continued CCTV inspection at a rate of approximately 19 miles per year, which would result in a complete assessment every ten years, beginning in FY2012-13.

These supplemental goals were considered during development of the CIP. However, due to budgeting constraints, the objectives of achieving a 3.8 mile per year replacement cycle or system-wide CCTV inspection are not achievable within the 10-year planning window. **Table 3-1** shows the amount of pipe that can be inspected and rehabilitated per fiscal year, within established project objectives.

Table 3-1: Proposed CCTV Inspection and Pipe Replacement Lengths

	Length (miles)	
Fiscal Year	CCTV Inspection[1]	Pipeline Replacement [2]
FY2006-07	4	2.6
FY2007-08	4	2.1
FY2008-09	4	2.0
FY2009-10	38	2.1
FY2010-11	38	2.6
FY2011-12	4	3.4
FY2012-13	4	2.0
FY2013-14	4	2.0
FY2014-15	38	2.5
FY2015-16	38	2.5
Total	**176 miles**	**23.7 miles**

[1] CCTV inspection at the recommended rate of 38 miles per year can only be achieved during four of the ten planned fiscal years, due to annual budget constraints

[2] Pipe lengths do not include associated lower laterals that will be rehabilitated as part of each pipeline replacement project

In order to achieve a replacement rate of 3.8 miles per year, the District would need to increase its ten-year capital budget by approximately 35 percent or $22.4 million. Similarly, in order to complete a complete system CCTV assessment by FY2011-12 and maintain an ongoing ten-year cycle for system-wide re-inspection, the District would need to increase the budget for the six years beginning in FY2006-07 through FY2011-12 by 2.8 percent or $1.1 million, and maintain a $200,000 annual CCTV program thereafter.

3.3 Recommended Projects

All of the tables referenced within this section are presented at the end of this Technical Memorandum. **Table 3-2** presents general project information for each CIP project; CIP projects are named according the fiscal year in which all included subprojects begin. Each CIP project comprises some combination of SHECAP, sewer, force main, pump station, cathodic protection, and CCTV inspection subprojects. In many cases, a CIP project will continue into subsequent fiscal years.

Table 3-3 shows a summary cash flow for the proposed CIP. **Total annual costs for FY2007-08 and FY2008-09 exceeded the District objective of $5 to $6 million per fiscal year. However, proposed costs reflect the minimum amount that the District can spend and still meet requirements set forth in the District's consent decree.** Project costs comprise predesign, design, construction, engineering, administration, and all other costs required to complete the project. Costs were developed based on conceptual requirements for facility planning, design, installation, replacement, and/or rehabilitation. Cost estimates use information from similar projects currently under construction by the District and in the Bay Area. The estimate provides a +50% to -30% level of accuracy, suitable for conceptual level planning as defined by AACE International. Costs are benchmarked to ENR Construction Cost Index for San Francisco of 8464, August 2006.

Table 3-4 shows pipeline rehabilitation and replacement lengths to be completed each fiscal year, delineated by Fiscal Year project. These pipe lengths do not include associated lower laterals that will be rehabilitated as part of each pipeline replacement project.

Tables 3-5, and 3-5a through 3-5k present detailed information regarding these subprojects. Subprojects are described as follows: sewer capacity improvement projects (SHECAP); gravity sewer rehabilitation and replacement improvements (SEWER); force main improvements (FM); and pump station improvements (PS). SEWER and SHECAP subprojects include replacement of associated laterals to the property line (lower laterals); costs are not included for rehabilitation of laterals on private property (upper laterals), to be consist with current District authority for lateral replacement work.

4 Next Steps

In order to maintain the proposed project schedule, and in particular, to maximize the facility improvements that are initiated in FY2006/2007, it is important that the District initiate CCTV, predesign, and design phases of recommended projects according the schedule established in the CIP. Depending on project location and potential impact, these projects may include a public outreach or environmental component sooner than shown in the CIP.

Table 3-2
Capital Improvement Strategic Plan
Project Summary

CIP Name	Type of Subproject	# of Subprojects	Schedule
FY 2006-07 Projects	Force Main	3	FY2006-07 through FY 2009
	Sewer / SHECAP	4	FY2006-07 through FY 2009
	Cathodic Protection	1	FY2006-07 through FY 2008
	CCTV Inspection	1	FY2006-07
FY 2007-08 Projects	Sewer / SHECAP	1	FY2007-08 through FY 2011
	CCTV Inspection	1	FY2007-08
FY 2008-09 Projects	Sewer / SHECAP	3	FY2008-09 through FY 2012
	CCTV Inspection	1	FY2008-09
FY 2009-10 Projects	Pump Station	1	FY2009-10
	CCTV Inspection	1	FY2009-10
FY 2010-11 Projects	Pump Station	1	FY2010-11
	Sewer / SHECAP	3	FY2010-11 through FY2012
	CCTV Inspection	1	FY2010-11
FY2011-12 Projects	Sewer / SHECAP	4	FY2011-12 through FY2013
	CCTV Inspection	1	FY2011-12
FY2012-13 Projects	Sewer / SHECAP	2	FY2012-13 through FY2014
	Force Main	1	FY2012-13
	CCTV Inspection	1	FY2012-13
FY2013-14 Projects	Sewer / SHECAP	7	FY2013-14 through FY2015
	CCTV Inspection	1	FY2013-14
FY2014-15 Projects	Sewer / SHECAP	1	FY2014-15 through FY2016
	CCTV Inspection	1	FY2014-15
FY2015-16 Projects	Sewer / SHECAP	1	FY2015-16 through FY2017
	Future Pump Station & Force Main Projects	1	FY2015-16
	CCTV Inspection	1	FY2015-16

Table 3-3
Capital Improvement Strategic Plan
Cash Flow (FY2007 through FY2016)

CIP#	Project Description	Total Cost $000	FY06-07	FY07-08	FY08-09	FY09-10	FY10-11	FY11-12	FY12-13	FY13-14	FY14-15	FY15-16
FY07	FY2006-07 Projects	$ 17,010	5,266	8,133	3,611							
FY 08	FY2007-08 Projects	$ 6,054		211	1,319	3,193	1,331					
FY 09	FY2008-09 Projects	$ 9,430		0	2,793	1,028	2,805	2,805				
FY 10	FY2009-10 Projects	$ 1,613		0	0	1,613	0	0				
FY 11	FY2010-11 Projects	$ 4,438		0	0	0	1,476	2,963				
FY12	FY2011-12 Projects	$ 2,829		0	0	0	0	377	2,453			
FY13	FY2012-13 Projects	$ 5,821		0	0	0	0	0	4,023			
FY14	FY2013-14 Projects	$ 9,359		0	0	0	0	0	0	5,927	3,432	
FY15	FY2014-15 Projects	$ 2,203		0	0	0	0	0	0	0	2,671	3,432
FY16	FY2015-16 Projects	$ 1,868		0	0	0	0	0	0	0	0	1,868
	Totals	**$ 60,626**	**$ 5,266**	**$ 8,344**	**$ 7,722**	**$ 5,835**	**$ 5,611**	**$ 6,144**	**$ 6,476**	**$ 5,927**	**$ 6,103**	**$ 5,300**

Costs were developed based on conceptual requirements for facility planning, design, installation, replacement, and/or rehabilitation. Cost estimates use information from similar projects currently under constructic by the District and in the Bay Area. The estimate provides a +50% to -30% level of accuracy, suitable for conceptual level planning as defined by AACE International. Costs are benchmarked to ENR Construction Cost Index for San Francisco of 8464, August 2006.

Table 3-4
Capital Improvement Strategic Plan
Pipeline Rehabilitation or Replacement Lengths
(FY2007 through FY2016)

		Pipe Length Rehabilitated or Replaced Each Fiscal Year									
CIP#	**Project Description**	**FY2006-07**	**FY2007-08**	**FY2008-09**	**FY2009-10**	**FY2010-11**	**FY2011-12**	**FY2012-13**	**FY2013-14**	**FY2104-15**	**FY2015-16**
FY07	FY2006-07 Projects	14,010	10,989	4,679							
FY 08	FY2007-08 Projects			2,723	10,890	4,538					
FY 09	FY2008-09 Projects			3,200		9,075	9,075				
FY 10	FY2009-10 Projects										
FY 11	FY2010-11 Projects						9,002				
FY12	FY2011-12 Projects							7,532			
FY13	FY2012-13 Projects							3,305	6,810		
FY14	FY2013-14 Projects								3,750		
FY15	FY2014-15 Projects									13,000	
FY16	FY2015-16 Projects										13,000
	Totals	**14,010**	**10,989**	**10,602**	**11,090**	**13,613**	**18,077**	**10,837**	**10,560**	**19,500**	**13,000**

Table 3-5
Capital Improvement Strategic Plan Summary
(FY2007 through FY2016)

CIP#	Project Description	Total Cost $000	FY06-07	FY07-08	FY08-09	FY09-10	FY10-11	FY11-12	FY12-13	FY13-14	FY14-15	FY15-16
FY07	**FY2006-07 Projects**	**$17,010**	**5,266**	**8,133**	**3,611**							
	Sewer Project CCTV & Design	$ 928	636	292								
	Sewer Project Construction	$ 8,105	4,283	3,376	445							
	Force Main Project Design	$ 893	245	647								
	Force Main Project Construction	$ 6,546	0	3,381	3,165							
	Cathodic Project Project Design	$ 59	59									
	Cathodic Project Construction	$ 436	0	436								
	CCTV ~ 4 mile per year goal	$ 42	42									
FY 08	**FY2007-08 Projects**	**$ 6,054**		**211**	**1,319**	**3,193**	**1,331**					
	Sewer Project CCTV & Design	$ 726		205	520							
	Sewer Project Construction	$ 5,322			798	3,193	1,331					
	CCTV ~ 4 mile per year goal	$ 6		6								
FY 09	**FY2008-09 Projects**	**$ 9,430**			**2,793**	**1,028**	**2,805**	**2,805**				
	Sewer Project CCTV & Design	$ 1,132			411	721						
	Sewer Project Construction	$ 8,298			2,382	307	2,805	2,805				
FY 10	**FY2009-10 Projects**	**$ 1,613**				**1,613**						
	Pump Station Project Design	$ 146				146						
	Pump Station Project Construction	$ 1,067				1,067						
	CCTV ~ 38 mile per year goal	$ 400		0		400						
FY 11	**FY2010-11 Projects**	**$ 4,438**					**1,476**	**2,963**				
	Sewer Project CCTV & Design	$ 392					302	89				
	Sewer Project Construction	$ 2,873					0	2,873				
	Pump Station Project Design	$ 94					94					
	Pump Station Project Construction	$ 689					689					
	CCTV ~38 mile per year goal	$ 390					390					
FY12	**FY2011-12 Projects**	**$ 2,829**						**377**	**2,453**			
	Sewer Project CCTV & Design	$ 334						334				
	Sewer Project Construction	$ 2,453						0	2,453			
	CCTV ~ 4 mile per year goal	$ 42						42				
FY13	**FY2012-13 Projects**	**$ 5,821**							**4,023**			
	Sewer Project CCTV & Design	$ 456							456			
	Sewer Project Construction	$ 3,341							1,544	**1,798**		
	Force Main Project Design	$ 238							238			
	Force Main Project Construction	$ 1,744							1,744			
	CCTV ~ 4 mile per year goal	$ 42							42			
FY14	**FY2013-14 Projects**	**$ 9,359**								**5,927**	**3,432**	
	Sewer Project CCTV & Design	$ 1,118								1,118		
	Sewer Project Construction	$ 8,199								4,767	3,432	
	CCTV ~ 4 mile per year goal	$ 42								42		
FY15	**FY2014-15 Projects**	**$ 2,203**									**2,671**	**3,432**
	Pump Station Project Design	$ 97									97	
	Pump Station Project Construction	$ 715									715	
	Future PS and FM Projects	$ 1,000									1,000	
	CCTV ~ 38 mile per year goal	$ 391									391	
FY16	**FY2015-16 Projects**	**$ 1,868**										**1,868**
	Sewer Project CCTV & Design	$ 468										468
	Future PS and FM Projects	$ 1,000										1,000
	CCTV ~ 38 mile per year goal	$ 400										400
	Totals	**$ 60,626**	**$ 5,266**	**$ 8,344**	**$ 7,722**	**$ 5,835**	**$ 5,611**	**$ 6,144**	**$ 6,476**	**$ 5,927**	**$ 6,103**	**$ 5,300**

Table 3-5a
Capital Improvement Strategic Plan
Subproject Descriptions

CIP ID#	Project Name	Project Description
1	Kentfield Force Main Replacement	**FM** project rehabilitates or replaces 7,500 feet of existing pipeline that is reaching the end of its design life and has a high probability and consequence of failure
2	Bon Air Tunnel Construction	**SEWER** project rehabilitates 3,000 feet of trunk sewer. Construction phase only is remaining in the proposed CIP.
3a	Cascade Sewer Rehabilitation Project	**SEWER** project replaces 3,621 feet of pipeline.
3b	Creek Bolinas Projects	**SHECAP** project that replace or upsizes 4,079 feet of pipeline.
4	Sir Francis Drake / Winship Projects	Combination of **SEWER** and **SHECAP** projects that replace or upsize 19,400 feet of pipeline.
5	Woodland / College Projects	**SHECAP** project replaces 1,600 feet of pipe and installs 650 feet of new relief sewer.
6	Sequoia Park / Tozzi Creek Projects	**SEWER** project rehabilitates 22,000 feet of pipeline.
7	Olive-Walnut / North-Hill Projects	**SEWER** projects that replace 11,000 feet of pipeline.
8a	Highway 101 and Riviera FM Replacement Projects	**FM** projects replace 1,050 feet of pipe. Highway 101 FM has leaked in the past and is adjacent to residential properties. Riviera FM crosses underneath Corte Madera Creek and is subjected to regular tidal variations that will likely lead to increased corrosion.
8b	William / Holcomb / Meadowood	**SHECAP** project upsizes or replaces 2,500 feet of pipe and adds 500 feet of new sewers. Project is combined with Riviera FM project due to close proximity.
9	Cathodic Improvements and Inspections	**FM** projects inspect, replace or add facilities to better monitor and/or protect force mains from corrosion.
10	PS 31, 32, 33, 34, 35, 36 Improvements	**PS** projects 34, 35, and 36 provide safe access for maintenance. PS 31 and 32 will receive new submersible pumps. All projects include general equipment upgrades.
11a	Miracle Mile	**SHECAP** project upsizes 2,000 feet of existing sewers and installs 1,250 feet of new diversion sewer.
11b	Redhill Avenue	**SEWER** project replaces sewers and lower laterals with known maintenance issues. Combined with Miracle Mile due to proximity.
12	Hillside Avenue	**SEWER** project replaces sewers and lower laterals with known maintenance issues.
13	PS-12, 13, 14, and 37 Improvements	**PS**-12 and 14 projects add pumps to provide adequate wet weather capacity with the largest pump out of service. PS-12 and 37 improvements comprise operations and reliability upgrades; these pump stations are grouped due to proximity.
14	Upper Butterfield	**SHECAP** project upsizes/replaces 6,375 feet of sewers and installs 487 feet of new diversion sewers.

Table 3-5a
Capital Improvement Strategic Plan
Subproject Descriptions

CIP ID#	Project Name	Project Description
15a	Cascade	**SHECAP** project upsize 1,727 feet of existing pipe.
15b	Westbrae/Hawthorne	**SHECAP** project upsizes 1,278 feet of pipe.
16a	Laurel Grove/McAllister	**SHECAP** project upsizes 2,256 feet of pipe.
16b	Magnolia	**SHECAP** project upsizes 2,300 feet of pipe.
17	Greenbrae FM Replacement	**FM** project replaces 3,800 feet of pipe that is nearing the end of its design life and showing increasing corrosion
18	Spruce/Park/Merwin/Broadway	**SHECAP** projects upsize 1,683 feet of existing sewers and install 2,000 feet of new diversion sewer.
19	Sonoma,Nokomis	**SHECAP** project replaces 965 feet of sewers and installs 1,800 feet of diversion sewer.
20	Lower Butterfield/Meadowcroft/ Broadmoor/SFD	**SHECAP** projects upsize 3,345 feet of existing sewers and installs 4,000 feet of new diversion and parallel sewers.
21	Sir Francis Drake / Berry	**SHECAP** project upsizes 1,100 feet of sewer pipe.
22	The Alameda / Brookmead	**SHECAP** project upsizes 670 feet of sewer pipe and constructs 1,000 feet of diversion sewer.
23	Manor Easement	**SHECAP** project upsizes 864 feet of sewer.
24	Eliseo	**SHECAP** project upsizes 218 feet of sewer pipe.
25, 27, 26	PS 20, 21, 30 Improvements	**PS** projects replace aging equipment and improve facility operation and safety/reliability.
28, 29	PS 15, 22, 23, 24, 25 Improvements	**PS** projects replace aging equipment and improve facility operation and safety/reliability.
OTHER	Misc PS & FM projects identified in future	**PS**, and **FM** projects address unidentified issues in all facilities as identified by District staff
SEWER	Sewer Projects Identified by CCTV	Design of new **SEWER** projects identified by CCTV, as allowable by budget constraints.
CTV4	Systemwide CCTV Inspection – 4 mi/year goal	**SEWER** project provides CCTV inspection in addition to those CCTV inspections identified as part of planned SEWER projects, in order to achieve four miles of CCTV inspection annually.
CTV38	Systemwide CCTV Inspection – 38 mi/year goal	**SEWER** project provides CCTV inspection in addition to those CCTV inspections identified as part of planned SEWER projects, in order to achieve 38 miles of CCTV inspection annually, and a system-wide assessment within five years.

Table 3-5b
Capital Improvement Strategic Plan
Fiscal Year 2006 - 2007

					FY 2006-07												
ID #	**Subproject Name**	**Estimated Total Cost $000**	**Start Year**	**R/R Footage**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**FY07 Budget $000**
1	**Kentfield Force Main Rehabilitation**	**$ 7,194**	FY07														**216**
	Predesign & Design	$ 863															216
	Construction	$ 6,331															0
2	**Bon Air Tunnel Construction Only**	**$ 1,303**	FY07	**3,000**													**1,303**
3a	**Cascade Sewer Rehab**																**0**
	Design																0
	Construction																0
3b	**Creek / Bolinas Capacity Upgrades**	**$ 3,037**	FY07														**73**
	Design	$ 364															73
	Construction	$ 2,673															0
7	**Olive/Walnut Projects Des & Cons**	**$ 3,387**	FY07	**11,010**													**3,386**
8a	**Highway 101 & Riviera FM Replacements**	**$ 245**	FY07														**29**
	Design	$ 29															29
	Construction	$ 216															0
8b	**William/Holcomb/Meadowood**	**$ 1,306**	FY07														**157**
	Design	$ 157															157
	Construction	$ 1,149															0
9	**Misc Projects - Cathodic Improvements & Inspections**	**$ 496**	FY07														**59**
	Design	$ 59															59
	Construction	$ 436															0
CTV4	**CCTV Inspection Goal: 4 mi/yr**	**$ 42**	FY07														**42**
	Total			**14,010**												**FY07**	**$ 5,266**

Legend

CCTV

Design

Construction

Table 3-5c
Capital Improvement Strategic Plan
FY2007 - 2008

ID #	Project Name	Estimated Total Cost $000	Start Year	R/R Footage	FY2007-08 July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FY08 Budget $000
1	**Kentfield Force Main Rehabilitation**	**$ 7,194**	FY07														**3,813**
	Predesign & Design	$ 863															648
	Construction	$ 6,331		**4,000**													3,165
3a	**Cascade Sewer Rehab**																**0**
	Design																0
	Construction																0
3b	**Creek / Bolinas Capacity Upgrades**	**$ 3,037**	FY07														**2,519**
	Design	$ 364															292
	Construction	$ 2,673		**3,400**													2,227
4	**Sir Francis Drake / Winship Projects**	**$ 6,048**	FY08														**205**
	Design	$ 726															205
	Construction	$ 5,322															0
8a	**Highway 101 & Riviera FM Replacements**	**$ 245**	FY07														**216**
	Design	$ 29															0
	Construction	$ 216		**1,050**													216
8b	**William/Holcomb/Meadowood**	**$ 1,306**	FY07														**1,149**
	Design	$ 157															0
	Construction	$ 1,149		**2,539**													1,149
9	**Misc Projects - Cathodic Improvements & Inspections**	**$ 496**	FY07														**436**
	Design	$ 59															0
	Construction	$ 436		**0**													436
CTV4	**CCTV Inspection Goal: 4 mi/yr**	**$ 6**	FY07														**6**
	Total	**$ 18,326**		**10,989**												**FY08**	**$ 8,345**

Legend

CCTV

Design

Construction

Table 3-5d
Capital Improvement Strategic Plan
Fiscal Year 2008 - 2009

ID #	Project Name	Estimated Total Cost $000	Start Year	R/R Footage	FY2008-09 July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FY09 Budget $000
1	**Kentfield Force Main Rehabilitation**	**$ 7,194**	FY07														**3,165**
	Predesign & Design	$ 863															0
	Construction	$ 6,331		**4,000**													3,165
3b	**Creek / Bolinas Capacity Upgrades**	**$ 3,037**	FY07														**445**
	Design	$ 364															0
	Construction	$ 2,673		**679**													445
4	**Sir Francis Drake / Winship Projects**	**$ 6,048**	FY08														**1,319**
	Design	$ 726															520
	Construction	$ 5,322		**2,723**													798
5	**Woodland / College Projects**	**$ 1,309**	FY09														**1,309**
	Design	$ 157															157
	Construction	$ 1,152		**1,600**													1,152
6	**Sequoia Park Projects**	**$ 6,374**	FY09														**44**
	CCTV & Design	$ 765															44
	Construction	$ 5,609															0
11a	**Miracle Mile**	**$ 1,747**	FY09														**1,440**
	Design	$ 210															210
	Construction	$ 1,537		**1,600**													1,230
	Total			**10,602**												**FY09**	**$ 7,722**

Legend

CCTV

Design

Construction

Table 3-5e
Capital Improvement Strategic Plan
Fiscal Year 2009 - 2010

ID #	Project Name	Estimated Total Cost $000	Start Year	R/R Footage	FY2009-10 July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FY10 Budget $000
4	**Sir Francis Drake / Winship Projects**	**$ 6,048**	FY08														**3,193**
	Design	$ 726															0
	Construction	$ 5,322		**10,890**													3,193
6	**Sequoia Park Projects**	**$ 6,374**	FY09														**721**
	CCTV & Design	$ 765															721
	Construction	$ 5,609															0
10	**PS31, 32, 33, 34, 35, 36 Improvements**	**$ 1,213**	FY10														**1,213**
	Design	$ 146															146
	Construction	$ 1,067		**0**													1,067
11a	**Miracle Mile**	**$ 1,747**	FY09														**307**
	Design	$ 210															0
	Construction	$ 1,537		**400**													307
CTV38	**CCTV Inspection Goal: 38 mi/yr**	**$ 400**	Varies														**400**
	Total			**11,290**												**FY10**	**$ 5,835**

Legend

CCTV

Design

Construction

Table 3-5f
Capital Improvement Strategic Plan
Fiscal Year 2010 - 2011

ID #	Project Name	Estimated Total Cost $000	Start Year	R/R Footage	FY2010-11 July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FY11 Budget $000
4	**Sir Francis Drake / Winship Projects**	**$ 6,048**	FY08														**1,331**
	Design	$ 726															0
	Construction	$ 5,322		**4,538**													1,331
6	**Sequoia Park Projects**	**$ 6,374**	FY09														**2,805**
	CCTV & Design	$ 765															0
	Construction	$ 5,609		**9,075**													2,805
11b	**Redhill Ave.**	**$ 545**	FY11														**36**
	CCTV & Design	$ 65															36
	Construction	$ 480															0
12	**Hillside Ave.**	**$ 1,134**	FY11														**76**
	CCTV & Design	$ 136															76
	Construction	$ 998															0
13	**PS 12, 13, 14, 37 - Bon Air, Greenbrae, Larkspur, Larkspur Plaza**	**$ 783**	FY11														**783**
	Design	$ 94															94
	Construction	$ 689															689
14	**Upper Butterfield**	**$ 1,586**	FY11														**190**
	Design	$ 190															190
	Construction	$ 1,396															0
CTV38	**CCTV Inspection Goal: 38 mi/yr**	**$ 390**	Varies														**390**
	Total			**13,613**												**FY11**	**$ 5,611**

Legend

CCTV

Design

Construction

Table 3-5g
Capital Improvement Strategic Plan
Fiscal Year 2011 -2012

ID #	Project Name	Estimated Total Cost $000	Start Year	R/R Footage	FY2011-12 July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FY12 Budget $000
6	**Sequoia Park Projects**	**$ 6,374**	FY09														**2,805**
	CCTV & Design	$ 765															0
	Construction	$ 5,609		**9,075**													2,805
11b	**Redhill Ave.**	**$ 545**	FY11														**509**
	CCTV & Design	$ 65															29
	Construction	$ 480		**1,677**													480
12	**Hillside Ave.**	**$ 1,134**	FY11														**1,058**
	CCTV & Design	$ 136															60
	Construction	$ 998		**3,489**													998
14	**Upper Butterfield**	**$ 1,586**	FY11														**1,396**
	Design	$ 190															0
	Construction	$ 1,396		**3,836**													1,396
15a	**Cascade**	**$ 573**	FY12														**69**
	Design	$ 69															69
	Construction	$ 504															0
15b	**Westbrae/Hawthorne**	**$ 425**	FY12														**51**
	Design	$ 51															51
	Construction	$ 374															0
16a	**Laurel Grove/McAllister**	**$ 951**	FY12														**114**
	Design	$ 114															114
	Construction	$ 837															0
16b	**Magnolia**	**$ 838**	FY12														**101**
	Design	$ 101															101
	Construction	$ 737															0
CTV4	**CCTV Inspection Goal: 4 mi/yr**	**$ 42**	FY12														**42**
	Total			**18,077**													**$ 6,144**

Legend

CCTV

Design

Construction

Table 3-5h
Capital Improvement Strategic Plan
Fiscal Year 2012- 2013

ID #	Project Name	Estimated Total Cost $000	Start Year	R/R Footage	FY2012-13 July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	FY13 Budget $000
15a	**Cascade**	**$ 573**	FY12														**504**
	Design	$ 69															0
	Construction	$ 504		**1,727**													504
15b	**Westbrae/Hawthorne**	**$ 425**	FY12														**374**
	Design	$ 51															0
	Construction	$ 374		**1,278**													374
16a	**Laurel Grove/McAllister**	**$ 951**	FY12														**837**
	Design	$ 114															0
	Construction	$ 837		**2,256**													837
16b	**Magnolia**	**$ 838**	FY12														**737**
	Design	$ 101															0
	Construction	$ 737		**2,271**													737
17	**Greenbrae FM Replacement**	**$ 1,982**	FY13														**1,982**
	Design	$ 238															238
	Construction	$ 1,744		**2,900**													1,744
18	**Spruce/Park/Merwin/Broadway**	**$ 1,754**	FY13														**1,754**
	Design	$ 210															210
	Construction	$ 1,544		**405**													1,544
SEWR	**New Sewer Projects based on CCTV**	**$ 245**	FY13														**245**
	Design																245
	Construction																0
CTV4	**CCTV Inspection Goal: 4 mi/yr**	**$ 42**	FY13														**42**
	Total			**10,837**													**$ 6,476**

Legend

CCTV

Design

Construction

Table 3-5i
Capital Improvement Strategic Plan
Fiscal Year 2013 - 2014

ID #	Project Name	Estimated Total Cost $000	Start Year	R/R Footage	FY2013-14 July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total FY14 $000
19	**Sonoma/Nokomis**	**$ 1,789**	FY14														**1,789**
	Design	$ 215															215
	Construction	$ 1,574		**405**													1,574
20	**Lower Butterfield/Meadowcroft/ Broadmoor/SFD**	**$ 1,985**	FY14														**1,985**
	Design	$ 238															238
	Construction	$ 1,747		**493**													1,747
21a	**Sir Francis Drake/Berry**	**$ 472**	FY14														**472**
	Design	$ 57															57
	Construction	$ 415		**1,103**													415
21b	**The Alameda/Brookmead**	**$ 766**	FY14														**766**
	Design	$ 92															92
	Construction	$ 674		**667**													674
21c	**Manor Easement**	**$ 339**	FY14														**339**
	Design	$ 41															41
	Construction	$ 298		**864**													298
21d	**Eliseo**	**$ 66**	FY14														**66**
	Design	$ 8															8
	Construction	$ 58		**218**													58
SEWR	**New Sewer Projects based on CCTV**	**$ 2,266**	FY14														**2,266**
	Design																468
	Construction			**6,810**													1,798
CTV4	**CCTV Inspection Goal: 4 mi/yr**	**$ 42**	FY14														**42**
	Total			**10,560**													**$ 7,725**

Legend

CCTV

Design

Construction

Table 3-5j
Capital Improvement Strategic Plan
Fiscal Year 2014-2015

					FY2014-15												
ID #	**Project Name**	**Estimated Total Cost $000**	**Start Year**	**R/R Footage**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**Total FY15 $000**
SEWR	**New Sewer Projects based on CCTV**	**$ 3,900**	FY15														**3,900**
	Design																468
	Construction			**13,000**													3,432
CTV38	**CCTV Inspection Goal: 38 mi/yr**	**$ 390**	FY15														**390**
	Total			**13,000**													**$ 6,102**

Legend

CCTV

Design

Construction

Table 3-5k
Capital Improvement Strategic Plan
Fiscal Year 2015-2016

ID #	Project Name	Estimated Total Cost $000	Start Year	R/R Footage	FY2016 July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total FY16 $000
Other	**Future PS and FM Projects**	**$ 1,000**	FY16														**1,000**
SEWR	**New Sewer Projects based on CCTV**	**$ 3,900**	FY16														**3,900**
	Design																468
	Construction			**13,000**													3,432
CTV38	**CCTV Inspection Goal: 38 mi/yr**	**$ 400**	FY16														**400**
	Total			**13,000**													**$ 5,300**

Legend

- CCTV
- Design
- Construction

Appendix

TM-1 Prioritization Process

TM-2 Fiscal Year 2006/2007 Prioritized Projects

TM-3 Prioritization Criteria and Preliminary Results

Technical Memorandum CIP-1

RVSD Sewer System Assessment and Capital Improvement Planning

Subject:	**Prioritization Process**
Prepared For:	Barry Hogue, District Manager, RVSD
Prepared by:	Rachael Wark and Vivian Housen
Reviewed by:	Gisa Ju
Date:	July 12, 2006
Reference:	0147-001

This memorandum presents the preliminary goals, criteria and project prioritization process for consideration as part of the development of the Ross Valley Capital Improvement Strategic Plan. This TM is organized as follows:

- Background
- Prioritization Criteria
- Weighting of Criteria
- Project Performance Metrics

1 Background

Facing a number of challenges relating to the condition, capacity and operation of its collection system facilities, Ross Valley Sanitary District (District) has embarked upon several planning efforts to identify effective solutions to address these challenges:

- Sewer Hydraulic Evaluation and Capacity Assurance Plan (SHECAP). This work evaluates trunk sewer facilities and flows, and recommends upgrades to larger-diameter trunk sewers that will minimize the potential for capacity-related sanitary sewer overflows. SHECAP also identifies potential capacity constraints in some smaller-diameter sewers that could be addressed in conjunction with trunk sewer rehabilitation and replacement. SHECAP work was completed in June 2006. A draft report summarizing results is under review by District staff.
- Sewer System Management Plan (SSMP) Gap Analysis. This work, which was completed in late 2005, assessed District operations and documentation with regard to SSMP guidelines. The Gap Analysis identified potential areas that require attention during development of the District's SSMP.
- History Inventory Maintenance Condition Assessment Database (HIMCAD). This effort mapped existing facilities and maintenance information in a GIS database, for future use by the District. Initial HIMCAD mapping was completed in late 2005; the database is a working document and recommendations for improvements will be made based on

findings from ongoing facility assessments.

- Sewer System Assessment and Capital Improvement Planning (SSACIP). This effort includes detailed assessments of the District's facilities, and will culminate in the development of three Master Plans: Sewer Master Plan, Force Main Master Plan, and Pump Station Master Plan, including recommended rehabilitation and replacement projects for each of these groups of facilities. This work, in conjunction with SHECAP and using information from HIMCAD, uses a decision analysis model to develop a long-term projection of system improvement projects for implementation by the District, based on established goals and priorities. SSACIP also recommends near-term projects to be implemented in a one- to three-year timeframe. SSACIP will be completed by the end of 2006; near-term projects will be finalized in July 2006.

As part of the SSACP effort discussed above, the District is developing a long-term Capital Improvement Strategic Plan that will result in a comprehensive, prioritized Capital Improvement Program (CIP). Following identification of solutions by the planning efforts noted above, the next steps in development of a Strategic Plan involve:

1. **Identifying Prioritization Criteria**. These criteria represent the driving forces behind the recommended improvement projects and reflect the goals of the District.
2. **Assigning Relative Weights to the Criteria.** This task involves defining the relative importance of the identified criteria.
3. **Establishing Project Metrics and Evaluating Proposed Projects.** With the criteria and weighting defined, the next step is to determine metrics that will be used to evaluate each of the improvement projects with respect to these parameters, and to conduct this evaluation.
4. **Developing Project Rankings**. A decision model will be used to develop a prioritized list of improvement projects based the above evaluation.
5. **Identifying Overriding Factors**. In general, highest scoring projects should receive the highest priority for implementation. However, there are some cases where project-specific constraints may override the project ranking.
6. **Developing Prioritized Cash Flow & Schedule**. The final step in the process is to work with District staff to develop a cash flow and schedule that balances improvement needs with projected funding.

This memorandum describes potential Prioritization Criteria and Weighting (Steps 1 and 2) for consideration by the District in development of the Strategic Plan, and presents potential project performance metrics by which each improvement project may be evaluated (Step 3).

2 Prioritization Criteria

The District's Mission is "*to provide the highest quality and most cost-effective wastewater collection possible for its constituents by meeting the following goals*:

- *Be available and responsive to the needs of the public*

- *Perform preventive maintenance on all collection system components*
- *Proactively identify and correct public sewer system defects*
- *Work cooperatively with local, state and federal agencies*
- *Uphold the District's standards and specifications on newly constructed public and private sewers*"

The prioritization criteria shown in **Table 1** were developed to support the District's goals, and are presented for consideration by District staff:

Table 1 - Prioritization Criteria

Criteria	Definition
Traffic Impacts / Temporary Shutdowns	Project would minimize potential traffic impacts and/or temporary shutdowns that could result in a system failure or operational issue.
Legal Compliance	Project contributes to requirement for rehabilitation of 2 miles of pipe per year or equivalent.
Regulatory Compliance including SSO Reduction	Project is needed to comply with existing regulations (e.g. reduces risk for Sanitary Sewer Overflows and meet other SSMP requirements).
Large-Scale Impact Involving Trunk Sewers	Project is needed to address capacity deficiencies or reliability issues in an existing trunk sewer that could result in SSOs
Operational Efficiency/Aging Infrastructure	Project is needed to maintain or improve the management, operational efficiency, and reliability of the system, and/or to extend the useful life of the facilities

3 Weighting of Criteria

Table 2 presents proposed weights for the criteria identified for consideration as part of the Strategic Plan, with 5 being most critical to the District, and 1 being less critical but still highly important for the District to achieve its goals.

Table 2 - Criteria Weighting

Criteria	Relative Weighting	
	Score (1-5)	% of Total
Traffic Impacts/Temporary Shutdowns	1	5.3%
Legal Compliance	5	26.3%
Regulatory Compliance (SSOs, SSMP)	5	26.3%
Large-Scale Impact (Trunk Sewer)	5	26.3%
Operational Efficiency/Aging Infrastructure	3	15.8%
Total	**19**	**100%**

4 Project Performance Metrics

Project metrics are benchmarks that will be used to determine to which degree each project meets the prioritization criteria described above. **Table 3** presents a summary of the performance metrics identified for consideration as part of the Strategic Plan.

Table 3 - Project Performance Metrics

Criteria	Performance Metric	
	Project Score	**Description**
Traffic Impacts/Temporary Shutdowns	**10**	Reduces risk of **high** traffic or shutdown-related impacts in the next 5 years: - Reduces risk of temporary interruption of service to *large number* of customers; and/or - Reduces risk of *significant* traffic impacts from failed infrastructure
	7	Reduces risk of **moderate** traffic or shutdown-related impacts in the next 5 years: - Reduces risk of temporary interruption of service to *some* customers; and/or - Reduces risk of *moderate* traffic impacts from failed infrastructure
	3	Reduces risk of **low** traffic or shutdown-related impacts in the next 5 years: - Reduces risk of temporary interruption of service to *limited number of* customers; and/or - Reduces risk of *low* traffic impacts from failed infrastructure
	0	Does not address traffic or shutdown-related impacts.
Legal Compliance	**10**	Rehabilitates 3000' of pipe or greater.
	9	Rehabilitates 2000' to 3000' of pipe.
	7	Rehabilitates 1000' to 2000' of pipe.
	5	Rehabilitates up to 1000' of pipe.
Regulatory Compliance (SSOs, SSMP) Note: Score increased one level if SSO will impact sensitive environment	**10**	Predicted overflow in 5-year design storm >400,000 gal OR resolves a historical or documented overflow
	9	Predicted overflow in 5-year design storm >100,000 gal
	8	Predicted overflow in 5-year design storm >10,000 gal
	7	Predicted overflow in 5-year design storm >1,000 gal OR resolves a known issue (such as a structural or grease problem) with the potential to cause future SSOs
	5	Predicted surcharge in 5-year design storm within 3 feet of ground surface
	3	Predicted surcharge in 5-year design storm >3 feet below surface
	0	No predicted surcharge
Large-Scale Impact (Trunk Sewer)	**8**	Trunk line modeled in SHECAP and 18" diameter or greater.
	5	Trunk line modeled in SHECAP and less than 18" diameter
	3	Not modeled in SHECAP.
Operational Efficiency/Aging Infrastructure	**10**	Provides critical redundancy or improvement to O&M
	5	Provides level of redundancy or O&M consistent with good operating practices;
	0	Does not address an identified operational efficiency/aging infrastructure

Technical Memorandum CIP-2

RVSD Sewer System Assessment and Capital Improvement Planning

Subject:	**Fiscal Year 2007 Prioritized Projects**
Prepared For:	Barry Hogue, District Manager, RVSD
Prepared by:	Vivian Housen
Reviewed by:	Gisa Ju
Date:	July 6, 2006
Reference:	0147-001

1 Introduction

RMC is completing a comprehensive Sewer System Assessment and Capital Improvement Planning (SSACIP) effort for Ross Valley Sanitary District (District). The overall goal of this project is to evaluate existing pump stations, force mains, and gravity sewers, and establish requirements and develop a plan for continued rehabilitation or replacement of these facilities. These rehabilitation plans will be summarized in individual master plans developed for each group of facilities. The SSACIP effort incorporates information from other work recently completed by the District, including the Sanitary Sewer Hydraulic Evaluation and Capacity Assurance Plan (SHECAP) and development of the District's inventory, maintenance, and condition assessment database (called HIMCAD), as well as on-going sewer rehabilitation projects, and is scheduled to be completed by the end of 2006.[1]

An intermediate goal of this project is to develop recommendations for priority projects that should be implemented in FY2007. A preliminary list of priority projects was developed after completion of all initial assessments, and using a weighted decision analysis model developed specifically for the District. This model is described in greater detail in Technical Memorandum CIP-1, attached. The preliminary list of projects was reviewed by RMC, District staff and Nute Engineering, and further refined to more accurately reflect District priorities and needs.

The purpose of this Technical Memorandum is to present the finalized list of FY07 prioritized projects, including estimated project costs and projected schedules. This TM is organized as follows:

- Introduction
- FY2007 prioritized projects, including estimated costs and project schedules
- Summary of project drivers
- Next steps

[1] A separate component of the SSACIP that is not discussed in this memorandum is development of a Sewer System Management Plan (SSMP) in accordance with guidelines published by the San Francisco Bay Regional Water Quality Control Board.

2 FY2007 Prioritized Projects

2.1 Project List

Table 1 presents seven projects that are proposed to begin in FY2007. These projects include one force main project and six sewer rehabilitation/replacement projects. Although no pump station projects were identified for completion in FY2007, the pump station assessment did identify areas for future improvement and rehabilitation, and will address these long-term needs in the pump station master plan.

Table 1 – FY2007 Priority Projects

Project Short Name	Description	Approximate Length (ft)
Techite Force Main	Rehabilitates, replaces, and/or increases capacity of the existing techite force main parallel to Corte Madera Creek in Kentfield and along Eliseo Drive in Larkspur. This project require predesign and design in FY2007. Construction is planned for FY2008.	8,000
Bon Air Tunnel	Rehabilitates the original trunk sewer between Bon Air shopping center and Bon Air Road in Larkspur. This project is currently under construction, and will be completed by December 2006.	3,000
Creek/Bolinas/Cascade	Replaces and increases capacity of existing pipelines on Creek Road, Bolinas Road, and in the easement parallel to Cascade Creek in Fairfax, and replaces collection system piping upstream of these sewers and on Wood Lane. A portion of this project is currently under design by Nute Engineering. Due to permitting issues, this project will not be ready for construction until FY2008.	7,652
SFD/Shady Lane	Increases capacity of existing pipelines on Sir Francis Drake Boulevard (San Anselmo) and Bolinas Avenue and Shady Lane (Ross), adds relief sewers, and replaces collection system piping adjacent to these sewers and in Winship Park. CCTV inspection and design are planned for FY2007. Construction will be completed in FY2008.	19,371
Woodland/Goodhill	Increases capacity of existing pipelines on Woodland Road, Goodhill Road, College Avenue, and Stadium Way (Kent Woodlands and Kentfield), and adds two relief sewers. Design is planned for FY2007 with construction in FY2008.	5,850
Sequoia Park/Olive	Replaces collection system piping near Sequoia Road (San Anselmo), and Olive Ave and Park Drive (Ross). CCTV inspection and design are planned for FY2007. Construction will be completed in FY2008.	21,951
Olive/North/Cypress	Replaces collection system piping on nine streets throughout the District's service area. These pipes are experiencing maintenance issues and located in areas where construction during FY2007 is feasible.	11,010

2.2 Project Costs

Estimated costs for the identified FY2007 priority projects are presented in **Table 2**. The projected cost for FY2007 is $6.5 million. This estimate includes CCTV inspection, predesign, and design efforts for most projects, and construction of the Bon Air Tunnel and Olive/North/Cypress project. Costs were developed based on conceptual requirements for pipeline installation, replacement, and rehabilitation. Cost estimates use information from similar projects currently under construction by the District, and in the Bay Area. The estimate provides a +50% to -30% level of accuracy, as defined by AACE International. Costs are benchmarked to ENR Construction Cost Index, San Francisco, April 2006.

In addition to FY2007 priority projects, Table 2 presents other related projects that are recommended as part of the near-term CIP. These additional efforts include implementing a system-wide condition assessment program using CCTV inspection beginning in FY2008[2] and completing ongoing SSACIP and capital projects.

2.3 Project Schedules

Proposed schedules for the FY2007 priority projects are presented in **Table 3**. FY2008 and FY2009 activities include only include projects that are initiated in FY2007. A long-term CIP will be developed by the end of 2006 that identifies projects that will begin design in FY2008 and later. This schedule will be updated and augmented at that time to reflect the final strategic capital improvement plan.

3 Summary of Project Drivers

3.1 Decision Model

RMC created and implemented a decision analysis model to develop an initial list of FY2007 priority projects. Technical Memorandum CIP-1, attached, describes model components, including the process, criteria, and metrics used. Although the decision model captures the most significant project drivers, there is a component of CIP development that cannot be mechanized. This component relies on the facility knowledge of operations and technical staff, and the relationships between various projects (e.g., in general, downstream capacity improvements should be completed before upstream improvements). Therefore, the initial list was reviewed by the project team and discussed with District operations staff and Nute Engineering to make sure that overriding criteria driving project development were accurately addressed.

3.2 Additional Project Drivers

Additional project drivers that were considered in the final list of priority projects include:

1. **Proximity of priority and non-priority projects**. Projects located in the same general proximity were combined to minimize construction impacts and optimize costs. As a result,

[2] FY2007 priority projects involving collection system rehabilitation incorporate CCTV inspection; therefore, the system-wide approach is not recommended to begin until FY2008.

some projects that were not initially flagged as priority projects moved onto the priority list. These projects include portions of the Creek/Bolinas/Cascade, SFD/Shady Lane and Woodland/Goodhill projects.

2. **Interface with other agencies or property owners**. Several projects are located adjacent to other utilities (e.g., water pipelines) with planned construction in FY2007, or in areas with known property or permitting issues. Although project design is planned for FY2007, construction has been deferred to FY2008. These projects include portions of SFD/Shady Lane and Sequoia Park/Olive projects.
3. **Need for accelerated sewer rehabilitation**. The District is committed to rehabilitating at least two miles of sewer pipe every fiscal year. In order to meet this requirement, individual sewer projects in areas where construction during FY2007 appears achievable were included on the priority project list. These individual sewer rehab projects are collectively named Olive/North/Cypress, and include pipelines with known maintenance issues located on nine streets within the District's service area.

3.3 Next Steps

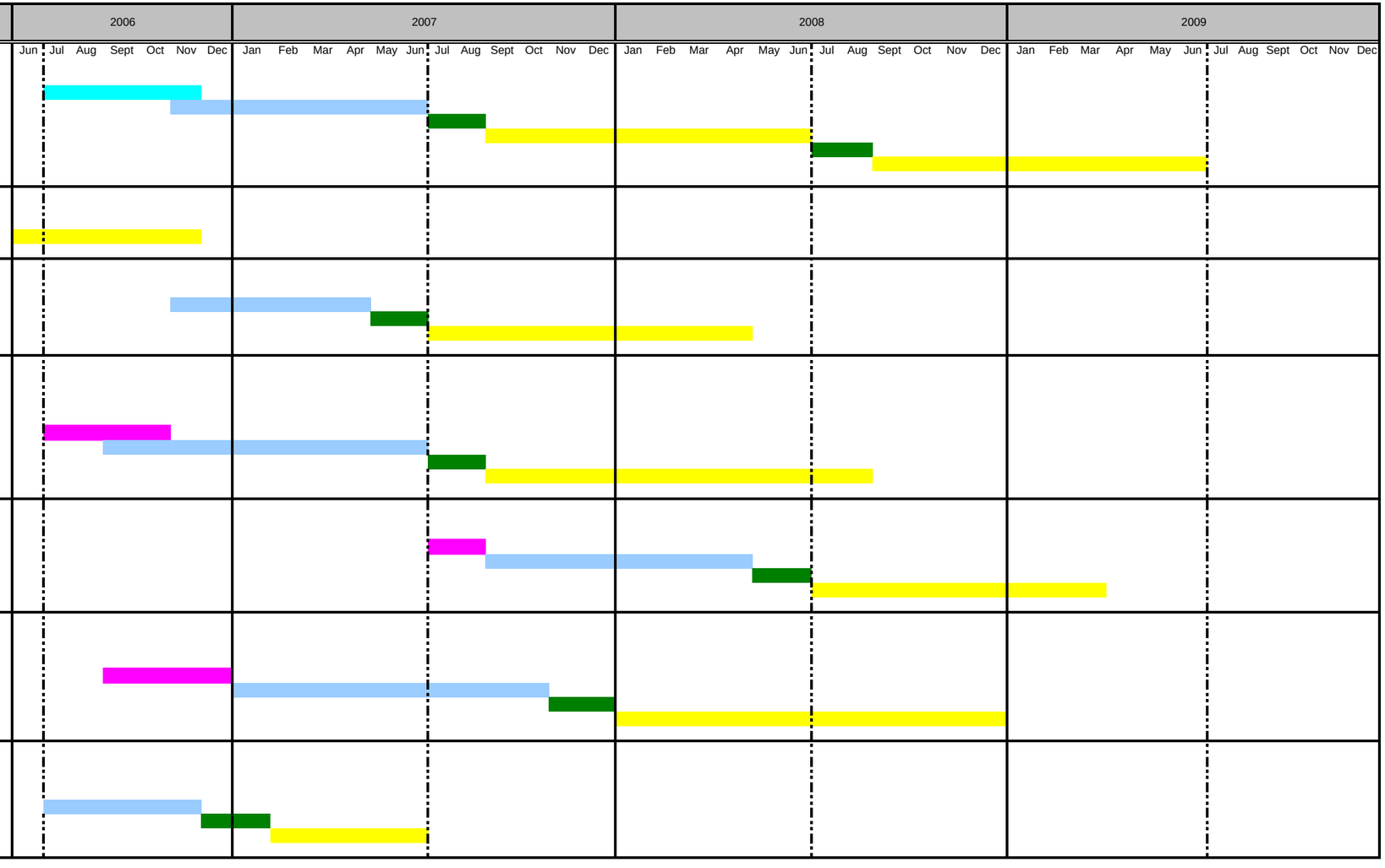
In order to maintain the proposed project schedule, and in particular, to maximize the length of sewer pipe that is rehabilitated in FY2007, it is important that the District initiate CCTV, predesign, and design phases of the priority projects in summer 2006. Depending on project location and potential impact, these early project tasks may include a public outreach or environmental component.

Table 1
RVSD Sewer System Assessment and Capital Improvement Planning
Project Cash Flow for FY07 Priority Projects

Task Name/Subtask (Project ID)	Total Capital Cost	Total Footage	FY2007 ($000)	FY2008 ($000)	FY2009 ($000)	Notes
1. Techite Force Main (F-1)	**$6 to $12.5 M (use $9M average)**	**8,000 ft.**				All Design in FY07. Construction phased across FY08 and FY09.
a Preliminary Design			216	0	0	
b. Final Design			864	0	0	
c. Bid Period - Phase 1			0	0	0	
d. Construction - Phase 1			0	3,960	0	
e. Bid Period - Phase 2			0	0	0	
f. Construction - Phase 2			0	0	3,960	
TOTAL FORCE MAIN PROJECTS			1,080	3,960	3,960	FY08 and FY09 Design & Construction Costs will be updated in late 2006 to include long-term CIP projects.
2. Bon Air Tunnel (R-3)	**$1,303 M**	**3,000 ft.**				
a. Bid Period			0	0	0	
b. Construction			1,303	0	0	
3. Creek/Bolinas (S-4) combined with Cascade Sewer (R-4) & Wood Lane (R-67)	**$3.033 M**	**7,652 ft.**				
a. Design			364	0	0	
b. Bid Period			0	0	0	
c. Construction			0	2,669	0	
4. Sir Francis Drake/Winship (S-10) Combined with Winship Park (R-9), Sir Francis Drake (R-7), Bolinas/Fernhill (S-11), Upper Shady Lane Trunk Sewer (S-12), and Winship Collection System (R-68)	**$7.118 M +$74k condition assessment**	**19,371 ft.**				
a. Condition Assessment			74	0	0	
b. Design			854	0	0	
c. Bid Period			0	0	0	
d. Construction			0	5,220	1,044	
5. Woodland/College (S-15) combined with Goodhill (S-14) and Kentfield Relief Sewer (S-16)	**$3.072 M + $37k condition assessment**	**5,850 ft.**				Design will be accelerated to FY07 if possible after review of final project costs for other priority projects.
a. Condition Assessment			0	37	0	
b. Design			0	369	0	
c. Bid Period			0	0	0	
d. Construction			0	0	2,703	
6. Sequoia Park (R-8, 10, 11) and Sequoia Collection System (R-69) combined with Olive Avenue (2007) and Tozzi Creek Crossing (R-5)	**$6.374 M + $74k condition assessment**	**21,951 ft.**				
a. Condition Assessment			74	0	0	
b. Design			459	306	0	
c. Bid Period			0	0	0	
d. Construction			0	2,805	2,805	
7. Olive-Walnut; North-Hill; Holcomb-Monte Vista; San Anselmo (Ave.); Hickory; Cypress (R-70)	**$3.387 M**	**11,010 ft.**				2 miles of collection system piping rehab to be completed in FY07
a. Condition Assessment			0	0	0	
b. Design			406	0	0	
c. Bid Period			0	0	0	
d. Construction			2,980	0	0	
TOTAL GRAVITY SEWER PROJECTS			**$6,514**	**$11,405**	**$6,552**	**FY08 and FY09 Design & Construction Costs will be updated in late 2006 to include long-term CIP projects.**
Condition Assessment			147	37	0	
Design			2,083	675	0	
Construction			4,283	10,693	6,552	
Additional system-wide condition assessment			0	283	320	FY2007 CCTV for planned projects only. In future years, cost includes 200k feet of CCTV inspection annually, or CCTV of all system pipes within approximately 5 years.
Projects in progress not listed above			150			
SSACIP through end of 2006			500			
OTHER CAPITAL EXPENDITURES			**$650**	**$283**	**$320**	
TOTAL CAPITAL BUDGET			**$7,164**	**$11,688**	**$6,872**	

Table 3
RVSD Sewer System Assessment and Capital Improvement Planning
Estimated Schedules for FY07 Priority Projects

Task Name/Subtask (Project ID)	Total Capital Cost	Total Footage
1. Techite Force Main (F-1) a Preliminary Design b. Final Design c. Bid Period - Phase 1 d. Construction - Phase 1 e. Bid Period - Phase 2 f. Construction - Phase 2	**$6 to $12.5 M (use $9M average)**	**8,000 ft.**
2. Bon Air Tunnel (R-3) a. Bid Period b. Construction	**$1.720 M**	**3,000 ft.**
3. Creek/Bolinas (S-4) combined with Cascade Sewer (R-4) and Wood Lane (R-67) a. Design b. Bid Period c. Construction	**$3.675 M**	**9,732 ft.**
4. Sir Francis Drake/Winship (S-10) Combined with Winship Park (R-9), Sir Francis Drake (R-7), Bolinas/Fernhill (S-11), Upper Shady Lane Trunk Sewer (S-12), and Winship Collection System (R-68) a. Condition Assessment b. Design c. Bid Period d. Construction	**$7.118 M +$72k condition assessment**	**19,371 ft.**
5. Woodland/College (S-15) combined with Goodhill (S-14) and Kentfield Relief Sewer (S-16) a. Condition Assessment b. Design c. Bid Period d. Construction	**$3.072 M + $36k condition assessment**	**5,850 ft.**
6. Sequoia Park (R-8, 10, 11) and Sequoia Collection System (R-69) combined with Olive Avenue (2007) and Tozzi Creek Crossing (R-5) a. Condition Assessment b. Design c. Bid Period d. Construction	**$6.374 M + $72k condition assessment**	**21,951 ft.**
7. Olive-Walnut; North-Hill; Holcomb-Monte Vista; San Anselmo (Ave.); Hickory; Cypress (R-70) a. Condition Assessment b. Design c. Bid Period d. Construction	**$3.386 M**	**11,010 ft.**



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Draft Final Technical Memorandum CIP-3

RVSD Sewer System Assessment and Capital Improvement Planning

Subject:	**Prioritization Criteria and Preliminary Results**
Prepared For:	Paul Causey, Interim District Manager, RVSD
Prepared by:	Vivian Housen
Reviewed by:	Gisa Ju
Date:	January 31, 2007
Reference:	0147-001

In July 2006, RMC and Ross Valley Sanitary District (District) staff established initial prioritization criteria to be used in development of the Fiscal Year (FY) 2007 Capital Improvement Plan (CIP). This criteria, formalized in Technical Memorandum (TM) CIP-1, addressed issues related to pipeline projects, with a focus on the gravity sewer system; a preliminary assessment of the District's force mains and pump stations identified one urgent force main project and no critical pump station projects. TM CIP-3 expands upon information presented in CIP-1 to include prioritization criteria and metrics that are relevant to the District's long-term force main and pump station rehabilitation needs.

This TM is organized as follows:

- Background
- Prioritization Criteria
- Weighting of Criteria
- Project Performance Metrics
- Preliminary Prioritization Results

1 Background

Facing a number of challenges relating to the condition, capacity and operation of its collection system facilities, the District is completing several ongoing planning efforts to identify effective solutions to address these challenges:

- Sanitary Sewer Hydraulic Evaluation and Capacity Assurance Plan (SHECAP). This work evaluated trunk sewer facilities and flows, and recommended upgrades to larger-diameter trunk sewers in an effort to minimize the potential for capacity-related sanitary sewer overflows. SHECAP also identified potential capacity constraints in some smaller-diameter sewers that could be addressed in conjunction with trunk sewer rehabilitation and replacement. A final report summarizing the SHECAP effort was completed in August 2006.
- Sewer System Management Plan (SSMP). An initial "Gap Analysis," completed in late 2005, assessed District operations and documentation with regard to SSMP requirements of the Regional Water Quality Control Board and State Water Resources Control Board. The Gap Analysis identified potential areas that require attention during development of the District's

SSMP. The first four elements of the District's SSMP were completed in August 2006, and a final draft of the remaining elements will be completed in January 2007.

- History Inventory Maintenance Condition Assessment System (HIMCAS). This effort mapped existing facilities and maintenance information in a GIS database for future use by the District. Initial HIMCAS mapping was completed in late 2005; the database is a working document that is updated by District staff. Efforts are ongoing to add Computerized Maintenance Management System (CMMS) and sewer inspection and condition assessment functionality to the underlying program (Munsys) driving HIMCAS.
- Sewer System Assessment and Capital Improvement Planning (SSACIP). The goal of the SSACIP is to develop a long-term strategic replacement and rehabilitation plan in the form of a comprehensive, prioritized CIP. This effort began with assessments of the District's gravity sewer, force main, and pump station facilities, using information from HIMCAS and considering findings from SHECAP. Assessment results, recommended improvements, and their associated costs and impacts were documented in individual facility master plans. Critical recommendations were prioritized and presented as the District's FY07 CIP. SSACIP will incorporate the FY07 CIP into a long-range Capital Improvement Strategic Plan that draws upon information from the facility master plans. The strategic CIP will be completed in January 2007.

Key steps in development of the long-range CIP include:

1. **Identify Prioritization Criteria**. These criteria represent the driving forces behind the recommended improvement projects and reflect the goals of the District.
2. **Assign Relative Weights to the Criteria.** This task involves defining the relative importance of the identified criteria.
3. **Establish Project Metrics and Evaluating Proposed Projects.** With the criteria and weighting defined, determine metrics that will be used to evaluate each of the improvement projects with respect to these parameters, and to conduct this evaluation.
4. **Develop Project Rankings**. A decision model will be used to develop a prioritized list of improvement projects based the above evaluation.
5. **Identify Overriding Factors**. In general, highest scoring projects should receive the highest priority for implementation. However, there are some cases where project-specific constraints may override the project ranking.
6. **Develop Prioritized Cash Flow & Schedule**. The final step in the process is to work with District staff to develop a cash flow and schedule that balances improvement needs with projected funding.

This memorandum describes potential Prioritization Criteria and Weighting (Steps 1 and 2) for consideration by the District in development of the Strategic Plan, presents potential project performance metrics by which each improvement project may be evaluated (Step 3), and establishes a preliminary project ranking (Step 4).

2 Prioritization Criteria

The District's Mission is "*to provide the highest quality and most cost-effective wastewater collection possible for its constituents by meeting the following goals*:

- *Be available and responsive to the needs of the public*
- *Perform preventive maintenance on all collection system components*
- *Proactively identify and correct public sewer system defects*
- *Work cooperatively with local, state and federal agencies*
- *Uphold the District's standards and specifications on newly constructed public and private sewers*"

The prioritization criteria shown in **Table 1** were developed to support the District's goals, and are presented for consideration by District staff:

Table 1 - Prioritization Criteria

Criteria	Project Attributes
Traffic Impacts / Temporary Shutdowns / Residential Impacts	• Minimizes temporary shutdowns that could result in a system failure or operational issue; and/or • Minimizes potential traffic impacts from system failures; and/or • Minimizes potential impacts to residences or public gathering places from system failures
Pipeline Rehabilitation or Replacement Length	• Contributes to rehabilitation of 2 miles of pipe per fiscal year or equivalent, as required to meet conditions of District's Consent Decree
Regulatory Compliance including SSO Reduction / Safety	• Needed to comply with existing regulations (e.g. reduces risk for Sanitary Sewer Overflows, provides firm capacity, and/or meets other SSMP requirements); and/or • Addresses safety issues presented by the facility
Large-Scale Impact Involving Trunk System Facilities	• Addresses capacity deficiencies or reliability issues in an existing trunk sewer that could result in SSOs; and/or • Is integral to the larger sewer / force main system
Operational Efficiency/Aging Infrastructure	• Maintains or improves the management, operational efficiency, and reliability of the system; and/or • Extends the useful life of the facilities

3 Weighting of Criteria

Table 2 presents proposed weights for the criteria identified for consideration as part of the Strategic Plan, with 5 being most critical to the District, and 1 being less critical but still highly important for the District to achieve its goals.

Table 2 - Criteria Weighting

Criteria	Relative Weighting	
	Score (1-5)	% of Total
Traffic Impacts/Temporary Shutdowns	3	14.3%
Pipeline Rehabilitation or Replacement Length	5	23.8%
Regulatory Compliance	5	23.8%
Large-Scale Impact	5	23.8%
Operational Efficiency/Aging Infrastructure	3	14.3%
Total	**21**	**100%**

4 Project Performance Metrics

Project metrics are benchmarks that will be used to determine to which degree each project meets the prioritization criteria described above. **Table 3,** included on the following page, presents a summary of the performance metrics identified for consideration as part of the Strategic Plan.

5 Preliminary Prioritization Results

Project recommendations from the gravity sewer, force main, and pump station master plans were scored and ranked based on the criteria, weighting, and metrics discussed above. **Table 4** presents the preliminary project prioritization, which assigns the highest rankings to the projects with the highest scores. These rankings will be used to develop the long-term Capital Improvement Strategic Plan (CIP).

The CIP will further expand this project list into a long-term strategic implementation plan that focuses on the following four objectives with regard to implementation: 1) address the most critical projects early; 2) meet or exceed legal requirements for pipeline inspection and replacement; 3) address a combination of sewer, force main, and pump station needs each year, in a manner that optimizes overall cost and coordinates with other infrastructure projects within District boundaries; and 4) balance pipeline inspection, design, and construction activities through each fiscal year. The CIP is presented in Technical Memorandum CIP-4.

Table 3 - Project Performance Metrics

Criteria	Performance Metric	
	Project Score	**Description**
Traffic Impacts/Temporary Shutdowns	**10**	Reduces risk of **high** traffic, shutdown-related, or residential/public impacts in the next 5 years, including: - temporary interruption of service to *large number* of customers; and/or - *significant* traffic or residential/public impacts from failed infrastructure
	7	Reduces risk of **moderate** traffic, shutdown-related, or residential/public impacts in the next 5 years, including: - temporary interruption of service to *some* customers; and/or - *moderate* traffic or residential/public impacts from failed infrastructure
	3	Reduces risk of **low** traffic, shutdown-related, or residential/public impacts in the next 5 years, including: - temporary interruption of service to *limited number of* customers; and/or - *low* traffic or residential/public impacts from failed infrastructure
	0	Does not address traffic, residential/public, or shutdown-related impacts.
Pipeline Rehabilitation or Replacement Length	**10**	Rehabilitates 3000' of pipe or greater.
	9	Rehabilitates 2000' to 3000' of pipe.
	7	Rehabilitates 1000' to 2000' of pipe.
	5	Rehabilitates up to 1000' of pipe.
Regulatory Compliance (SSOs, SSMP) Note: Score increased one level if SSO will impact sensitive environment	**10**	Predicted overflow in 5-year design storm >400,000 gal OR resolves a historical or documented overflow OR addresses a critical safety concern
	9	Predicted overflow in 5-year design storm >100,000 gal
	8	Predicted overflow in 5-year design storm >10,000 gal OR provides safety improvements following best management practices
	7	Predicted overflow in 5-year design storm >1,000 gal OR resolves a known issue (such as a structural or grease problem) with the potential to cause future SSOs
	5	Predicted surcharge in 5-year design storm within 3 feet of ground surface OR provides less-critical safety improvements
	3	Predicted surcharge in 5-year design storm >3 feet below surface
	0	No predicted surcharge or safety improvements
Large-Scale Impact (Trunk System)	**8**	Trunk line or incoming/outgoing pipeline modeled in SHECAP and 18" diameter or greater.
	5	Trunk line or incoming/outgoing pipeline modeled in SHECAP and less than 18" diameter
	3	Not modeled in SHECAP.
Operational Efficiency/Aging Infrastructure	**10**	Provides critical redundancy or improvement to O&M
	5	Provides level of redundancy or O&M consistent with good operating practices;
	0	Does not address an identified operational efficiency/aging infrastructure

TABLE 4
RVSD CIP - Preliminary Project Prioritization

Project Name	Facility	Total Length (ft.)	Estimated Capital Cost ($000)	Reg Compliance	Large-Scale Impact (increase 1 step if environmentally sensitive)	Legal Compliance (pipe length)	Operational Efficiency/ Aging Infrastr.	Traffic, Residential, Public Impacts and/or Utility Crossings	Total Weighted Score
			Weight	5	5	5	3	3	
Techite Force Main	FM	8,000	$ 7,194	8	8	10	10	10	190
Bon Air Tunnel	SEWER	3,000	$ 1,303	8	8	10	10	10	190
Sir Francis Drake/Winship Combined with Winship Park (R-9), Sir Francis Drake (R-7), Bolinas/Fernhill (S-11), Upper Shady Lane Trunk Sewer (S-12), and Winship collection system (R-68)	SHECAP /SEWER	19,400	$ 6,048	10	5	10	10	10	185
Woodland/College combined with Goodhill (S-14) and Kentfield Relief (S-16)	SHECAP	4,200	$ 3,109	10	8	10	5	10	185
Creek/Bolinas combined with Cascade Sewer (R-4) and include Wood Lane (R-67)	SEWER	7,700	$ 3,037	10	5	10	10	3	164
Miracle Mile	SHECAP	3,254	$ 1,747	10	5	7	10	7	161
Sequoia Park. Combine with Olive Ave (N, S, E, W Streets) (2007) and Tozzi Creek Crossing (R-5). Include Sequoia collection system (R-69)	SEWER	22,000	$ 6,374	10	0	10	10	3	139
Hillside Ave.	SEWER		$ 1,134	10	0	10	10	3	139
Redhill Ave.	SEWER		$ 545	10	0	7	10	7	136
Olive-Walnut, North-Hill, Holcomb-Monte Vista; San Anselmo Ave; Hickory; Cypress	SEWER	11,010	$ 3,387	8	3	10	10	0	135
Spruce/Park/Merwin/Broadway	SHECAP	2,405	$ 1,754	8	8	5	0	10	135
Laurel Grove/McAllister	SHECAP	2,256	$ 951	8	5	9	0	7	131
Magnolia	SHECAP	2,271	$ 838	8	5	9	0	7	131
Upper Butterfield	SHECAP	3,836	$ 1,586	9	5	10	0	3	129
William/Holcomb/Meadowood	SHECAP	3,023	$ 1,306	9	6	9	0	3	129
Cascade	SHECAP	1,727	$ 573	8	5	7	5	3	124
Greenbrae FM Replacement	FM	2,900	$ 1,982	0	8	9	5	7	121
Sonoma/Nokomis	SHECAP	2,765	$ 1,789	7	5	7	0	7	116
PS34 - 359 Riviera Circle PS	PS		$ 248	10	3	0	10	7	116
PS35 - Corte del Coronado	PS		$ 248	10	3	0	10	7	116
PS36 - 178 Riviera Circle	PS		$ 248	10	3	0	10	7	116
Sir Francis Drake/Berry	SHECAP	1,103	$ 472	5	5	7	0	10	115
Highway 101 FM Replacement	FM	700	$ 182	10	3	5	5	3	114
Lower Butterfield/Meadowcroft/ Broadmoor/SFD	SHECAP	3,543	$ 1,985	8	5	5	0	7	111
Westbrae/Hawthorne	SHECAP	1,278	$ 425	5	5	7	5	3	109
PS 13 - Greenbrae	PS		$ 265	8	8	0	5	3	104
PS 14 - Larkspur	PS		$ 111	8	8	0	5	3	104
PS20 - Landing A	PS		$ 258	10	3	0	5	7	101
PS 12 - Bon Air	PS		$ 364	10	3	0	5	7	101
The Alameda/Brookmead	SHECAP	1,643	$ 766	5	8	5	0	3	99
Manor Easement	SHECAP	864	$ 339	5	5	5	0	0	75
Riviera Circle FM Replacement	FM	350	$ 66	0	5	5	5	3	74
PS 30 - Heather Garden	PS		$ 92	7	3	0	5	3	74
PS21 - Highway 101	PS		$ 60	7	3	0	5	3	74
Eliseo	SHECAP	218	$ 66	3	5	5	0	3	74
PS15 - Kentfield	PS		$ 154	0	8	0	5	3	64
PS31 - Via la Brisa	PS		$ 213	0	3	0	10	3	54
PS 32 - Corte del Bayo	PS		$ 213	0	3	0	10	3	54
PS22 - Cape Marin	PS		$ 43	0	3	0	5	3	39
PS 23 - Capurro	PS		$ 43	0	3	0	5	3	39
PS 24 - Eliseo	PS		$ 68	0	3	0	5	3	39
PS 25 - South Eliseo	PS		$ 94	0	3	0	5	3	39
PS37 - Larkspur Plaza	PS		$ 43	0	3	0	5	3	39
PS 33 - 415 Riviera Circle	PS		$ 43	0	3	0	5	3	39
Misc Projects - Cathodic Improvements / Inspections	FM		$ 496	0	0	0	10	0	30
PS 10 - Landing B	PS		Pump Station Under Construction (Rehabilitation)						
Total		109,446	$ 52,262						