PROJECT MEMORANDUM

Project Name:	Additional Analysis of Alternative 1A of the Wet Weather Flow Management Program Facility Plan	**Date:**	10/19/2004
Client:	Sewer Authority Mid-Coastside	**Project Number:**	6158B.00
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Subject:	Wet Weather Flow Storage Alternatives		
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This memorandum presents our additional analysis of Alternative 1A of the SAM Wet Weather Flow Management Program Facility Plan, completed by Carollo Engineers in 1999. The purpose of this project is to evaluate the feasibility of using a large diameter pipeline to store wet weather flows as an alternative to the underground storage tank that was proposed in Alternative 1A.

This Project Memorandum (PM) includes the following sections:

- Background - description of project.
- Alternatives - examination of in-pipe storage alternatives.
- Comparison of Alternatives - comparison of capital construction costs for in-pipe alternatives.
- Conclusions and Recommendations.

BACKGROUND

The Wet Weather Flow Management Facility Plan Update, completed by Carollo Engineers in August 2004, contained four alternatives for managing wet weather flows. We recommended that Alternative 1A, consisting of a 200,000 gallon wet weather flow storage facility and improvements to the Portola Pump Station (replace pumps, upgrade equipment), be implemented as a first step. These improvements were developed for a 5-year, 6-hour duration storm. The storage concept was an underground structure with a storage volume of 200,000 gallons. At the August 23, 2004 SAM board meeting, the board discussed the option of phasing the Portola Pump Station project. The first phase would be to construct underground storage facilities. The second phase would be to replace the existing pumps and support equipment on an as-needed basis. Accordingly, this evaluation focuses on the first phase - wet weather flow storage alternatives.

The purpose of this project is to evaluate in-pipe storage as an alternative concept for providing wet weather flow storage. The alternative concept is to bury large diameter pipe, configured so the pipe would fill by gravity as the water level rises to a set level upstream of the Portola Pump

Station. The pipe would store 200,000 gallons, and then drain by gravity to the Portola Pump Station wet-well as the peak flows subside.

WET WEATHER FLOW STORAGE ALTERNATIVES

Two alternatives to the buried storage tank at Portola Pump Station were developed. Alternative 1A-1 is to replace the 800 linear feet of the 15-inch Montara Interceptor with an 84-inch reinforced concrete pipe (RCP). Alternative 1A-2 is to install two parallel 60-inch reinforced concrete pipes roughly at the same grade as the Montara Interceptor and parallel to the interceptor for a total length of 1,400 linear feet. These pipes would be connected to the 15-inch interceptor with a new junction box. In both alternatives, the storage pipes would be sloped for self-draining and to fill by gravity. No pumping would be required to fill or drain the storage pipes.

Alternative 1A-1 consists of replacing the existing Montara Interceptor with an 84-inch RCP. A plan view of the RCP is shown in Figure 1. The 800 feet of pipe provides approximately 210,000 gallons of storage. Because the pipeline under Alternative 1A-1 would replace the existing Montara Interceptor, provisions were made to ensure that minimum wastewater flow velocities were maintained to prevent solids from settling out and creating odors. The bottom of the 84-inch RCP would be grouted to duplicate the hydraulics of the existing 15-inch interceptor pipeline. The RCP would be laid at the existing slope of 1.1 percent to meet the minimum velocity requirements. Because of the large size of the storage pipeline and the 1.1 percent slope, the pipeline and junction boxes would be located more than 20 feet underground at some points. Shoring would be required to maintain trench sides at this depth. Figure 2 is a profile view of the 84-inch RCP laid in a 14-foot trench. The 84-inch pipeline would be lined with a PVC coating to prevent concrete corrosion from hydrogen sulfide.

Alternative 1A-2 consists of installing two parallel 60-inch RCP pipes immediately to the east of the existing Montara Interceptor pipeline. The parallel pipeline arrangement would be 700 feet in length, for a total length of 1,400 feet. This configuration would yield approximately 205,000 gallons of storage. A plan view of this alternative is shown in Figure 3. The parallel pipelines would be sloped at 0.5 percent to allow self-draining to the existing 15-inch interceptor. SAM's interceptor drawings indicate this is the maximum slope that can be achieved. At this slope sediments (sand and grit) may accumulate over a wet weather season. They should be flushed out at the end of the season. PVC coatings would not be required as the storage pipeline would not be in use for a large portion of the year. The parallel storage pipelines will intersect the existing 15-inch Montara Interceptor 20 to 25 feet east of Manhole No. 7 (also marked as 4A). The pipelines would be installed at a distance from the existing pipeline to allow for sloped trenching to reduce the need for shoring. This layout requires the acquisition of a permanent 18-foot wide sanitary sewer easement and a temporary construction easement of about 120 feet wide. The storage pipelines and the existing interceptor pipeline would be connected with a new concrete junction box. Manholes would extend from the top of the junction box to the ground surface. Access to the north end of the storage pipelines for maintenance and cleaning would be provided by two manholes (one for each pipe). The manholes would be covered with grating to allow airflow through the storage system during the filling and draining cycles. Figure 4 shows a profile of the parallel-pipeline system.

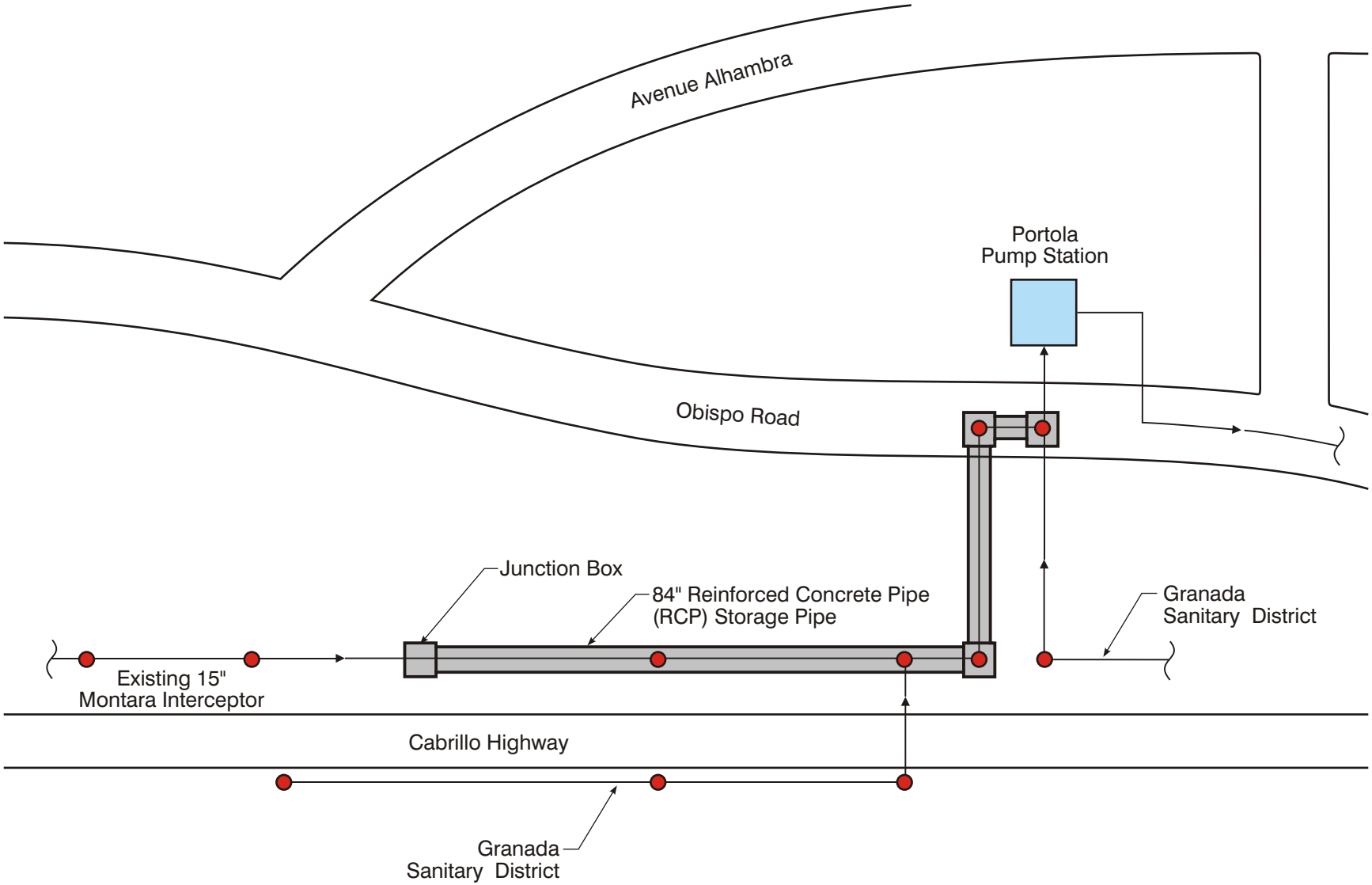

Figure 1
ALTERNATIVE 1A-1 – PLAN VIEW
SEWER AUTHORITY MID-COASTSIDE

Not to Scale

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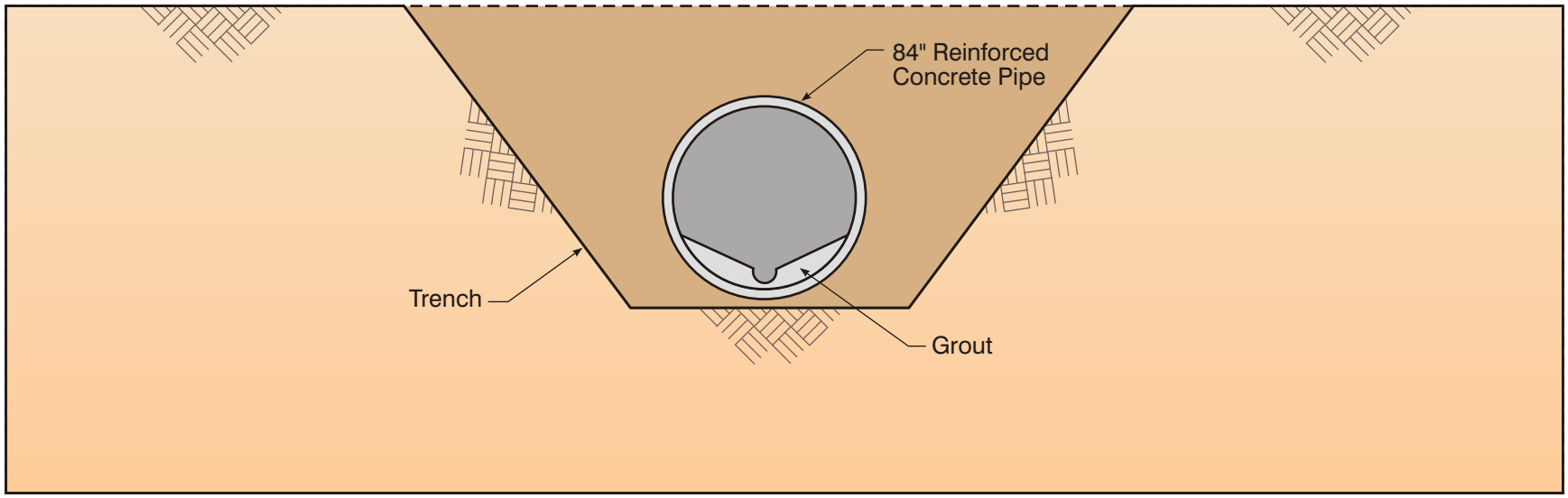

Figure 2
ALTERNATIVE 1A-1 – SECTION VIEW
SEWER AUTHORITY MID-COASTSIDE

Not to Scale

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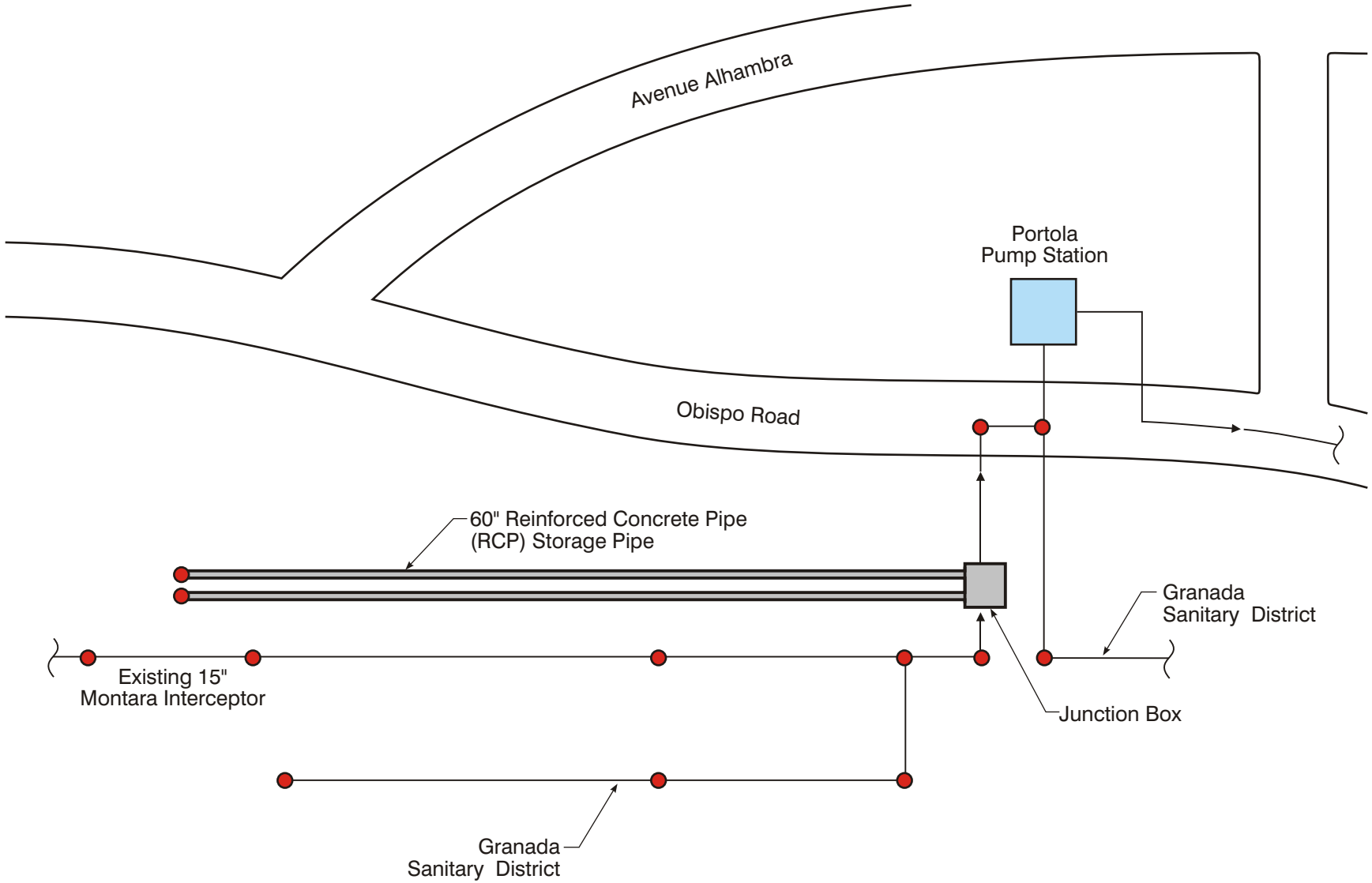

Figure 3
ALTERNATIVE 1A-2 – PLAN VIEW
SEWER AUTHORITY MID-COASTSIDE

Not to Scale

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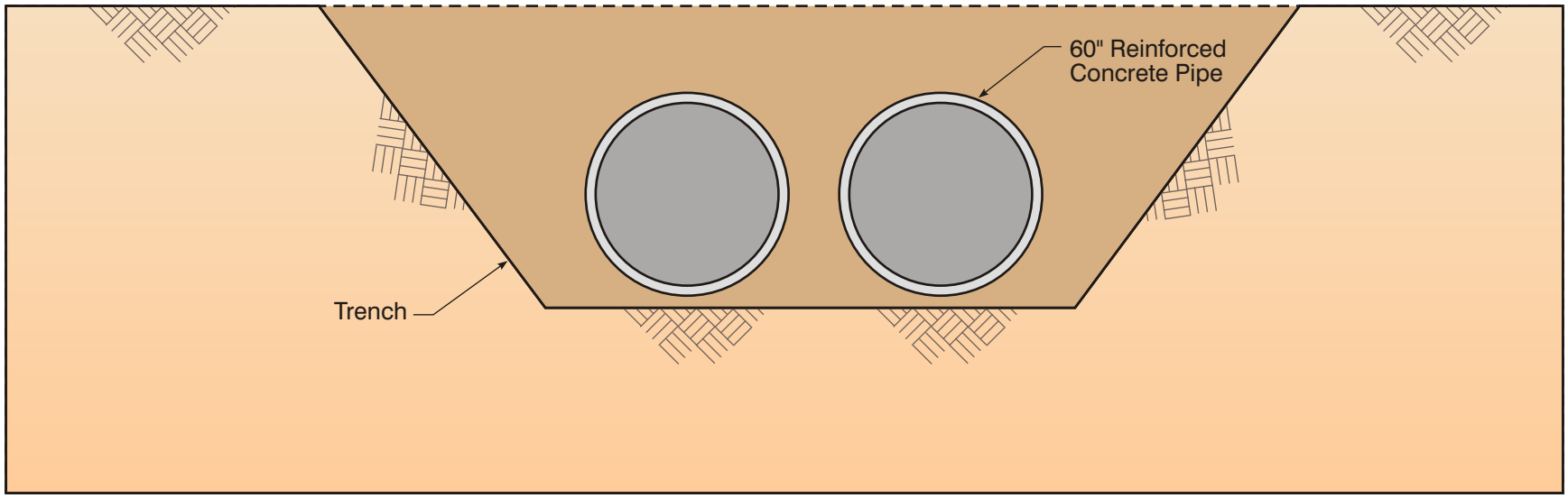

Figure 4
ALTERNATIVE 1A-2 – SECTION VIEW
SEWER AUTHORITY MID-COASTSIDE

Not to Scale

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COMPARISON OF ALTERNATIVES

Planning-level capital costs for the three storage alternatives are summarized in Table 1. Alternative 1A (underground storage tank) has the lowest cost at about $1.2 million. Alternative 1A-1 (in-line storage in 84-inch pipe) has the highest cost at about $2.7 million. Alternative 1A-2 (off-line storage in 60-inch pipe) is close to the same cost as Alternative 1A, at $1.3 million.

Based on the high cost for Alternative 1A-1, we recommend that this alternative be eliminated from further consideration. The remaining two alternatives should be evaluated further during preliminary design.

Table 2 lists a comparison of advantages and disadvantages for the two remaining alternatives.

Table 1 Preliminary cost Comparison of Wet Weather Flow Storage Alternatives - Portola Pump Station(1)

Item	Alternative 1A Buried Storage Tank(2)	Alternative 1A - 1 In-Line Storage	Alternative 1A-2 Off-Line Storage
Concrete Storage Tank	$482,000	---	---
Washdown/Drainage System	80,000	---	---
Piping (Fill and Drain)	52,000	---	---
Storage Pipe	---	$1,439,000(4)	$706,000(5)
Overflow Box	75,000	---	---
Junction Boxes	---	353,000	80,000
Electrical and Instrumentation	47,000	---	---
Subtotal	$736,000	$1,792,000	$786,000
Estimating Contingency @ 20%	147,000	358,000	157,000
Engineering Legal and Administration @ 20%	147,000	358,000	157,000
Subtotal	$1,030,000	$2,508,000	1,100,000
Land Acquisition(3)	200,000	200,000	200,000
Total Project Cost	$1,230,000	$2,708,000	$1,300,000

(1) Planning-level costs. Engineering News Record Construction Cost Index for San Francisco = 8148.
(2) Updated costs, not including Portola Pump Station improvements that will be done as a second phase.
(3) Estimated - to be verified with a property value appraisal.
(4) 800 feet of 84-inch diameter RCP.
(5) 1,400 feet of 60-inch diameter RCP.

Table 2 Comparison of Advantages and Disadvantages		
	Alternative 1A Buried Storage Tank	**Alternative 1A-2 Off-Line Storage in 60-inch Pipe**
Advantages	• Lowest capital cost • Smallest footprint	• Low operating and maintenance costs. • No moving parts • No access required (same as a normal gravity sewer) • Self-draining • Expandable
Disadvantages	• Higher operating and maintenance costs due to limited access and mechanical equipment. • Safety issues - confined space entry required. • Expansion more difficult. • Washdown System Required.	• Slightly higher capital cost • Longer footprint • Flat-slope. Sediments may accumulate

CONCLUSIONS AND RECOMMENDATIONS

1. Either Alternative 1A or 1A-2 appear to be feasible from a cost standpoint. Alternative 1A-1 does not appear to be feasible.

2. The two remaining alternatives, 1A and 1A-2, should be evaluated further during design. Input from SAM and other stakeholders should be obtained using a workshop or public outreach program.

3. SAM should initiate CEQA documentation, including the evaluation of the two viable alternatives, plus at least one other alternative, such as “no project.”

4. The need to upgrade the existing pumps at the Portola Pump Station should be evaluated. If the pump upgrade can be deferred, it could be constructed as a future phase to spread out costs.

5. The existing manholes near the Portola Pump Station should be surveyed to determine their elevation relative to the storage facilities and the pump station wet well. During this evaluation, the manhole elevations were not available. Some manholes appear to be low and may need to be raised to prevent overflows.