ATTACHMENT 3

527

PRELIMINARY

PROJECT REPORT

GRAHAM HILL ESTATES

OFF-SITE SANITARY SEWER SYSTEM

TO THE SANTA CRUZ REGIONAL TREATMENT FACILITY

SEPTEMBER 25, 1997

Consulting *Civil and* Structural Engineers

Monterey & San Jose, CA

ATTACHMENT 3

529

GRAHAM HILL ESTATES

OFF-SITE SANITARY SEWER SYSTEM
TO THE SANTA CRUZ REGIONAL TREATMENT FACILITY

TABLE OF CONTENTS

FIGURES

GRAHAM HILL ESTATES

ATTACHMENT 3 530

OFF-SITE SANITARY SEWER SYSTEM
TO THE SANTA CRUZ REGIONAL TREATMENT FACILITY

PRELIMINARY PROJECT REPORT

I. INTRODUCTION

The County of Santa Cruz has approved the Graham Hill Estates Subdivision and Tentative Map with the provision for an on-site wastewater treatment facility with effluent being pumped to and carried by the existing Scotts Valley gravity flow treated effluent pipeline in Graham Hill Road. This report evaluates an alternative method for handling the wastewater effluent with a pipeline connecting to the City of Santa Cruz collection system and treatment at the City of Santa Cruz Regional treatment facility.

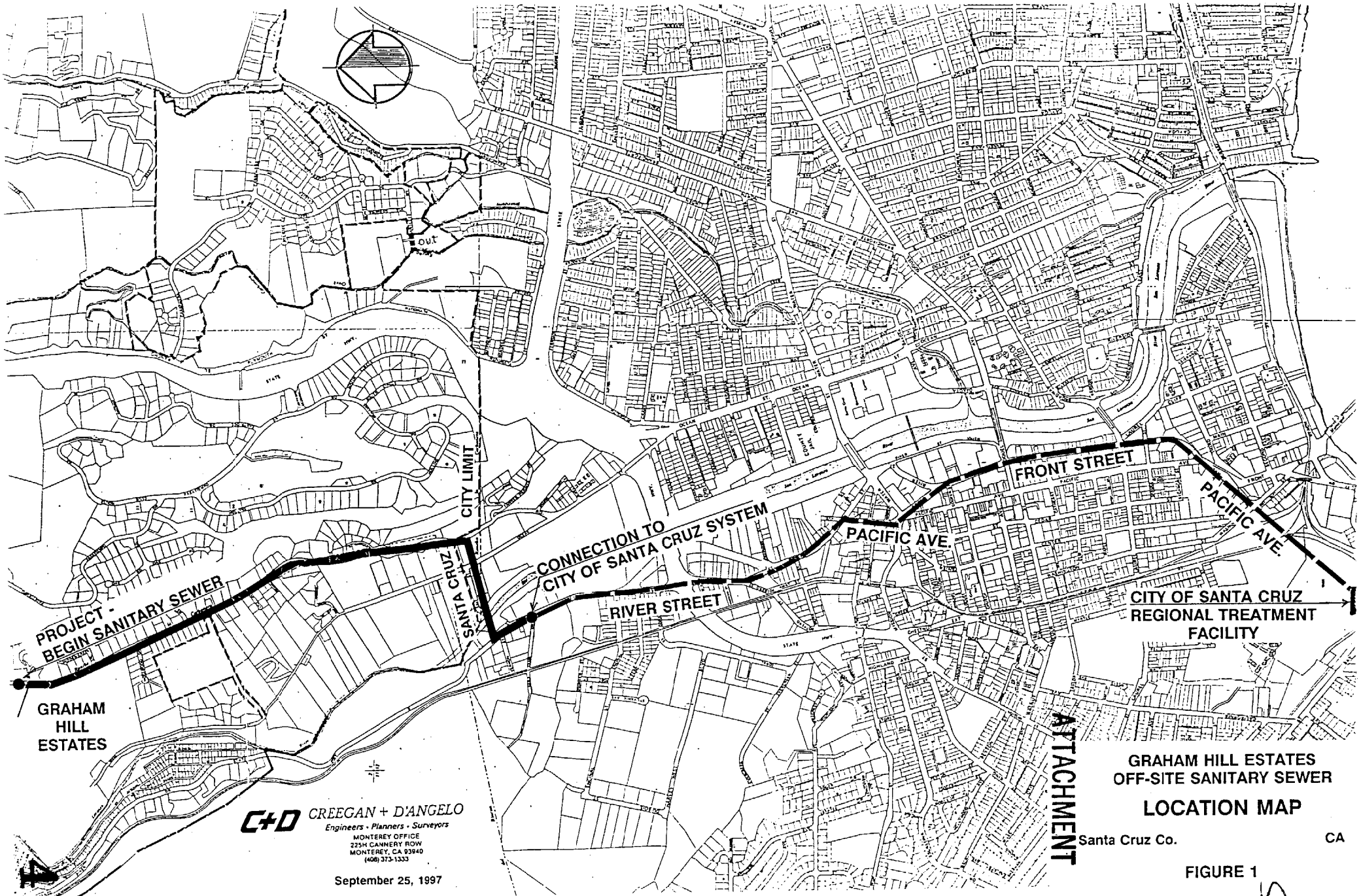
This alternative will provide the pipeline necessary to transport the untreated sewage from Graham Hill Estates to the existing wastewater system in the City of Santa Cruz. From the connection point in River Street at Golf Club Drive, the existing city wastewater system has adequate capacity to carry the flows from this subdivision. Treatment will be at the City of Santa Cruz Regional Treatment Facility with disposal to Monterey Bay.

II. THE PROPOSED PIPELINE

The 8-inch sanitary sewer pipeline project can be divided into four sections:

1. Graham Hill Road from the project site to the city limits;
2. Graham Hill Road to Ocean Street within the City of Santa Cruz;
3. From Ocean Street across the San Lorenzo River to River Street at Golf Club Drive; and
4. Beginning at River Street and Golf Club Drive to the Santa Cruz Regional Treatment Facility.

The pipeline alignment from Graham Hill Estates to the Santa Cruz Regional Treatment Facility is shown on Figure 1, Location Map.



C+D CREEGAN + D'ANGELO
Engineers • Planners • Surveyors
MONTEREY OFFICE
225H CANNERY ROW
MONTEREY, CA 93940
(408) 373-1333

September 25, 1997

ATTACHMENT 3

GRAHAM HILL ESTATES
OFF-SITE SANITARY SEWER

LOCATION MAP

Santa Cruz Co. CA

FIGURE 1

45

51

532

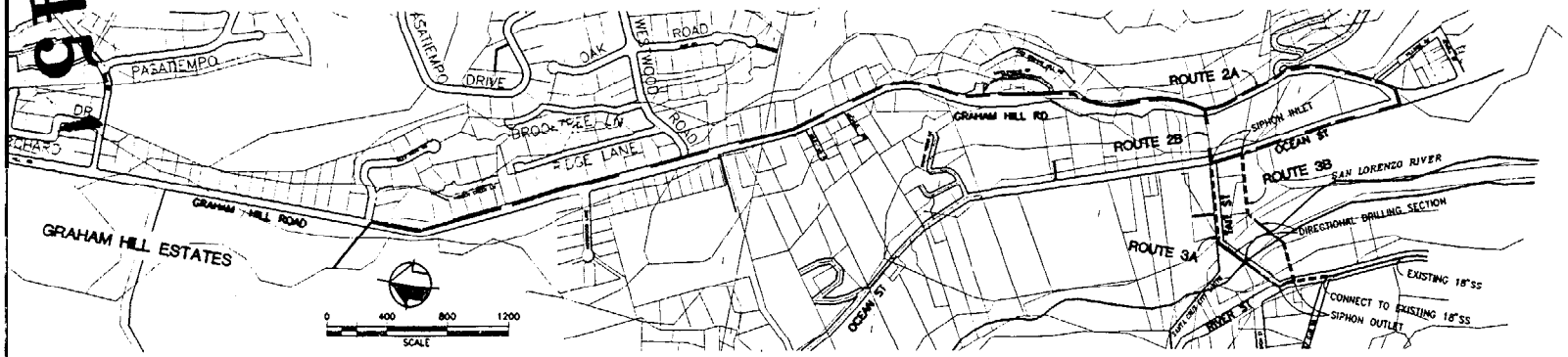
Section 1, Graham Hill Road, north of the City of Santa Cruz

This Section begins at Graham Hill Estates opposite Deer Path Road and continues along Graham Hill Road for about 6000 feet to a point where the pipeline continues down to Ocean and Tait Streets.

The right of way for Graham Hill Road varies between 50 and 60 feet with the improved area about 40 feet wide. This includes the paved travelway being 24-26 ft. wide with roadside drainage usually on both sides. The improved (roadway) portion of the right of way is towards the east side with about 10 feet from the edge of pavement to the right of way line. The west portion of the right of way has about 12-15 feet of space to the right of way line. Where the right of way is 60 feet wide, there is about 25-30 feet of vacant space on the west side of the right of way.

The existing vegetation is dense on both sides of Graham Hill Road. This precludes placing the new gravity sewerline outside of the pavement portion of the right of way.

Existing underground facilities in Graham Hill Road include a 20-inch waterline for untreated water (RW), the 12-inch gravity flow wastewater effluent line from the City of Scotts Valley (SVS), a PG&E high pressure gas main (G), and various storm drainage culverts that cross the street. The existing underground facilities are generally in the center and west side of the roadway pavement, either in the southbound lane, or off the southbound shoulder. The preliminary location for the proposed gravity flow wastewater line is within the northbound traffic lane, near the east side of the existing right-of-way. It would be located between the domestic waterline and the City of Santa Cruz raw water pipeline. In all cases, the separation between the domestic waterline and the new sewerline will be a minimum of 10 feet (center to center), except between Westwood Road and the water treatment plant driveway (Stations 134+50 to 137+00). In this section, the sewer pipeline will be equally spaced between two existing domestic waterlines. The space between the two existing domestic waterlines is about 12 feet. Therefore, the sanitary sewerline in this section will be installed as a double-wall pipe and at a grade lower than the waterlines.

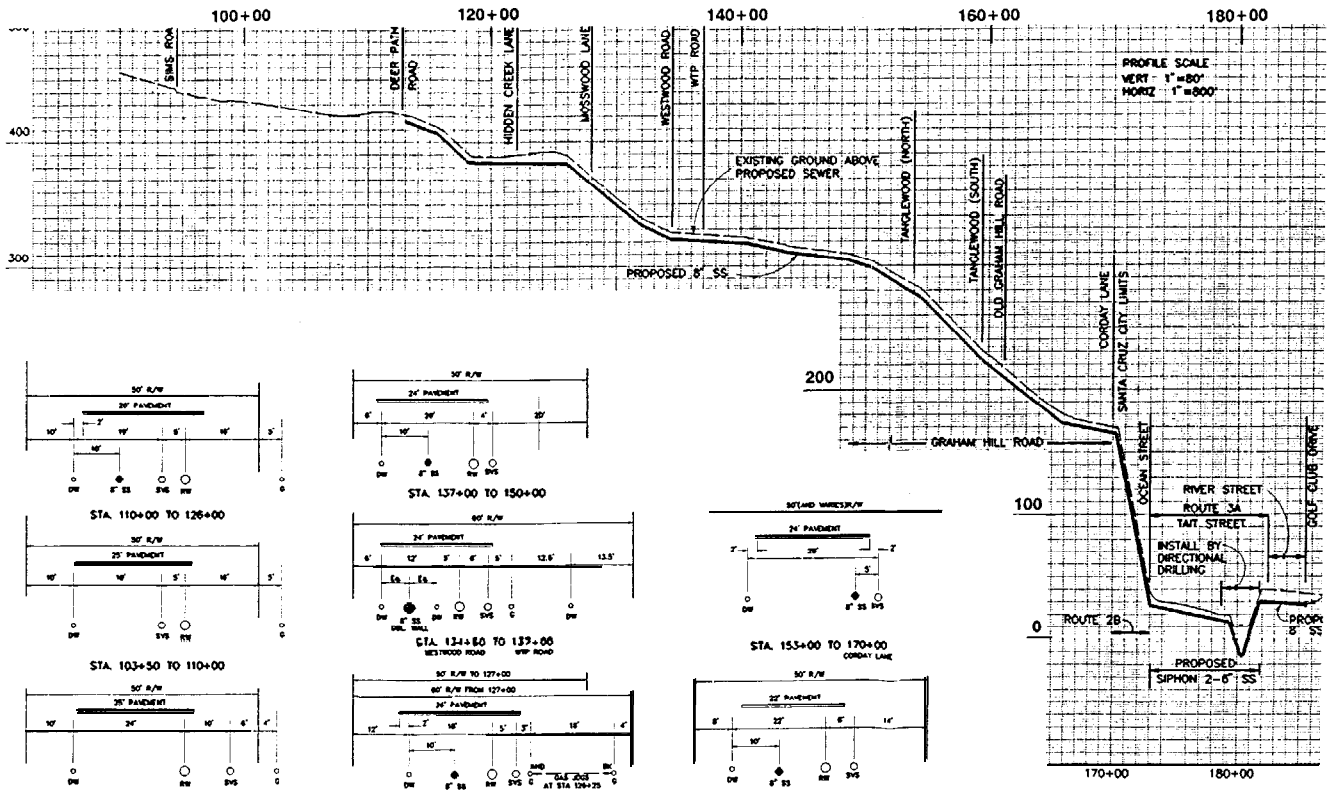


LEGEND

- PROPOSED SEWER, SECTION 1
- PROPOSED SEWER, SECTION 2
- PROPOSED SEWER, SECTION 3

ABBREVIATIONS

DW	DOMESTIC WATER
RW	RAW WATER
SVS	SCOTTS VALLEY SEWER
G	P.G. & E. HIGH PRESSURE GAS
SCSS	CITY OF SANTA CRUZ SEWER
WTP	CITY OF SANTA CRUZ WATER TREATMENT PLANT
●	PROPOSED SANITARY SEWER LINE



STA. 110+00 TO 126+00

STA. 103+50 TO 110+00

TO STA. 103+50

STA. 137+00 TO 150+00

STA. 134+60 TO 139+00

STA. 126+00 TO 134+50

STA. 153+00 TO 170+00

STA. 150+00 TO 153+00

GRAHAM HILL ESTATES
OFF-SITE SANITARY SEWER

Santa Cruz Co. CA

FIGURE 2

C+D CREEGAN + D'ANGELO
Engineers · Planners · Surveyors
MONTEREY OFFICE
225H CANNERY ROW
MONTEREY, CA 93940
(408) 373-1333

ATTACHMENT 3

Section 2, In the City of Santa Cruz, from Graham Hill Road to Ocean Street

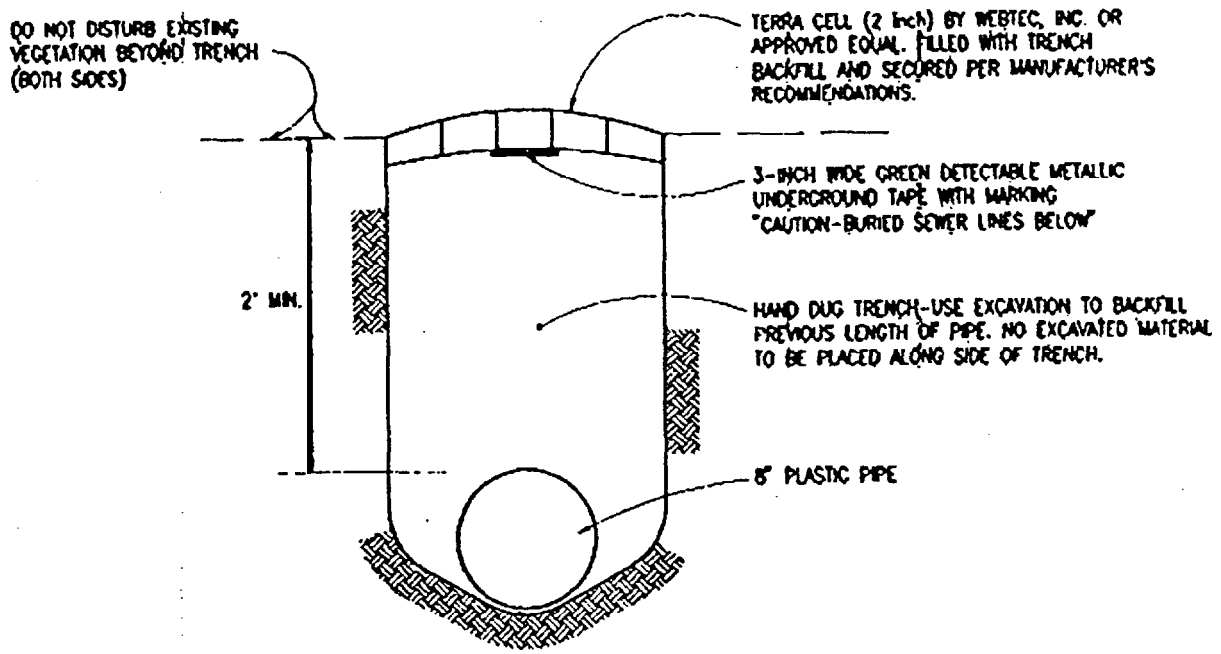
Two routes are under consideration for this second section. Route 2A follows Graham Hill Road to the intersection of Ocean Street, and then flows north along Ocean Street to Tait Street. This route is approximately 2500 feet long and is located within the existing public right-of-way.

The recommended route is Route 2B. This route is approximately 300 feet long and requires crossing private property in an easement which would be acquired as part of this project. This property (APN 008-031-17) is undeveloped and is shown on the current assessor's rolls as being owned by Peter G. Pethoe of 424 Escalone Drive, Santa Cruz. A twenty-foot permanent easement is recommended along with an additional twenty-foot construction easement.

The elevation change between Graham Hill Road and Ocean Street is about 140 feet in a horizontal distance of 300 feet. This is approximately a 2:1 slope which requires special construction considerations. Because of the relatively short distance and steep slope, this section of pipeline trench should be hand-excavated and laid uphill from Ocean Street to Graham Hill Road. As the trench is excavated for each section of pipeline, the previous section would be backfilled and compacted. To prevent erosion, the top of the trench and disturbed portions of the adjacent work area would be protected from erosion with a geogrid type of erosion matting. This material, which is a series of interconnected plastic cells, would be backfilled with the excavated soil. The geo-cells limit the exposed surface between cell lines thereby minimizing the potential for erosion because of the close spacing of the grids. One product that meets this requirement is Terra Cell, as manufactured by WebTech, Inc. A typical trench detail for this construction is shown on Figure 3.

After construction of the pipeline is completed, the work area should be hydroseeded using native grass and shrub seeds. There can also be some planting using shrubs, blackberry vines and/or other natives. This planting should be done in the late fall prior to the winter rains.

536



TRENCH DETAIL - SECTION 2
GRAHAM HILL ROAD TO OCEAN STREET

FIGURE 3

C+D CREEGAN + D'ANGELO
Engineers. Planners . Surveyors
MONTEREY OFFICE
2251 CANNERY ROW
MONTEREY, CA 93940
(408) 373-1333

S:\AUTOCAD\DWGS\CIVIL\18771A\TRENCH

Section 3, crossing the San Lorenzo River from Ocean Street to River Street

Two routes have been identified for crossing the San Lorenzo River. Route 3A, which is the recommended route, follows Tait Street from Ocean Street to the City of Santa Cruz water pump station adjacent to the river. The river would be crossed by directional drilling, and the wastewater pipeline would cross the river channel below the grade of the water pipeline and continue to River Street along the continuation of the Tait Street right-of-way or through the yard area of the city's coast pump station and meter repair shop. This route consists of 500 feet of sewer in Tait Street, a 300 foot river crossing, and 700 feet of sewer pipe to the point of connection on River Street at Golf Club Drive. All work would be within the public right of way.

In Tait Street, if the separation between the new gravity sewer pipe and the potable waterlines is less than 10 feet, the sewerline will be placed at a grade lower than the waterlines and in a double wall pipe.

In River Street to Golf Club Drive, the new 8-inch sewerline would be placed in the street with a minimum of 10 feet of separation to the domestic waterlines and with adequate clearance to other utilities. At Golf Club Drive, the sanitary sewer from Graham Hill Estates connects to an 18-inch sewer at an existing manhole.

Route 3B leaves Ocean Street at the north end of the IOOF Cemetery and crosses the cemetery lands in an easement which would be required for this alternate. This easement would be similar to the easement described for Section 2. The river crossing would be by directional drilling to either the driveway of the city meter shop or the parking area of the county transit facility. Easements would be required for crossing either of these properties. This route consists of 500 feet of sewer pipe from Ocean Street to the river, a 300-foot river crossing, and an additional 600 feet of sewer pipe to the point of connection.

Section 4, River Street and Front Street Route to the City of Santa Cruz Regional Wastewater Treatment Facility

This section of sanitary sewer pipeline utilizes the existing City of Santa Cruz sanitary sewer system which begins at Golf Club Drive as an 18-inch pipe and then enlarges to a 24-inch, 27-inch and finally 54-inch pipe to the treatment facility. There are also other parallel pipelines along this route. The capacity of these pipelines vary between 4.0 MGD and 43 MGD. The percentage of existing peak wet weather flows varies from a low of 14% to a high or near 100%. There are some sections along Front Street where the existing sewerlines flow partially under pressure for peak wet weather flow conditions. The projected flows from Graham Hill Estates for peak wet weather conditions is 0.04 MGD. This is 1% of 4 MGD and 0.1% of 43 MGD which is insignificant when considering the capacity of the City of Santa Cruz System.

There is no construction required in any part of this section to accommodate the Graham Hill Estates wastewater flows.

Siphon crossing the San Lorenzo River

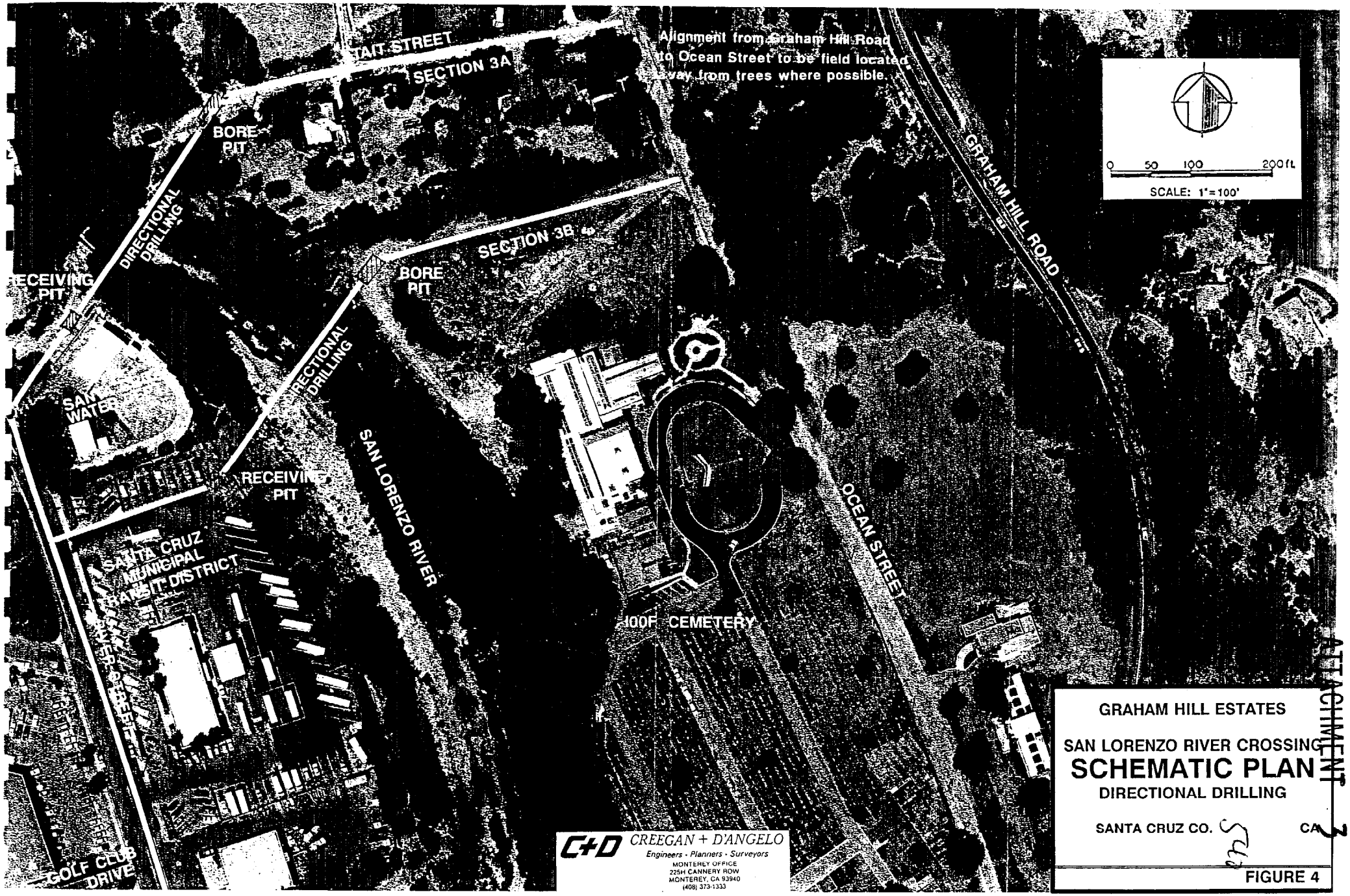
The invert of the existing twelve-inch sewer in River Street at Golf Club Drive, which is the point of connection for this project, is at elevation 26 with a ground elevation of 32. The ground elevation at the point where Route 3A reaches River Street is 40 and a probable pipe elevation of 34. Route 3B reaches River Street at elevation 36. It is anticipated that the flow in River Street would be by gravity and that the siphon portion of the system would be limited to the reach from Ocean Street where the pipeline would be at elevation 40 and River Street at elevation 34. For both Route 3A and Route 3B the siphon portion would be about 900 feet long. This is the only pressure flow section of pipeline which will be 2-6 inch pipes. It will begin at a diversion structure near Ocean Street. The pipeline will be valved so that the flow can be directed to either or both pipes. Installing 2-6 inch pipes will facilitate maintenance and cleaning when necessary.

All other sections are gravity flow.

539

The siphon location is shown on Figures 2 and 4 which shows the San Lorenzo River crossing. The location of the directional drilling site will be determined in the field considering local site conditions and the requirements of the property owner. Directional drilling will only be done at the river crossing. The pipe installation leading up to the drilling pit and receiving pit will be open-trench excavation. Using the directional drilling method will eliminate any impacts on the river channel or the riparian corridor on either side. Both the drilling pit and the receiving pit will be located outside of the riparian corridor in accordance with the applicable City and County ordinances.

This section of pipeline is within the City of Santa Cruz and will meet City design and construction requirements.



CREEGAN + D'ANGELO
Engineers · Planners · Surveyors
MONTEREY OFFICE
225H CANNERY ROW
MONTEREY, CA 93940
(408) 373-1333

GRAHAM HILL ESTATES

SAN LORENZO RIVER CROSSING

SCHEMATIC PLAN

DIRECTIONAL DRILLING

SANTA CRUZ CO. CA

FIGURE 4

ATTACHMENT 3

III. BUY-IN COSTS TO THE CITY OF SANTA CRUZ FACILITIES

541

Based on discussions with the City of Santa Cruz Public Works Department regarding the wastewater collection and treatment facilities, a cost has been calculated to buy in to the collection and treatment systems. These costs are based on the capacity of the collection and treatment systems and the portion of the cost related to the connected flows.

The collection system on River Street, beginning at Golf Club Drive and continuing along Front Street to the treatment plant, has sufficient capacity for Graham Hill Estates. Therefore, there will be no costs for upgrading the system, only a buy-in cost for Graham Hill Estate's portion of capacity used in the collection system.

This cost has been estimated at $50 per unit in accordance with the analysis provided by the City of Santa Cruz Public Works Department. This is based on a cost of $22,500 per 100,000 gallons of average daily flow contributed to the collection system.

The value of the City of Santa Cruz's investment in the treatment facilities is based on previous Value Engineering assessments and has been indexed to current construction costs. This value is estimated at $6,170,000 per million gallons of average daily flow plus an additional $102,000/MG for the tunnel and outfall pipeline. This equates to $6.272 per gallon. Based on 200 gallons per day per unit, the buy-in cost for the treatment facilities is $1,255 per unit.

The combined buy-in cost per unit to the City of Santa Cruz is estimated at:

Collection System	$ 50
Treatment Facilities	1.255
Per Unit Cost	$1,305

It is assumed these costs would be payable at the time of connection for each unit or at a time that is mutually agreeable to both the City of Santa Cruz and Santa Cruz County.

Although these costs were provided by the City of Santa Cruz Public Works Department, they are subject to negotiating an agreement allowing connection to the system and use of the facilities. These negotiations will probably involve a three-way agreement between the City of Santa Cruz, County of Santa Cruz through the Sanitary Engineering Section of the Public Works Department, and Graham Hill Estates. 542

Another requirement for connecting to the City of Santa Cruz facilities is formation of a public entity to represent Graham Hill Estates and to maintain and operate the facilities in the future. This could be either a County Service Area (CSA) or a sanitation district. The procedures for formation of the CSA or district will be determined as part of the previously described three-way agreement.

l-v. WASTEWATER CHARACTERISTICS

Wastewater from Graham Hill Estates is primarily of domestic origin. The affect of mandatory low-flow plumbing fixtures on sewage strength is to cause a slightly stronger sewage concentration than experienced in the past for domestic sewage. The concentration for the wastewater in parts per million or million gallons per liter (mgl) are:

BOD	250
Suspended Solids (SS)	200
Phosphate	10
Nitrogen	40

Wastewater loadings are a combination of expected flows and concentrations. During periods when there is infiltration, in the future, the concentrations of BOD and SS may be slightly lower. This is only expected to occur during the winter months. Because of the type of pipe to be used for the system (PVC with ring tight joints), the infiltration rates are expected to be low and not significantly affect the projected flows or wastewater quality.

Wastewater with the characteristics described will not have any affect on the normal treatment operation of the Santa Cruz Regional Treatment Facility.

V. CONSTRUCTION REQUIREMENTS

Utility Conflicts

Construction of a new sanitary sewer from Graham Hill Estates along Graham Hill Road, Tait Street, and River Street will encounter many existing utilities. Based on research of record data and field inspections, the approximate locations of the existing underground utilities are shown in the typical sections on Figure 2 and described in Section II of this report. In particular, because of the City of Santa Cruz 20-inch raw water pipeline to the treatment plant on Graham Hill Road and the 12-inch Scotts Valley effluent pipeline, portions of the right of way are occupied by these pipelines. In addition, there are separation requirements for clearances from domestic waterlines. There is also a high pressure PG&E gas pipeline along the west side of the roadway.

Other utilities such as electricity (PG&E), telephone (Pacific Bell), and cable TV are overhead on poles set back a short distance from the travelway. These do not present any clearance requirements. Also, because the utility poles are either within or at the edge of the tree line they will not conflict with the new sanitary sewer location.

During preparation of the construction plans, the utility locations for alignment will be marked by USA Service and field checked for depth by potholing at selected locations.

Traffic Control

Because the proposed location of the sanitary sewer pipeline is within the travelway, traffic control will be necessary to accomplish the work. It is anticipated that installation of about 300 - 500 feet of the pipeline can be accomplished each day. This will require one-way traffic control through the construction area. The 6000 feet of pipeline will require about 15-20 working days for installation with additional time for installation of manholes, finish paving, and striping.

To minimize the effects on traffic, the construction time when traffic control would be in effect could be limited to 8:30 AM to 4:00 PM or a time period that least impacts traffic. Before setting specific time limits for construction, traffic counts can be taken to determine the traffic use patterns and peak time period.

Based on the work to be performed each day, the traffic control limits would be adjusted daily. Signs will be posted in each direction of the work area in accordance with the requirements of the County of Santa Cruz for Graham Hill Road and the City of Santa Cruz for Tait Street and River Street. All traffic control will meet the requirements of the encroachment permits issued by the City and County.

San Lorenzo River Crossing

To eliminate any impacts on the San Lorenzo River, the crossing will be accomplished by directional drilling. The preferred crossing location is at the end of Tait Street near the City of Santa Cruz's water pumping facilities. A second location at the northerly property line of the IOOF cemetery property. Crossing the river channel and riparian corridor can be accomplished from either location with no impact on the river channel or the riparian vegetation.

The bore pit at Tait Street could be located at the end of the roadway or adjacent to the Santa Cruz Pump Station. The receiving pit for this alignment (3A) would be across the river within the Tait Street right of way and adjacent to the Santa Cruz Water Company plant site.

The bore pit for the other alignment from the corner of the IOOF cemetery property would be from an open clearing along a maintenance road. The pipeline would be drilled under the river channel to either the corner of the Bus Company maintenance parking area or to the City of Santa Cruz Water Department property. The alignment will require easements from IOOF cemetery, the bus company, or City and an encroachment permit for construction within the Tait Street right of way.

Either location can accommodate a bore pit and construction equipment area on the east side of the river channel and a smaller receiving pit on the west side of the channel. The final location of the bore pit site will be made at the time the construction plans are completed and will be at a location with minimal impact on the riparian vegetation, existing properties, buildings, and utilities. Figure 4 is an aerial photo plan for alignments 3A and 3B and the San Lorenzo River and riparian corridor crossing.

VI. SUMMARY AND RECOMMENDED PROJECT

The foregoing sections describe the considerations in selecting a route for construction of the 8-inch offsite sanitary sewer and the siphon crossing at the San Lorenzo River. The alignment along Graham Hill Road (Section 1), because of utility restraints, is proposed to be on the east side within the northbound travel lane. Traffic control will be needed for installation of the pipeline and manholes, repaving the half width of the roadway where the trench is located, and striping the roadway.

From Graham Hill Road to Ocean Street the alignment across the Pethoe property should be as close to the property line as possible considering trees and other vegetation. This is a steep slope and will require hand excavation for about 300 feet with special treatment of the trench to prevent erosion.

The alignment continues along Tait Street to the City of Santa Cruz Pump Station and is labeled 3A on the plan. The bore pit for directional drilling under the San Lorenzo River and the riparian corridor will be located near the pump station. The receiving pit is located in the Tait Street right of way below River Street. From there the pipeline continues to River Street. The siphon portion of the pipeline begins near Ocean Street at an invert elevation of about 40 and continues to River Street with an invert of about 34. The siphon would be 2-6 inch polyethylene pipes with valves in a diversion structure at the upper end. It will be designed for alternate use and with one pipe carrying the primary flow. Final design will establish the inverts necessary for efficiency flow through the siphon. There will also be access manholes on both sides of the river channel outside of the riparian corridor for maintenance of the inverted portion of the siphon.

544

At River Street the pipeline continues to Golf Club Drive where it connects to the existing 18-inch pipe which terminates at a manhole in the intersection. Construction along River Street will require traffic control and possibly night time work to reduce the effect on traffic. The trench will be repaved about ‘12 feet wide or the width of the travel or parking lane where the pipe is located.

The project can be constructed applying good engineering design and construction practices with essentially no impacts, except for short-term construction traffic control. If there are other connections made to the Graham Hill Estates off-site sanitary sewer pipeline in the future, those connections and their impacts can be evaluated independently of this project.

533

The existing utility lines and proposed sewerline locations are shown on Figure 2 entitled "Graham Hill Estates Sanitary Sewer." Existing utility locations are based on field observations and record utility maps. As part of the final design, the existing utilities will be field located through the USA service. It will also be necessary to pothole the depth of the existing utilities to provide for adequate vertical clearance.