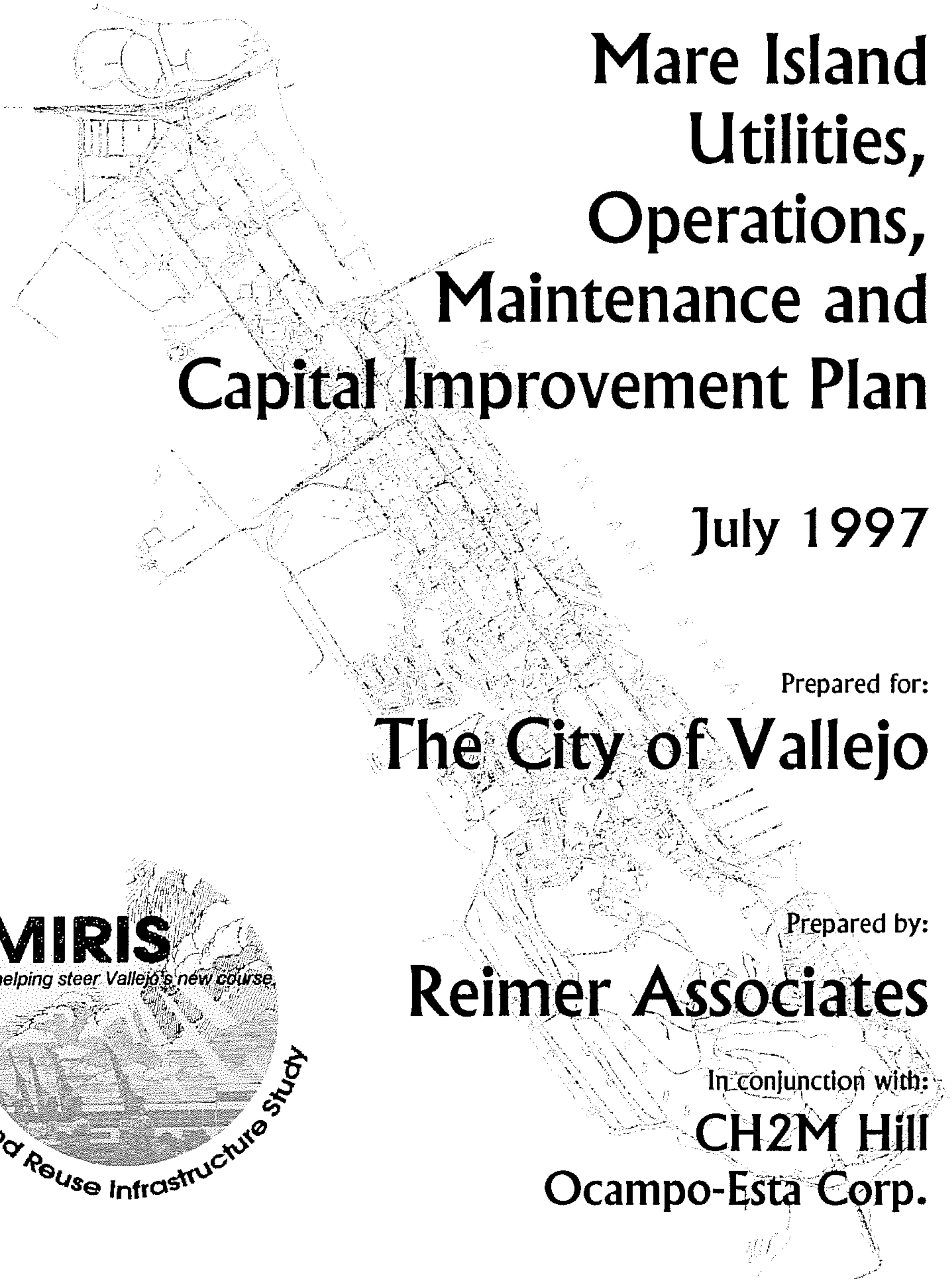

Mare Island Utilities, Operations, Maintenance and Capital Improvement Plan

July 1997

Prepared for:

The City of Vallejo

Prepared by:

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In conjunction with:

CH2M Hill
Ocampo-Esta Corp.

MIRIS

helping steer Vallejo's new course

Mare Island Reuse Infrastructure Study

This Infrastructure Study was accomplished by professional consultants under contract to the City of Vallejo through funds provided by an Economic Development Administration Strategy Grant and Department of the Navy contract # N62474-97-2-0003-P002. The statements, findings, conclusions, recommendations, and other data in this report are solely those of the consultant and do not necessarily reflect the views of the Economic Development Administration or the Department of the Navy.

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EXECUTIVE SUMMARY

BACKGROUND AND OBJECTIVES

This report describes and summarizes the investigations and findings from the Reimer Associates' Mare Island Reuse Infrastructure Study (MIRIS) prepared for the City of Vallejo. The Strategy Report, which constituted the initial deliverable of the study, established the actions, activities and assessments required to provide the City with updated, comprehensive base and infrastructure system maps and this Utility Operations, Maintenance and Capital Improvement Plan for potable water, salt water, sanitary and storm drainage systems, and the Causeway Bridge. A follow-up triennial inspection of the Causeway and Sacramento Street bridges was conducted in late 1997 using Navy funds; the final report resulting from this inspection has been provided under separate cover.

MIRIS followed publication of the Mare Island Base Reuse Plan and reflects the land use plan and assumptions accordingly. Additional information was developed, defined and integrated as a part of the ongoing Economic Development Conveyance (EDC) negotiations. Data from the MIRIS report was also used to define critical infrastructure improvements in support of the EDC application for property transfer from the Navy to the City of Vallejo as the Local Reuse Authority (LRA).

Three additional studies were conducted conjunctively. The first was a wastewater reclamation feasibility study which used the preliminary sewer generation and water demand data derived under MIRIS. The second was a utility user fee study to establish billing rates and connection fees for potable water, sanitary sewer and storm drainage on Mare Island. In both instances, Reimer Associates and members of the MIRIS Team were integrally involved throughout the studies. Third was a transportation study by Fehr and Peers which assessed the transportation requirements generated by the MIRIS plan and its impact on recommended road improvements on site. Reimer Associates was requested to estimate the cost for the Fehr and Peers transportation improvements, and to include these costs in this Executive Summary which is the final deliverable under the Reimer Associates contract with the City of Vallejo.

The objective for this report was to provide the City of Vallejo with an independent assessment of the condition of infrastructure on Mare Island as well as the costs associated with system improvements needed to support redevelopment according to the Base Reuse Plan.

SCOPE AND METHODOLOGY

Due to uncertainties over the depth and accuracy of existing information, Reimer Associates reviewed available documentation and recommended a course of actions to meet the objectives of the contract. The first action involved the use of aerial photogrammetry to develop an accurate base map. Municipal utilities were marked and mapped using this same technique. Extensive field inspections were conducted to confirm connectivity of the surface features (manholes, valves, etc.) and correct discrepancies in the Navy's "Quad Maps". These maps were then divided as an extension of the City's cadastrial grid system and plotted accordingly. Electronic copies of these maps were also provided to the Public Works Department and Vallejo Sanitation and Flood Control District (VSFCD). A prototype document management system was also developed and provided to the City in order to inventory and manage the massive volume of system information that the Navy turns over to the City.

To assess the capacity of the utilities to meet reuse requirements, Reimer Associates developed an individualized utility demand model for the water, sanitary and storm water systems at Mare Island. This "InfraStrategy Analysis" started with definition of planned development areas derived from the Final Base Reuse Plan. These reuse areas were revised to incorporate current, accurate base mapping, recent changes within redevelopment areas and revised absorption forecasts from the Economic Development Conveyance (EDC) application. Finally, discrepancies were corrected thus providing a current, accurate projection of redevelopment demands. Our InfraStrategy Model was then configured at three key timeframes as reflected in the Base Reuse Plan; current conditions (1997), long term development (2007)*, and ultimate development (20XX).

The capital improvements that are required for ultimate redevelopment of the base will entail numerous types of system improvements. Due to the unique features, aspects and causes for these improvements, they have been grouped into 4 categories; on-site upgrades, on-site system expansion, life cycle replacement costs, and outfall consolidation improvements.

To develop an accurate basis for demand, regional and local utility demand factors were compiled and applied to reflect reuse area attributes (Appendix A-1 and A-2). These factors were derived from Reimer Associates experience in Bay Area land development and base conversions at Fort Ord and MCAS El Toro. Each of these factors was then reviewed with appropriate City agencies and revised to account for local factors and experience. The final set of demand factors were applied to each of the three timeframes thus determining the utility demands at current, intermediate and buildout points in the reuse process.

SUMMARY OF FINDINGS

Potable Water

The Mare Island Potable Water System is serviced from the City of Vallejo's water supply grid at two metered feeder connections and consists of five water storage tanks, five booster pump stations, two chlorination stations, cathodic protection, and distribution piping. Most of the primary water distribution is provided through 12-inch and smaller piping. A schematic of the backbone water distribution system is provided in Section 2, Figure 2-2.

The two feeder lines, installed in 1942 and 1938, are both lined and encased in concrete for their submarine sections under the Mare Island Strait. At present, both feeder pipes appear to be in

* Terminology consistent with the EDC Application

good external and internal condition. The master meters on both of these lines have been replaced and recalibrated within the last 12 months.

None of the water storage tanks operate at the normal hydraulic grade line of the island. Only one tank is capable of gravity feed into the system, Tank 188B, and this is only possible under conditions of extreme flow and reduced system pressure. Two of the five existing tanks are no longer operational. Since none of the remaining tanks are within the hydraulic grade line of the City's "Grid Zone", all are served by pump stations. In addition, booster pumps are located under the Causeway to boost the service pressure on that feeder line. With the exception of new pump stations at Tank 774 and Building A-295, all of these booster pumps are in poor to failed condition and can no longer be relied upon in an emergency.

Due to low demand, the water system is currently operating between 60 and 70 psi. This operating condition has created a number of issues, primarily related to low water turnover rates, currently 11 days during the spring of 1997. This is an overall turnover rate; local turnover in low demand areas (Reuse Area 6, 7, 8, 9, & 10) will be much longer and could exceed 30 days. Combined with low residual chlorine levels at the service connections, low demand has increased the potential for contamination within the system. The city has instituted a short-term correction for this situation by flushing hydrants and periodic spot chlorination of Tanks 920 and 774. This has reduced the volume of water needed to be flushed and introduced disinfection at these storage sites. However, spot chlorination does not provide an acceptable long term corrective action. Measures recommended to alleviate this situation until daily demand increases include isolation of Tank 774 (which is not suitable for fire flows) as well as isolation of piping to areas which are not projected for use during the next five to ten years.

Overall, the base water demand since closure on April 1, 1996 has dropped proportionately to population thus indicating reasonable system integrity. Base maintenance staff indicates that the vast majority of recent water leaks seem to be related to an increase in the static pressure due to lower water demand. Of these breaks, a significant number were being "secured" by closing the valves leading to leaking segments thereby isolating the breaks and fragmenting the overall system. Since October 1996, this trend has been reversed. Repairs are being made and lines kept in service. Cursory inspection of the booster pumps indicates that they are operational; however, with the present low water demand they are not used, except for the possibility of a fire. Booster pump stations at water storage tanks were constructed such that they constitute a "confined entry area" under OSHA.

The salt water system is currently being used only for fire protection and is planned for abandonment except for the new portions at the south end of the island, which is to be connected to the potable water system. As a result, the MIRIS Team was directed by the City of Vallejo Public Works Department not to inspect the salt water system, other than mapping lines and hydrants slated for conversion.

Sanitary Sewer

The Sanitary Sewer System collects liquid waste from the developed sections of the base through a series of gravity mains, lift stations and force mains. The untreated wastewater is pumped along the Causeway across the Mare Island Strait discharging into the Vallejo Sanitation and Flood Control District's trunk line along Wilson Blvd. Originally, in keeping with the standards of the 1800's and early 1900's, the base's sewer system was constructed as a combined sewer system (sanitary and storm) which discharged into the Strait. Over the years, this system was separated and upgraded to bring it into compliance with modern standards and included a waste treatment plant on the island. This plant was eventually abandoned and transformed into an industrial waste pretreatment facility while the sanitary sewage was pumped across the Causeway Bridge directly to VSFCD for treatment and disposal. A schematic of the present backbone sanitary sewer system is provided in Section 3, Figure 3-1.

The base sanitary system currently consists of a series of gravity lines boosted by 13 lift stations (DOM's) scattered around the island. These feed into a central pump station, DOM-4 located on A St. DOM-4 contains four pumps which feed a 18 inch steel force main running from DOM-4, across the Causeway Bridge, to the Wilson Ave. trunk sewer in Vallejo. DOM-4 also has two emergency overflows. One discharges directly to Mare Island Strait and is currently sealed with a closed gate valve; the other is connected to Station W. Station W pumps excess flow from DOM-4 westerly to the industrial waste treatment ponds through a 12-inch pipe. These ponds then discharge back to DOM-4 through a 21 inch gravity line (which also contains the 12 inch force main), thus functioning as retardation basins for excess sanitary sewer flows beyond the discharge capacity of DOM-4.

In addition to domestic sanitary sewage, the base system can accommodate ship-based sewage system discharges. Large vessels can empty waste tanks into the berth collection system. This system is powered by 14 Ship-To-Shore (STS) pump stations located along the berths and finger piers. 8 Sewage Pump Stations (SPS) which were installed recently to expand sanitary sewage service to the North Pier and correct problems throughout the NAD area (Reuse Area 10) augment these pump stations. In general, however, the dockside pumps have been secured and a number of pump stations have essentially been bypassed and/or abandoned in place.

Due to the age of the system, particularly in the central and southern end of the island, pipe materials vary from late 1800's era oval brick sewers to modern reinforced concrete trunk lines. The flat slope of the majority of the Base sewer lines requires many sections of pipe to extend below the water table. Figure 3-2 in Section 3 graphically portrays the sections of submerged and tidally influenced pipe. This feature, in conjunction with the use of inappropriate materials (such as corrugated metal pipe), slotted storm drain manhole covers on the sanitary system, and soil instability (settlement) problems, resulted in very large inflow and infiltration (I&I), the single most demanding deficiency in the entire system. Since early 1997, VSFCD has conducted a program to isolate and reduce this I & I flow.

Another aspect of the high I&I rate is the shutdown and isolation of lift stations serving areas not currently leased or otherwise occupied. Although this is an effective short-term elimination of the problem, it will resurface, as additional tenants require these stations to be placed back in service. An additional implication is the increased maintenance required to reactivate and operate pump stations that have been shut down for an extended period of time (one year or more).

The sanitary sewer system appears to be in the worst shape of the systems inspected. Although potable water demand has reduced dramatically since base closure, sanitary discharge was initially reduced only marginally. This was caused by significant infiltration and/or inflow (I&I) into the sanitary pipes from surrounding sources (i.e.: groundwater, salt water, water leaks). In early 1997, water demand averaged around 260,000 gallons per day (gpd) while sanitary discharges were near 900,000 gpd.

Storm Drainage

The Storm Water Systems collect surface water from most of the developed sections of the Base through a series of catch basins, collection laterals, gravity mains, and three lift stations. Storm water is discharged primarily into Mare Island Strait. Most of the western discharge points (into the San Pablo Bay wetlands) have been removed in conjunction with wetland restoration efforts or abandoned in place as military activities were removed from the areas served.

After consolidating areas of natural overland flow and accounting for abandoned or removed discharge points, 16 major drainage basins were identified throughout the developed portions of the base. A schematic showing the backbone portion of the major storm water collection and discharge systems serving the 16 tributary drainage basins is provided in Section 4, Figure 4-3. Each of these basins was reviewed for redevelopment plans, consolidation potential and estimated upgrade consolidation cost. An inspection of each of the existing outfalls was conducted to assess their condition, elevation, degree of siltation, capacity and the operation of tidegates.

Most of the storm outfalls along the strait are at or below low tide levels with resulting backwash during high tide and deposition of Bay mud and silt in the pipes. Over time, these deposits develop a cementitious cohesion and become all but impossible to remove. Such deposition reduces effective flow capacity and leads to blockages further up the drainage pipeline. In the spring of 1997, VSFCD started a program of inspecting and cleaning storm drain manholes to reverse this process.

Due to flat topography and low elevation (below 10' NGVD), storm drainage in Reuse Area 1 is the most critical of any location on the island. At present, the existing systems and pump stations are incapable of providing adequate storm drainage in this area. In 1984, a dike break during the rainy season caused the area to flood extensively (to a level of 6'-7' NGVD). Contributing to the Area 1 problem is settlement of low-lying areas and subsequent seepage of groundwater and tidal backup through leaking lines. As this area is planned for early redevelopment, construction of a drainage system to match specific reuse plans should have a high priority.

Reuse Area 10 represents the other main area of concern. Due to its construction on fill material and the presence of older interconnected sanitary and storm drainage systems, it is a prime candidate for reconstruction in conjunction with future redevelopment. Drainage systems throughout the remainder of the Base appear capable of supporting redevelopment as planned in the Final Reuse Plan. Only spot deficiencies were identified during modeling and corrections to these problems are identified in Section 4.3 of this report.

Transportation and Bridges

The Mare Island Causeway Bridge provides the only vehicular, rail and pedestrian access route to Mare Island from the east. (A second vehicular only access is provided to the north via Highway 37.) The Causeway Bridge across the Mare Island Strait, provides two lanes of traffic inbound (westbound), one lane of traffic outbound (eastbound), a single railroad track, and a 7.5' wide sidewalk. The Bridge, including approaches, is approximately 2070' in length.

The Sacramento Street Bridge is located within the City of Vallejo. The structure carries four lanes of municipal vehicular traffic over the same railroad tracks that service Mare Island via the Causeway Bridge. The bridge is approximately 100' in length. As noted previously, the MIRIS team performed a triennial inspection to meet Navy regulatory requirements and assess the feasibility of joint rail/vehicle use of the Causeway Bridge.

A record review showed that the lift section of the Causeway Bridge was built in 1978, replacing an older Bascule drawbridge. At the same time, pilings for the approach spans were reinforced with metal and concrete casings, and some additional outer pilings were added. Periodic (5 year) structural inspections have been conducted to Navy standards; the last inspection was completed in 1993. This inspection consisted of a detailed underwater assessment of the pilings and supports and a cursory inspection of structural members under the bridge deck. Load calculations were performed for a heavy nuclear rail shipment scheduled to traverse the bridge that same year. Together, these assessments meet many of the AASHTO requirements for public bridge inspections; however one significant deficiency was a detailed examination of the structural members and connections under the road deck. The mechanical and electrical inspection indicated that the bridge is operable. However, limitations in the control system and the need for synchronous operation of four lifting motors have caused the bridge to lock-up or stick during operation.

Transportation improvements on Mare Island were identified separately by Fehr and Peers. Based on their assessment of trip generation factors and peak traffic projections, a series of road cross-sections were developed for arterial improvements. The recommended cross sections were used by Reimer Associates to develop linear foot costs reflecting current construction information from the Wilson Ave. Improvement Project. These costs extended by the length of road construction are combined with rail crossing improvements so as to reflect overall street improvement costs with the exception of environmental remediation costs and the cost of the "Southern Crossing" bridge (addressed by Fehr and Peers but not included in their improvements). This new bridge, near Lemon Street, has been roughly cited to cost $86 million[1] and is not included in the $60 million cost estimate for transportation improvements.

CONCLUSIONS AND RECOMMENDATIONS

Overall costs for projected Infrastructure Capital Improvements at Mare Island are summarized in the following table:

[1] This cost has not been verified or validated and appears excessively high at first inspection.

Table 1
Summary of Capital Improvements by System

TYPE OF IMPROVEMENT	WATER SYSTEM	SANITARY SEWER SYSTEM	STORM WATER SYSTEM	TRANS-[1] PORTATION SYSTEM	TOTAL COST
ON-SITE SYSTEM UPGRADES (To meet current operation standards)	$4,572,000	$774,000	$51,000		$5,397,000
ON-SITE SYSTEM EXPANSION (To meet projected future development)	$2,641,000	$4,953,000	$13,740,000	$60,420,000	$81,754,000
LIFE CYCLE REPLACEMENT COSTS (Until Year 2017)	$2,817,000	$2,057,000	$1,329,000		$6,203,000
OUTFALL CONSOLIDATION PROJECTS	NA	NA	$334,000	NA	$334,000
TOTAL SYSTEM ESTIMATED COSTS (Including 15 % for engineering and 20% for contingency)	$10,030,000	$7,784,000	$15,454,000	$60,420,000	$93,688,000

NOTE [1]: The Caltrans cost estimate of $86 million for the proposed new bridge at the Southern Crossing has not been included in these transportation cost estimates.

GENERAL A: These estimated costs do not include environmental related work - analysis, restoration or remediation.

B: All cost estimates are in 1997 dollars and no inflation has been added to improvement costs proposed in future years.

In addition, based on the result of this assessment, a number of key projects appear to warrant immediate attention in order to maintain the redevelopment projections. These projects are summarized below, along with the key issues surrounding each of them.

New 5.7 MG Storage Tank - This tank is required to provide adequate water storage for domestic and maximum fire demands. Due to the size and location of Mare Island at the end of the City's "Grid Zone", the Island's water system must be capable of sustaining these demands separately from the City's main water system. Present storage tanks are located at elevations too low to provide adequate pressure in peak demand situations. Key factors in the siting and sizing of this tank are its outlet (top of tank) elevation, domestic and fire storage requirements and equalization storage. Existing storage tanks provide only marginal volumetric coverage for current reuse demands; further redevelopment will require additional water storage capacity. Due to this impending water storage deficiency, as well as the low elevation of existing tanks and Department of Health Services requirements, the new storage tank will be needed before 2000. Presently, the Public Works Department's schedule allows time for funding, design and site preparation. However, current funding efforts should be aggressively pursued since the lead-time required to fund, design and construct the tank amount to a two year program. As an interim measure to maintain adequate system pressures and peak fire flows during this two-year period, a section of 12" pipe along 14th St between Railroad Ave. and Cedar Ave. should be replaced with a 20" line. Following completion of the new storage tank, Tanks 188A, 188B, and 645, along with their pump stations and the Causeway pump station, should be removed from service and demolished. Total cost for this upgrade program will be $7,280,000 between 1998 and 2001.

Install New Water Service Meters - Although they have not been specifically included as a Capital Improvement within this report, individual service meters will be required as facilities are leased and eventually transferred. The cost for these installations will continue to accrue over a ten-year period and will not be incurred as a single expense. The total cost for metering existing facilities (which will be retained) can be estimated from tentative redevelopment plans. Assuming a 40% retention of 900 industrial facilities, 360 meters will need to be retrofitted. This leads to a total estimated cost of $368,000[2].

Install New Sewer Main; Isolate and Remove DOM-1 - This project eliminates one lift station at the far north end of the island, replacing it with a gravity main from the northwest corner of the Base directly into DOM-2. This requires the installation of 900 feet of a 12-inch sewer line to isolate an area of high inflow and infiltration (I&I). Due to the current occupancy of facilities served by this line, its low cost, and the high I&I experienced, this project is recommended for immediate construction. This project is expected to cost $74,100. Additional upgrades required to accommodate redevelopment within Reuse Area 1 will entail replacement of the entire sewer trunk line along Railroad Ave. at a cost of $610,000.

Isolation and Removal of SPS and STS Pump Stations - This program removes and salvages equipment at unnecessary SPS and STS Pump Stations. Because of minor demand, SPS-1, 2 and 5 should be abandoned. SPS-1, 2, 3 and 4 are linked in series with SPS-1 at the furthest end of

[2] Based on 100 facilities at $2000 each, 200 facilities at $750 each, and 60 facilities at $300 each.

the North Pier and SPS-3 on the corner of the pier closest to land. SPS-4 is on land and discharges to the DOM main line on Railroad Avenue. Minor demand is expected on the pier for a rest room, fish and bait preparation and water fountain. These uses are projected for the period 2000 to 2007. SPS-3 and SPS-4 are recommended for maintenance and correction of safety problems in the near term. (SPS-4 equipment is subject to flooding during heavy rainstorms and must be elevated.) SPS-5 is isolated and lines to and from the station are being removed as a part of unexploded ordinance removal on the south end of the island. STS- H, I, J, K, L, M, N, O and V along the waterfront berths should be removed or moth balled until tenants and/or ship berths require their reactivation. At the time this report was completed, actions had been initiated under the Caretaker Agreement to start mothballing and salvage of some of these pump stations. Total cost for these removals and mothballing will be $72,000.

Repair Storm Drainage Pump Stations - Two key storm drainage pump stations, SDPS 14 and 15, are in urgent need of repair and overhaul of the main pumps. The Navy concurred with these actions and a major overhaul was accomplished under the Caretaker Agreement in the summer of 1997, prior to completion of this report. The total cost for these repairs was $51,000.

Transportation Upgrades - The majority of transportation improvements will be accomplished in conjunction with redevelopment efforts; i.e. as a parcel is developed, roads serving it will be reconstructed. One notable exception to this is Walnut Ave. from G St. to Cedar Ave. This portion of Walnut Ave. runs through the center of the historic district and is unsuitable for expansion. It also serves the center of the "Downtown" portion of the island containing the Post Office, utility company offices, Alden Park and "Captain's Row", and represents the current façade of the island. At present it is in poor condition with numerous cracks, potholes, and evidence of base/subbase failures. This road should be resurfaced within the next year to prevent further decay and failures and improve the appearance of the island's central district. The total cost for this road resurfacing, including subgrade repairs, will be $180,000. (Note: as of the date of this final report, the Navy had agreed to accomplish this road repair under the Caretaker Agreement; initial grinding and site preparation have been completed.) A related transportation safety item is the need for railroad crossing warning signs. The Public Utilities Commission conducted a tour of the base in the summer of 1997 and identified a number of safety items that needed to be addressed. A series of these was the need for railroad crossing crossbucks and/or barricades at 51 intersections. The cost for these initial warning signs and barricades will be $120,000.

SECTION 1

INTRODUCTION

SECTION 1
INTRODUCTION

1.1 BACKGROUND

This report describes and summarizes the investigations and findings under the Scope of Work for the Reimer Associates Mare Island Reuse Infrastructure Study (MIRIS) Team contract with the City of Vallejo. Under Task A of the contract, the MIRIS Team gathered information, conducted interviews and performed spot inspections and site surveys to determine the amount of information available, assess its accuracy and validity, and identify data gaps. The strategy report prepared as the deliverable from Task A established the cartography and field assessments required to provide the City with comprehensive operational information as well as detailed digital infrastructure system maps which were completed under Task B. Finally, this Utility Operations, Maintenance and Capital Improvement Plan for potable water, salt water, sanitary and storm drainage systems, and the Causeway Bridge along with document research, inventor, and record management represent the Task C deliverable and builds on the "Proposed Strategy for Mapping and Evaluation" presented at the end of Task A.

1.2 ORGANIZATION OF THIS REPORT

This report is presented in sections:

- Section 1: Introduction: Summary discussion of the methodology, validation and overall utility demands using the MIRIS InfraStrategy analysis;
- Section 2: Potable Water;
- Section 3: Sanitary Sewer;
- Section 4: Storm Drainage;
- Section 5: Causeway Bridge;

Appendices contain the detailed calculations, backup data and assessments collected or generated during this project. Electronic and hard copy maps (at 1" = 100' scale) of the base and utility systems generated under Task B were provided to the City of Vallejo separately and were used to create most of the graphic maps included in this report (MIRIS 1996 Aerial Planimetric). Detailed topographic maps of Reuse Area 1 (at 1" = 40' scale) and an electronic document tracking and management system were also created under Task C and provided separately to the City to meet ongoing redevelopment requirements.

1.3 SUMMARY OF OBSERVED CONDITIONS AND AVAILABLE INFORMATION FROM TASK A

Overall, the MIRIS Team found significant documentation pertaining to the base's utility systems. These records, when compiled and compared, revealed areas of discrepancy and minor data gaps.

Field spot inspections indicated a lack of horizontal control and accuracy which were corrected by the use of ortho-digital photogrammetry to prepare base and system maps under Task B. Field surveys provided a high level of confidence in the vertical accuracy of system elevations, which were translated into the City's elevation standard through ties to USGS monuments. One weakness noted was the lack of as-built drawings for new construction and subsequent updates to base drawings. Numerous manholes were noted in the field which were not shown on existing system maps, elevations in areas which had been paved within the last three years were inaccurate and numerous manholes had been removed, paved over or were otherwise not visible during field marking and inspections.

Maintenance records were reviewed. However, the Navy Public Works Center (PWC) uses an automated management system only to track work in progress. Historical files, especially since the base's closure in April 1996, and automated search routines were unavailable to help determine historical trends, patterns and problems in the systems reviewed. Personal interviews with PWC and other base maintenance staff, along with field inspections, and actual experience under the Base Caretaker Agreement which began October 1, 1996 provided the basis for most operations and maintenance observations.

Overall, the base water demand since closure on April 1, 1996 has dropped proportionately to population, indicating reasonable system integrity. Base maintenance staff initially indicated the vast majority of recent water leaks occurred in transite pipe and seemed to be related to an increase in the static pressure due to lower water demand. Subsequent discussion with PWC maintenance workers revealed no trends related to pipe materials. However, a trend was noted in that a majority of metal pipe failure were clean shear breaks, indicating failure due to horizontal and/or vertical displacement. Of these breaks, a significant number were being "secured" by closing the valves leading to leaking fire segments thereby isolating the breaks and fragmenting the overall system. Since October 1996 when the City assumed O&M responsibility under the caretakers agreement, this trend has been reversed. Repairs are being made and lines kept in service. Cursory inspection of the booster pumps indicate that they are operational; however, with the present low water demand they are not functioning except as standby boosters in the case of fire. Except for Building 880, all of the booster pump stations at water storage tanks are constructed such that they constitute a "confined entry area" under OSHA. The salt water system is currently being used only for fire protection and is planned for abandonment, with new portions of the system at the south end of the island scheduled for conversion to the potable water system in the summer of 1997. As a result, the MIRIS Team was directed by the City of Vallejo Public Works Department not to inspect the salt water system, other than to map lines and hydrants slated for conversion.

The sanitary sewer system appears to be in the worst shape of the systems inspected. Although water demand has reduced dramatically since base closure, sanitary discharge has reduced only marginally. This is being caused by significant infiltration and/or inflow (I&I) into the sanitary pipes from surrounding sources (i.e.: groundwater, salt water, water leaks). At present, water demand averages around 260,000 gallons per day (gpd)[1] while sanitary discharges were near

[1] This is based on metered water consumption from November 1996 to March 1997. New users and recently replaced master meters have increased this number to 570,000 gpd in April and May 1997.

900,000 gpd[2]. In addition to shutting down and isolating dockside pump stations, the excessive wastewater flow caused the PWC to take the extreme action of grouting up manholes and pipes to restrict and contain I&I flows. In addition to secured dockside pumps, and OSHA violations, a number of lift stations do not operate and have essentially been bypassed and/or abandoned in place.

The storm drainage system on the main base has not been cleaned in over four years and is exhibiting signs of blockage and heavy tidal silt buildup. Long-term silt depositions can, and have, consolidated to the point of developing a cementitious cohesion which is difficult to clear. Lines in the Heavy Industrial "Shipyard" Area (Reuse Area 5) were cleaned as problems were identified until the end of 1995 and are in better condition, however they are also showing signs of siltation and sediment buildup. A program to inspect and clean these lines has recently been implemented by the Vallejo Sanitation and Flood Control District under the Caretaker Agreement. Storm drainage lines to the south and west of the island (into wetland areas and sludge basins) have either been removed or abandoned in place in conjunction with wetland restoration efforts. The storm water collector system next to Dry-Dock #2 has been sealed at both inlets and outfall and abandoned in place due to PCB contamination pending future remediation.

A record review showed that the lift section of the Causeway Bridge was built in 1978, replacing an older Bascule draw bridge. At the same time, pilings for the approach spans were reinforced with metal and concrete casings, and some additional outer pilings were added. Periodic (5 year) structural inspections have been conducted to Navy standards; the last inspection was completed in 1993. This inspection consisted of a detailed underwater assessment of the pilings and supports and a cursory inspection of structural members under the bridge deck. In addition, load calculations were performed for a heavy nuclear rail shipment scheduled to traverse the bridge that same year. Together, these assessments meet many of the AASHTO requirements for public bridge inspections; however one significant, outstanding item is a detailed examination of the structural members and connections under the road deck. This inspection should not be required until the bridge is transferred from federal to public ownership. A cursory mechanical and electrical inspection indicated that the bridge is operable. However, limitations in the control system and the need for synchronous operation of four lifting motors have caused the bridge to lock up or stick during operation. In addition, although cursory walkover inspections have been conducted by the Navy, annual and periodic maintenance had not been regularly performed on the bridge. However, prior to transition of operation and maintenance responsibility under the Caretaker Agreement, the Navy Public Works Center performed a complete periodic maintenance of the mechanical systems.

1.4 OUTLINE OF TASKS B & C ACTIVITIES

Task B activities were focused on developing accurate electronic base and system maps and resolving outstanding issues related to connectivity, cross-connections, blockages, system limitations, and

[2] Since December 1996 when these measurements were taken, VSFCD has undertaken a number of steps and actions to reduce effective infiltration and inflow by shutting down nonessential pump and lift stations and installing reduced orifice plugs in low use lines to limit peak flows. This has resulted in an average daily flow of 500,000 gpd in February and March 1997.

physical attributes. Additional activities under this task needed to complete system assessments under Task C included: additional record reviews, physical inspection of all pumps and storage tanks, external inspection of transite pipe, soil corrosivity tests, identifying potential locations of lead piping, video inspection of selected storm and sanitary pipes, removal and testing of 35 water pipe samples[3], conducting smoke tests of potential sewer cross-connections, and location and inspection of storm outfalls and tide gates along Mare Island Strait.

Task C activities were concentrated on water, sanitary and storm system condition and capacity assessments leading to development and delivery of a Capital Improvement Plan and maintenance and repair requirements along with recommendations for system repairs, improvements and expansions. Activities included: code compliance, identifying and prioritizing pipe replacement, determining utility demands based on planned land use, accurate modeling of storm and sanitary systems, determining current infiltration rates, assessing system capacities to determine capital expansion requirements, and estimating budget requirements for future bridge inspections under AASHTO requirements.

1.5 METHODOLOGY FOR DEMAND GENERATION AND COST ANALYSIS

In order to fully assess the capabilities of existing base utility systems to provide adequate service levels for base redevelopment, Reimer Associates developed an individualized utility demand model for the water, sanitary and storm water systems at Mare Island. This "InfraStrategy Analysis" started with definition of planned development areas, derived from the Final Base Reuse Plan. Changes were made to correct discrepancies in facility size, FAR factor allocations, and population verses employment projections (ie. Golf Course: 6-12 employees vs. 312 population). These reuse areas were also revised to incorporate current, accurate base mapping; recent changes within redevelopment areas; revised absorption forecasts from the Economic Development Conveyance (EDC) application: thus providing a current, accurate projection of redevelopment demands. The InfraStrategy Model was then configured at three key timeframes as reflected in the Base Reuse Plan; current conditions (1997)[4], long term development (2007)[5], and ultimate development (20XX).

In Set 1, Reuse Area Attributes (see Appendix A-1), each reuse area was subdivided by land use designations and attributes were assigned for acreage, facility square footage, population, residential dwelling units and beds, facility footprints and paved area, and developed or open green space. These factors, as noted or footnoted on the Set 1 sheets, were derived from the existing base facility inventory, Base Reuse Plan land use allocations and development projections and the EDC's revised facility absorption schedule. Floor Area Ratios (FARs) were reviewed and

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3 As of the date of this report, only 18 pipe coupons had been retrieved from taps by the Department of Public Works.

4 Attributes for 1997 were derived from Mare Island Conversion Division records for current leases and other activities currently located throughout the island. Inactive facilities were assigned to "Open Space" in order to quantify them for storm water and sanitary infiltration impacts without assigning them occupied water or sewer demand figures.

5 The Base Reuse Plan originally identified the long term period as ten years from closure, 2006. Subsequent discussions with City of Vallejo Economic Development staff centered over the need to modify this date to 2009 to match EDC assessment timeframes. Due to the negative value assessed for the water, sewer and storm utility systems, the decision was made to retain the ten-year timeframe, but updated to the date of this report, i.e. 2007.

revised to reflect local and regional experience[6]. The final page of Set 1 delineates the individual utility demand factors used in all three timeframes to establish individual utility demands within each reuse area.

Set 2 of the analysis, Demand Generation (see Appendix A-2), which defines the individual utility demands for modeling of each system, is discussed in detail (Appendix A-3) within each Utility System (Section 2 to 4). Set 2 of the InfraStrategy Analysis is based upon the attributes developed for each reuse area in Set 1 and consists of three separate utility demand calculations, one for each of the systems assessed. To develop an accurate basis for demand, regional and local utility demand factors were compiled and applied to reflect reuse area attributes defined in Set 1. These factors were derived from Reimer Associates experience in Bay Area land development and base conversions at Fort Ord and MCAS El Toro. Each of these factors were then reviewed with appropriate City agencies and revised to account for local factors and experience[7]. The final set of demand factors, listed at the end of Set 1, were applied across each of the three timeframes (1997, 2007, 20XX) to determine the utility demands at these points of redevelopment.

Set 3 - Capital Improvements and Cost Analysis (Appendix A-3), represents the on-site upgrades and system expansion requirements needed to meet each timeframe. These costs are presented in two parts for each system. The first section describes the improvement, identifies the associated cost, and assigns the phasing for each improvement. The second section allocates these costs to contributing land use designations based on each land use's impact on the system, providing an overall per acre cost[8]. A graphic display of the land use distribution by reuse area is shown in Figure 1-1. The final page of Set 3 summarizes the total infrastructure costs by land use. These cost estimates include 15% for contingency and 20% for engineering design and construction management, along with a work stoppage cost due to environmental contamination, but **do not include** costs for demolition, in-tract development, environmental clean up or on-going operation and maintenance activities.

The capital improvements required for ultimate redevelopment of the base will require numerous types of system improvements. Due to the unique features, aspects and causes for these improvements, they have been grouped into 4 categories; on-site upgrades, on-site system expansion, life cycle replacement costs, and outfall consolidation improvements. Off-site improvements were reviewed but not required due to existing permit limitations. The following is a brief discussion of the definition and purpose of each of these groups.

On-Site System Upgrades are system deficiencies that either violate municipal or public utilities codes and standards, represent a risk to public health, endanger the system, or are so outdated

[6] FARs for warehouse and light industry were combined under the EDC. For this report, they were separated to more accurately reflect land use, facility area and employment populations.

[7] Changes to demand factors included minor increases in sanitary return rates for water consumption and application of existing storm water C factors instead of locally assigned planning factors to reflect both current levels of development in the Heavy Industrial Area (Reuse Area 5) and local soil conditions for low lying open areas.

[8] At the request of the City of Vallejo, Reuse Area 1 was separated and capital improvements and cost allocations were made based on development requirements over a 1997 baseline. Remaining reuse area development requirements were assessed in whole after Reuse Area 1 improvements were defined and applied against the remaining land use designations for Reuse Areas 2 through 13.

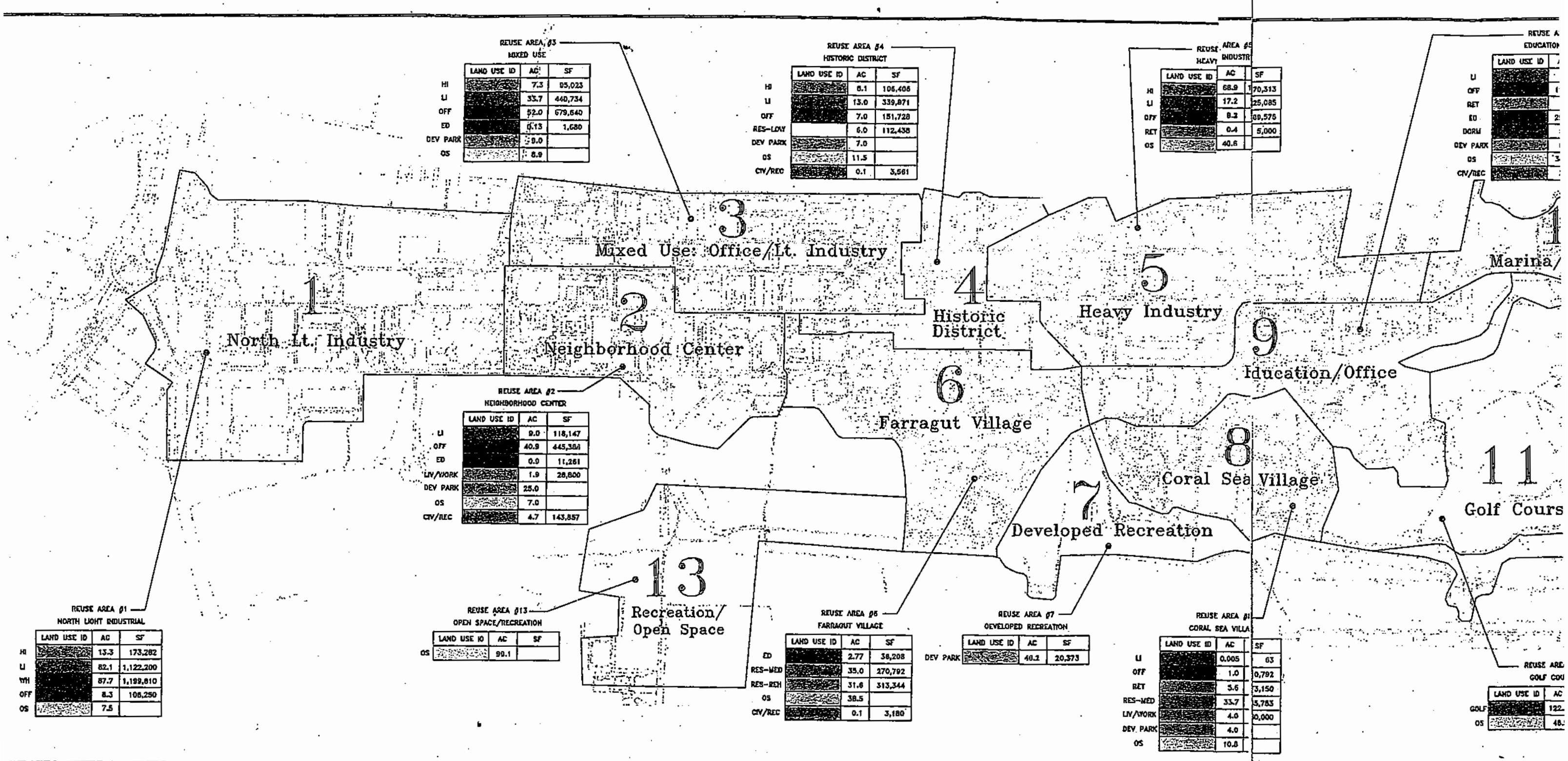
that replacement is required before the system can be properly used as a part of a public utility. Frequently these deficiencies are due to the different operating standards used by federal and public agencies, or because standards have been waived by the federal government. These deficiencies should be corrected before conveyance of the system and/or should be considered as "cost to cure" figures in future negotiations for conveyance. Costs are generally systemic and attributed to the base as a whole.

On-Site System Expansion projects are major capital construction projects required to expand the "backbone" of the utility system to meet the demands generated by the redevelopment plan. These projects are driven by the increased use or demand on the utility system and are limited to the physical boundaries of the Base. The cost of these improvements is generally attributed to the demand of the areas they serve.

Life Cycle Replacement Costs are those expenses anticipated to replace existing base systems that will reach the end of their useful lifespan during the redevelopment timeframe. These costs are based on the condition, age and failure rate of the existing systems and are spread throughout the system since system failures are statistical and an exact location cannot be assigned. These costs are normally incurred by the operating agency as a part of their Operation and Maintenance replacement program. It should be noted that Life Cycle Replacement Costs will continue well beyond 2007 and, in fact, can be expected to increase annually.

Outfall Consolidation Improvements are capital construction projects required to reduce the number of operable permitted storm water discharge points into surrounding waterways. These projects are driven by the Vallejo Sanitary and Flood Control Districts (VSFCD) policy of limiting the number of NPDES outfall requiring monitoring. The cost of these improvements is generally attributed to the water drainage areas served.

Figure 1-1
land use distribution by reuse area map



REUSE AREA #1 NORTH LIGHT INDUSTRIAL
REUSE AREA #2 NEIGHBORHOOD CENTER
REUSE AREA #3 MIXED USE
REUSE AREA #4 HISTORIC DISTRICT
REUSE AREA #6 FARRAGUT VILLAGE
REUSE AREA #7 DEVELOPED RECREATION
REUSE AREA #13 OPEN SPACE/RECREATION
1 North Lt. Industry
2 Neighborhood Center
3 Mixed Use: Office/Lt. Industry
4 Historic District
5 Heavy Industry
6 Farragut Village
7 Developed Recreation
8 Coral Sea Village
9 Education/Office
11 Golf Cours
Marina
13 Recreation/ Open Space

SECTION 2

POTABLE WATER

SECTION 2
POTABLE WATER

2.1 BACKGROUND

At the time of base closure in April 1996, there were three water systems installed at Mare Island. Two of these, the Salt Water and Potable Water systems, were operational, while one system, the pure water system, had been shut down and mothballed over the previous 12 months. The scope of this study was therefore initially limited to preliminary assessment of the Salt and Potable Water systems.

As discussed in the previously submitted "Proposed Strategy for Mapping and Evaluation", the Salt Water system was generally in poor condition with failing pumps and questionable system integrity. Three studies commissioned by the Department of the Navy prior to closure identified extensive repair costs in order to retain the Salt Water system. As a result, the City of Vallejo and the Navy agreed to: 1) install 32 additional fire hydrants; 2) transfer the southern loop of the Salt Water system (installed in 1991) over to the Potable Water system; and 3) shut off the Salt Water system. As of the date of this report, the work was in progress and scheduled for completion later in 1997. Accordingly, the scope of this study was modified to provide assessment and capital improvement recommendations for the Potable Water system only.

2.1.1 DISTRIBUTION AND STORAGE SYSTEM

The following discussions address existing conditions within each component of the Potable Water system.

Pipe Materials and Condition

Water mains at Mare Island consist of common commercial materials (cast iron, ductile iron, asbestos-cement, galvanized steel) as well as some less common grades of materials (PVC and steel). Table 2-1 breaks down the primary distribution piping by size, and shows the relative percentage of pipe materials used in each category.

Table 2-1: Pipe Size and Composition

PIPE SIZE	LENGTH	MATERIAL	% OF PIPE *
6 inch	30,300 ft.	Cast Iron Transite	73 19
8 inch	55,100 ft.	Cast Iron Transite	51 45
10 inch	38,000 ft.	PVC Cast Iron Transite	58 29 13
12 inch	33,700 ft.	Cast Iron PVC Transite	62 32 5
14 inch	10,500 ft.	Steel Cast Iron Transite	42 32 26

Table 2-1: Pipe Size and Composition (cont'd)

16 inch	3,000 ft.	Transite Steel	85 15
20 inch	10,000 ft.	Cast Iron	100
TOTAL	**179,100 ft.**	**Cast Iron Transite PVC Steel Ductile Iron**	**48 27 18 6 1**

*May not sum to 100% due to small amounts of other pipe material.

The high percentage of PVC pipe in the 10 and 12 inch categories is primarily due to the Salt Water system on the south end of the island which is being converted to the Potable Water system and thus provide fire protection for this area. One item of significance is the high percentage of steel pipe in the 14 and 16 inch sizes. These pipes are used for transmission along the waterfront in aggressive soils and corrosive environments requiring cathodic protection.

As noted in Subsection 2.1.3, the MIRIS Team conducted physical inspections of tap coupons to assess actual pipe condition and deterioration and to assign accurate "C" values for hydraulic modeling. Ten potholes were also excavated to inspect the exterior of transite pipes at various locations across the base. Table 2-2 summarizes exterior conditions at all 44 pothole locations[1] and interior conditions at 18 locations where coupons were retrieved; Figure 2-1 graphically portrays these pothole locations around the base.

Despite a reported high failure rate for transite pipe during the first half of 1996[2], exterior inspections revealed no visible weakening, pitting, pealing, weeping, bubbling, or softening in the pipes examined. Subsequent discussions with PWC maintenance workers indicated no trend in line breaks relations to pipe materials. However, a strong correlation was established with clean shear breaks in metal pipes. Over 50% of cast iron and ductile iron pipe breaks were "as clean as if they had been snapped", indicating horizontal and/or vertical shear soil movement as the cause. Cast and ductile iron pipe coupons varied in their degree of deterioration from near new appearance at service connections to heavy external corrosion and internal tubercularization (see Table 2-2).

The water distribution system works as a network utilizing an array of interconnecting small diameter pipes to stabilize pressures rather than a set of large diameter transmission mains. This represents a constraint to redevelopment in that the geographic distribution of water demands the system was designed to meet may not match the distribution of projected redevelopment demands. During modeling of the system, this constraint was observed and corrections and modifications were made. Subsections 2.3 and 2.5 discuss these system weakness and the required corrective measures.

[1] Originally 32 potholes were planned for hydrant installations; 10 were added to asess the condition of various transite pipes. Pothole locations 43 and 44 were added after pipe failures caused the City to remove sections of pipe at these locations.

[2] Per discussion with Dave Elder, PWC Utilties Manager, Mare Island. In Elder's opinion, the reported higher system pressure resulting from lower delivery demand which accompanied base phase-down and closure.

Figure 2-1

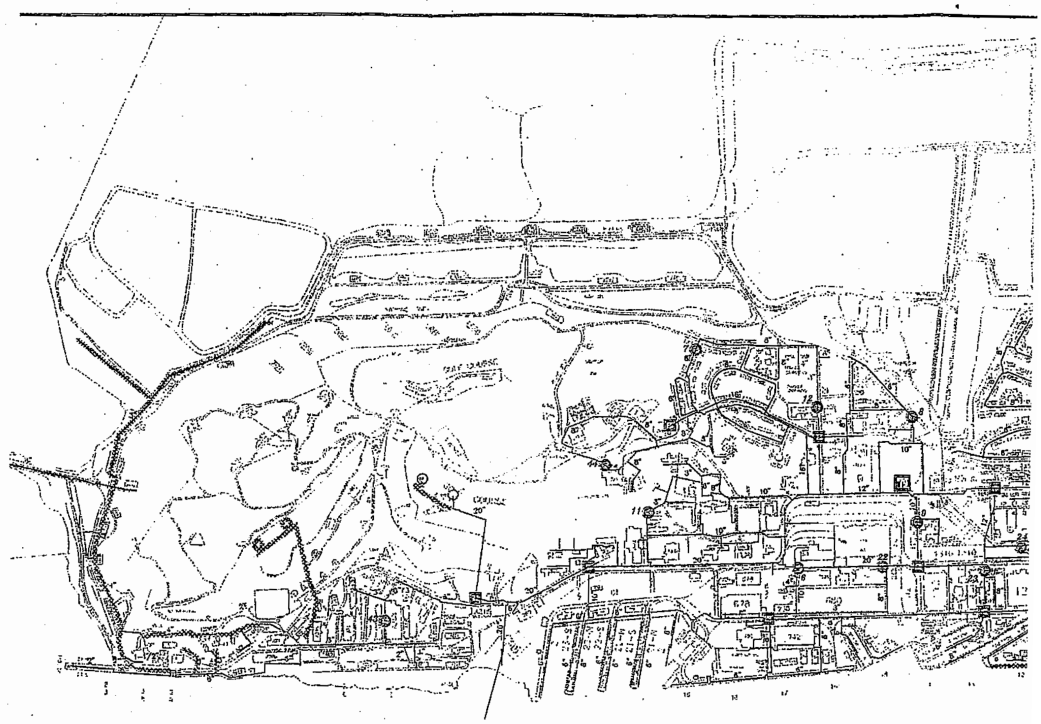


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Table 2-2: Pipe Condition Summary

No.	PIPE LOCATION	SIZE	MATERIAL	LINING	CONDITION
1	Cedar St. at Bldg. 759	14"	Transite		No Sample Taken
2	K St. near old Gas St.	16"	Cast Iron		No Sample Taken
3	Between M & N St.	8"	Transite		No Sample Taken
4	Cedar St. before I St.	14"	Transite		No Sample Taken
5	Behind Bldg. 759	14"	Transite		No Sample Taken
6	S/W corner Bldg. 750	12"	Ductile Iron	lined	No exterior corrosion, light interior pitting
7	Wasmuth & Mesa	8"	Transite		No Sample Taken
8	1214 Mesa	8"	Transite		No Sample Taken
9	Bldg. 208	8"	Cast Iron	unlined	Light exterior corrosion, 1/8" interior deposits
10	9th & Tisdale	8"	Cast Iron		No Sample Taken
11	17th St.	8"	Transite		No Sample Taken
12	13th St.	8"	Cast Iron		No Sample Taken
13	#522 Walnut & 5th	4"	Cast Iron		Note 1
14	Walnut & A St.	12"	Cast Iron		Note 1
15	Railroad 100' south of I St.	8"	Cast Iron	lined	Light exterior corrosion, 1/8" interior deposits
16	Railroad corner Bldg. 655	8"	Cast Iron	lined	1/8" exterior pitting, no interior deposits
17	Railroad Ave. at Bldg. 100	12"	Cast Iron	unlined	Light exterior corrosion, 1/8" interior deposits
18	Walnut St.	12"	Cast Iron	unlined	Light exterior corrosion, 1/8" interior deposits
19	Long Hydrant run to #27				Note 1
20	Railroad Ave. by Bldg. 229	12"	Cast Iron		Note 1
21	North of Cedar & 9th	8"	Cast Iron	unlined	1/8" exterior pitting, interior corroded, 1/2" tubercular deposits
22	Railroad Ave.	8"	Ductile Iron	unlined	Light exterior corrosion, 1/8" interior deposits
23	10th & Railroad Ave.	10"	Cast Iron		Note 1
24	Walnut near Quarters E	8"	Cast Iron		Note 1
25	Walnut & 8 St.	8"	Cast Iron		Note 1
26	Railroad & Bldg. 497	12"	Cast Iron	lined	1/16" exterior pitting, 1/8" interior deposits
27	California & 5th	10"	Cast Iron		Note 1
28	Housing Bldg. 416 Walnut	12"	Cast Iron	lined	Light exterior pitting, 1/8" interior modules
29	(Being relocated)				Note 1
30	Bldg. 535 PWC	12"	Cast Iron	lined	Light exterior pitting, 1/16" interior deposits
31	Bldg. 507	12"	Cast Iron	lined	1/8" exterior pitting, no interior corrosion
32	Navy to do job	12"	Cast Iron		Note 1
33	A & Walnut	12"	Cast Iron		Note 1

Table 2-2: Pipe Condition Summary (cont'd)

34	C St. next to Bldg. 533	6"	Ductile Iron	unlined	Light exterior corrosion, 1/8" interior deposits
35	Rodman center	12"	Cast Iron		Note 1
36	K St. & Railroad	14"	Gal. Steel		Note 1
37	Q St. & Railroad	8"	Cast Iron	lined	Moderate exterior corrosion; 1 1/2" interior tubercular deposits
38	Railroad north of Fifth St.	8"	Cast Iron		Note 1
39	Walnut & E St.	12"	Ductile Iron		Note 1
40	Walnut & D St.	12"	Cast Iron		Note 1
41	West of Pier 55	8"	Cast Iron	lined	No ext. corrosion, 1/16" interior deposits
42	West of Pier 55	8"	Cast Iron	lined	No ext. corrosion, 1/16" interior deposits
43	East of Bldg. A-130	6"	Cast Iron	unlined	Heavy ext. corrosion and interior pitting; less than 1/8 " viable metal
44	By Bldg. 396	3"	Cast Iron	unlined	Mild ext. corrosion, 1/4" interior deposits

* Note 1: Taps not completed; pipe coupons not available prior to completion of this report

Cathodic Protection

Cathodic protection systems have been installed in a number of areas, primarily in locations near the Mare Island Strait, at sections of steel distribution piping, and at steel storage Tanks (920 and 188B). The passive systems appear to be providing protection of the systems to which they are tied; however the last significant anode replacement was conducted in 1987 (1993 for the Causeway Bridge anodes) and these systems will begin to lose their effectiveness within the next 5 years. Two active protection systems near the seawall appear to operate[3], but they have been shut down as sections of the dockside berth piping system have been isolated or valved off. As a part of the operation and maintenance of the water system, each of the active systems should be reenergized and maintained while a program of anode renewal should be initiated to check and replace all anodes over a ten year cycle. This will ensure the continued reliability of metallic pipes along the waterfront and reduce capital expenditures to replace these pipes.

Booster Pumps

Basewide, there are 6 booster pump stations, including one on the Salt Water system which is scheduled for conversion to the Potable Water system in the summer of 1997. Overall, corrosion of pumps and piping is widespread. Because the service line suppling Tank 645 has a leak that is not repairable, the pump station is secured and will be removed in the future. As noted in Appendix B and Subsection 2.2.1, some electrical safety issues are present and require immediate resolution. In addition, pumps by Tank 774 and the Causeway need to be operated to fully assess their condition. The pumping stations at Building 880 and A-295, which are relatively new and in excellent

[3] Samples from pipes in these areas were in excellent condition with minimal corrosion and pitting, despite the aggressive soils near the strait.

condition, represent the only exception to generally deteriorated conditions. Table 2-3 summarizes existing conditions and equipment at each of the pumphouse locations.

Table 2-3: Existing Pumphouse Conditions

STATION	MOTOR IN SUMP	PUMP IN SUMP	DEEP (FT) or SUMP (S)	DESCRIPTION
Causeway Water Pumps	No	No	No	Open on three sides
Building 774 Water Pumps	No	No	No	Enclosed embankment covered at ground level, needs ventilation.
Building 645 Water Pump	No	No	25'	Concrete pit. Motor upper level, Pump lower, Needs safety equipment. Has ladder w/no cage, No ventilation, Controls upper level. Abandoned.
Building A-295 Salt Water Pumps	No	No	No	Metal Shed, Ground level, no fan needed, excellent condition.
Building 880 Water Pump	No	No	No	Metal Shed, Ground level, no fan needed, excellent condition.

Based on the City of Vallejo's Fire Department requirement to provide fire flows to lower elevations through gravity flow alone, it was assumed that the demand on the pumps will not increase and that as sufficient storage capacity is reached, pumps on the lower pressure zone will be eliminated. As noted in the following water storage section, installation of a 5.7 MG reservoir should occur within the next five years and is the priority improvement listed in the City's Economic Development Conveyance (EDC) application.

Water Storage Tanks

As noted in the introduction, there are five water storage tanks on the island; 188A, 188B, 645, 774, and 920. All of these tanks operate below the normal hydraulic grade line of the Island's water distribution system. The one tank capable of gravity feed into the system is tank 188B; however this is only under conditions of extreme flow and reduced system pressures. Tanks 188A and 645 are no longer operational. Tank 188A, a heavily corroded metal plate tank originally designed and built for fuel oil storage, was valved off from the system in the 1980's and is in an advanced state of decay; the roof is collapsing and side panels are exhibiting interior rust protruding from the exterior of the plates at the base. Tank 645 has been valved off from the system for over 7 years but was never drained; it is presently being physically isolated from the water system due to water leaks in the supply pipe and the potential for contamination.

Of the three remaining functioning storage tanks, Tank 920 (120,000 gal. capacity) is a steel tower tank at elevation 190 and serves a small upper pressure zone of buildings above elevation 140. This area is located on a hill along Club Drive near the golf course. Tank 774 (3,000,000 gal. capacity) was constructed in 1942 as a buried concrete tank at elevation 87 next to the Coral Sea Housing Area. Although the original pumphouse and equipment have deteriorated, the tank appears to be in good condition exhibiting no signs of corrosion or leakage. Tank 188B (2,000,000 gal capacity) is a steel plate tank originally constructed in 1917 as a fuel oil tank[4] at elevation 144. It is the highest of the water tanks in the main pressure zone, however it is still 30 feet below the hydraulic grade line managed by the City of Vallejo. All of these tanks are served, directly or indirectly, by pumphouses and booster pumps.

Current water demand and fire flow requirements call for 2.0 million gallons of storage (see Appendix A-2). This requirement will expand to 5.7 million gallons at ultimate buildout. At present, Tank 188B is marginally capable of meeting this requirement. Further development will require the construction of additional storage. In addition, for Tank 188B to become effective, system pressures must drop nearly 15 psi, reducing its effectiveness and requiring booster pumps to effectively provide fire flows. This reliance on mechanical systems to maintain water pressures is not in compliance with Vallejo Fire Standards, and is imprudent in times of a natural disaster when water is essential and power may be interrupted. The optimum correction for this condition is to construct a new storage reservoir, sized for ultimate storage requirements, at the hydraulic grade line[5]. This will preclude the need for booster pumps and pump stations, except to feed the upper pressure zone around the golf course. Subsection 2.5 specifies the requirements for this tank.

Chlorination Stations

Two chlorination stations are located on the base, one on each of the feeder lines across the Strait. Both of these stations are abandoned and a majority of the operable equipment has been salvaged. Discussions with Navy personnel indicate they had a relativity high O & M cost using these stations. Subsequent improvements in water quality by the City eliminated the need for these stations. Considering the City's current program of periodic rechlorination at storage tanks, and the high Trihalomethane (THM) formation potential, the MIRIS Team recommends the removal of these stations including any remaining equipment. We do not envision the need for a rechlorination station since storage turnover time will decrease as demands on the system increase. If the Department of Public Works determines that rechlorination is required in the future, the station should be installed at the new storage reservoir.

Valves, Meters and Backflow Devices

Based on an average spacing of 150 feet, nearly 1200 valves exist on the Potable Water system. 1089 were observed and documented during the utility mapping component of this project. Of these valves, the vast majority observed in field investigations are cast iron gate valves. Discussions with Navy maintenance personnel revealed that a significant percentage (up to 10%) of these valves

[4] No records were available to confirm the date of its conversion to the Potable Water system or verify if it was ever actively used for fuel oil storage.

[5] The maximum hydraulic grade line for the Grid Zone is 208'.

were either non-functioning (unable to turn) or broken (unable to seal)[6]. In addition, Navy maintenance maps frequently included the notation "NFG" (non-functioning gate valve). A limited number of butterfly valves were also noted, primarily along the waterfront and around the dry-docks. Although these appeared to operate, maintenance staff revealed that many were broken by unskilled laborers trying to turn them past 90 degrees, assuming they were stuck gate valves. Based on these observations, we anticipate that as valves are used to isolate pipes in the future, a significant number will require replacement. As a part of system operations and preventative maintenance, we recommend the City institute a biennial program of valve inspection and lubrication to identify and correct this problem.

Master meters, located on the two feeder lines to the Base, have been recently replaced and calibrated due to inaccurate readings after the Base closed in April 1996. An additional 185 local meters exist throughout the base, primarily in housing areas and at previous industrial, leased and recreational facilities. Except for the master meters, the remaining meters are colibrated in gallons and are not compatable with City metering standards. These meters were not inspected as they were not a part of the main distribution system. However, field notes on location and size were made as a part of the utility mapping component of this project and are available on those records which will be provided to City maintenance staff.

Nearly 360 backflow devices are reported to exist[7] on the Potable Water system. Only a small portion of these (28) were observed on the main distribution system. However, this should not be viewed as contradictory since the largest percentage of backflow devices would be located on service lines feeding irrigation and industrial process water systems. Despite the large number of devices reported, there exists the potential for a significant number of unprotected connections to irrigation, industrial or other non-potable system. This is due to DOD's sporadic identification and correction programs which focused on one type of cross-connection at a time. During this study, a siphon on the upper pressure zone caused water from the Officer's Club swimming pool to be drawn into the water system, causing contamination. Although this problem has been rectified, it provides dramatic proof that undocumented, unprotected cross-connections still exist and will need to be corrected as they are discovered.

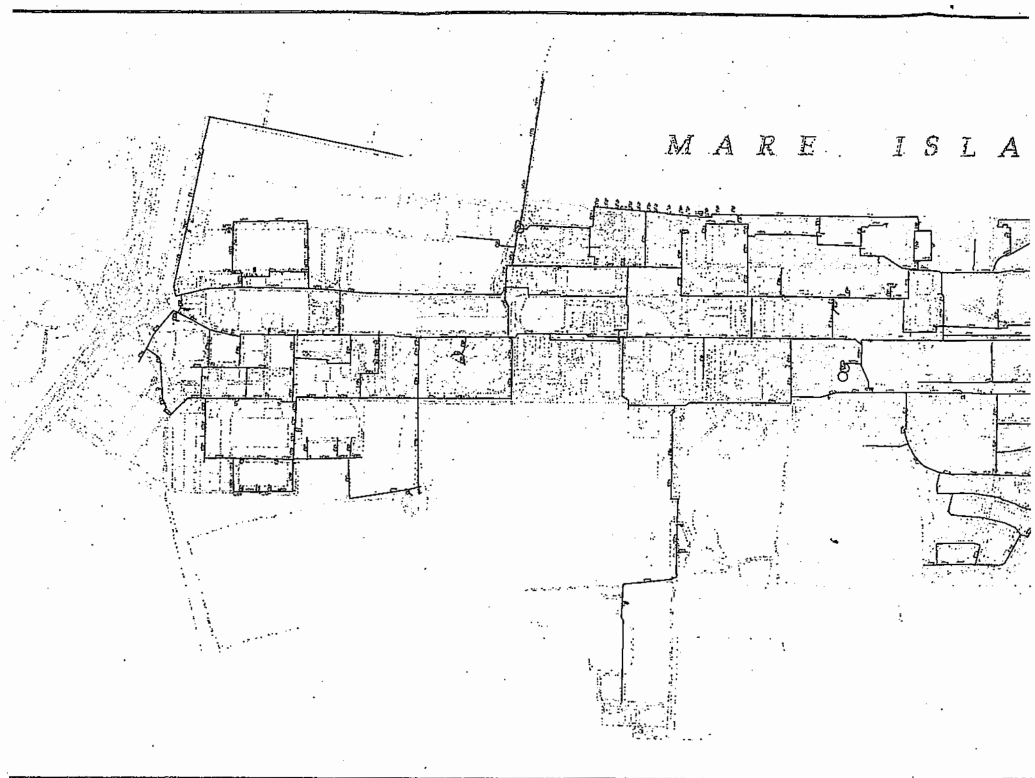
2.1.2 SUMMARY OF EXISTING CONDITIONS

The Potable Water system is serviced from the City of Vallejo's "Grid Zone" at two metered feeder connections and consists of five water storage tanks, five booster pump stations, two chlorination stations, cathodic protection, and distribution piping. Over 87% of the primary distribution is provided by 12 inch and smaller piping. Isolation valves are located at frequent intervals (typically less than 200 feet) and 360 backflow devices provide basic protection from cross contamination with industrial and irrigation water connections. Approximately 185 service meters are currently installed throughout the system; however these meters are calibrated in gallons and are not suitable for City use. A schematic of the backbone Potable Water Distribution System is provided in Figure 2-2.

[6] Individual estimates by PWC maintenance staff placed the percentage of non-functioning or broken valves in a range from 10% to 20%.

[7] Based on Navy recurring work and preventative maintenance records.

Figure 2-2 Potable Water Distribution System


M A R E   I S L A

The two feeder lines, a 20 inch submarine line at the southern end of the finger piers and a 14 inch line under the Causeway Bridge, were installed in 1942 and 1938 respectively. They are both lined and encased in concrete for their submarine sections under the Mare Island Strait. The steel risers at the Causeway Bridge are cathodically protected with anodes attached to the outside of the pipe. At present, both feeder pipes appear to be in good external and internal condition. The meters on both of these lines have been replaced and recalibrated within the last 12 months.

As previously reported on page 2-6, the five water storage tanks on the island are designated 188A, 188B, 645, 774, and 920. None of these tanks operate at the normal hydraulic grade line of the island. The only tank capable of gravity feed into the system is tank 188B; however this is only under conditions of extreme flow and reduced system pressures. Tanks 188A and 645 are no longer operational. Tank 188A, a heavily corroded metal plate tank originally designed and built for fuel oil storage, was valved off from the system in the 1980's and is in an advanced state of decay. Tank 645 has been valved off from the system for nearly 20 years but was never drained; it is presently being physically isolated from the water system.

Of the three remaining functioning storage tanks, tank 920 (120,000 gal. capacity) is a steel tower tank at elevation 190 and serves a small enclave of buildings above elevation 140. Tank 774 (3,000,000 gal. capacity) was constructed in 1942 as a buried concrete tank at elevation 87. Tank 188B (2,000,000 gal capacity) is a steel plate tank originally constructed in 1917 as a fuel oil tank[8] at elevation 144. Since none of these tanks are within the hydraulic grade line for the City's Grid Zone, all are served by pumphouses. In addition, booster pumps are located under the Causeway to boost the service pressure on the 14-inch feeder. Due to a lack of gravity storage and pressure regulating reservoirs, these pumps were required to operate the system and maintain acceptable system pressures during periods of high demand. With the exception of the new pumphouses at Tank 774 and Building A-295, all of these booster pumps are in poor to failed condition and can no longer be relied upon in an emergency. The original pumphouse at Tank 774 was replaced in 1989; the new pumphouse Building 880 with 1 pump is in good condition and is presently maintained and operated by the Vallejo Public Works Department.

As noted on page 2-7, two chlorination stations are located on the base, one on each of the feeder lines across the Strait. Both of these stations are abandoned and a majority of the operable equipment has been salvaged or otherwise removed.

Previously discussed on page 2-5, cathodic protection systems have been installed in a number of areas, primarily in locations near the Strait, at sections of steel distribution piping, and at steel storage Tanks (920 and 188B). The passive systems appear to be providing protection of the systems they are tied to; however the last anode replacement was conducted in 1987 and these systems will begin to lose their effectiveness within the next 5 years. Two active protection systems near the seawall appear to operate, but they have been shut down as sections of the dockside piping system have been isolated or valved off. Although water is provided through large (14 to 20 inch) service connections, these lines rapidly diminish into a network of smaller pipes (6 to 12 inch) for distribution. The impact of this is an exponential decrease in pressures (due to friction) as water

[8] No records were available to confirm the date of its conversion to the Potable Water system or verify if it was ever actively used for fuel oil storage.

demand increases[9]. Due to the installation of additional fire hydrants on the Potable Water system[10], the MIRIS Team was able to conduct physical inspections of tap coupons to assess actual pipe condition and deterioration and to assign accurate "C" values for hydraulic modeling. In addition, ten potholes were excavated to inspect the exterior of transite (asbestos-cement) pipes located throughout the base. These water lines were of particular concern due to the reported high frequency of pipe failures which occurred in transite pipe (vs. other pipe materials) since Base closure in April 1996. At all ten locations, these inspections revealed no visible degradation in the pipe materials (i.e.: pitting, pealing, weeping, bubbling, or softening), however they did reveal pipes of different sizes than indicated on Navy records at three of the ten locations. Subsequent discussions with PWC maintenance workers indicated no trend in breakage relative to type of material. However, a strong coorelation was noted with the type of failures – clean shear breaks in metal pipes.

Metal pipe coupons[11] varied in their degree of deterioration from near new appearance to heavy external corrosion and internal tubercularization (mineral deposition). Details of identified pipe conditions are presented in Subsection 2.1.1.

2.1.3 CURRENT SYSTEM OPERATION AND CONSTRAINTS

Due to low demand, the water system is currently operating between 60 and 70 psi without the need for booster pumps[12] to maintain adequate pressure throughout the system. This operating condition has created a number of issues, primarily related to low water turnover rates. As the following table shows, the relative low demand (570,000 gal. per day)[13] in relation to the large volume of

Table 2-4: Water System Storage Volume and Turnover Rate

Pipe Size (in.)	Length (ft.)	Volume (gal.)	
20	9,377	153,022	
16	2,955	30,862	
14	10,534	84,232	
12	33,671	197,810	
10	37,966	154,890	
8	55,076	143,804	
6	30,264	44,449	
Tanks			
920		120,000	
774		3,000,000	
188B		2,000,000	
Total		**5,929,069**	**gal.**
Turnover		**11**	**days**

[9] One of the first actions taken during modeling was to identify and locate key constrictions within the system that limited the ability of the pipes to work as a network to distribute flows and reduce pressure losses.

[10] Required by the elimination of the salt water system for fire protection throughout the central and northern portions of the island.

[11] As of July1997, only 18 pipe coupons had been retrieved from the 32 new hydrant locations

[12] Except for pumps at bldg. 880 which serve a small upper pressure zone along Club Drive near the golf course.

[13] Based on April 1997 water consumption after both master meters were replaced and calibrated. Previous meter readings indicated 260,000 gpd consumption November 1996 to February 1997.

piping and operating storage tanks has resulted in a low turnover rate, currently 11 days during the spring. The master meters were both replaced, the last one on 19 March 1997. This change in meters appeared to cause an increase in measured water consumption as reflected above. However, the April billing cycle also included an increase in irrigation demand over winter months. This factor would lead to an increase in basewide water turnover rates above the 11 day overage seen in April. In addition, this is an overage turnover rate; local turnover is low demand areas (Reuse Area 6, 7, 8, 9, & 10) will be much higher and could exceed 30 days. This should be considered during hydrant flushing. Combined with low residual chlorine levels at the service connections[14], low demend has increased the potential for contamination and/or culture development within the system. The city has instituted a short-term correction for this situation by flushing hydrants; however this flushing will require over 1 million gallons per day in order to reduce the turnover time to 10 days or less[15]. During the summer, irrigation demands should alleviate this situation[16]. As a precaution, the City is currently conducting increased water quality sampling on the island to ensure that any contamination that may occur is detected and treated. Another interim measure implemented by the Department of Public Works is periodic spot chlorination of Water Storage Tanks 920 and 774. This has reduced the volume of water needed to be flushed and introduced disinfection at these storage sites. However, spot chlorination does not provide an acceptable long term corrective action due to the high levels of trihalomethanes (THMs) produced as a result of rechlorination. Actions recommended to alleviate this situation until daily demand increases above 2 MGD, include superchlorination and isolation of Tank 774 (which is not suitable for fire flows)[17] as well as isolation of piping to areas which are not projected for use during the next ten years (i.e. Reuse Area 10, Marina).

2.2 SYSTEM O&M REQUIREMENTS AND COSTS

2.2.1 EXISTING O&M REQUIREMENTS

The deficient conditions found during the survey of pump houses for the Potable Water system in Task B have been reviewed. To assist in determining possible corrective actions, pump houses where severe or extensive corrosion exists are identified as high maintenance areas. Equipment installed outdoors, and in an environment where they are exposed to salt water, was found to have significantly more corrosion and rusting than those installed inside protective enclosures. The column on the right indicates whether or not the station has a protective enclosure.

[14] Current chlorine residual levels at the north feed connection were reported by the Vallejo Department of Public Works to vary between 0.0 and 0.1 ppm during the November 1996 and February 1997 timeframe.

[15] The City of Vallejo has historically experienced few problems with system contamination where residence time after chlorination has been less than 14 days. At present, residence times up to the feeder connections vary from 1-2 days for the 20 inch line to 4-7 days for the 14 inch line. Since near term redevelopment is scheduled for the north end of the base served by the 14 inch line will minimize the residence time of water through this feeder, the average service residence time (4 days) was subtracted from this 14 day 'standard' resulting in a desired island turnover time of 10 days or less.

[16] 1997 Maximum Day consumption is estimated at 916,000 gal. per day.

[17] Although this tank does not contribute to fire flows until the pressure in the 16 inch feeder line drops to 15 psi, it does represent significant storage capacity in the event of a natural disaster (i.e. earthquake) when water storage is more critical than maintaining system pressures. Superchlorination and isolation with semi-annual flushing would preserve this as a backup source of water for use in such an event.

Station	*Corroded Items*	*Enclosed?*
Causeway Pumphouse	Pumps #1 & #2, piping, valve connections	N
Tank 774 Pumphouse	Pump #1 base mount, Pump #2, valves, piping, controller external	Y
Tank 645 Pumphouse	Pump house roof is badly worn and leaking on electrical control equipment.	Y

Corrosion should be removed and surfaces painted to preserve stations at the Causeway and Pumphouse 774. At the Causeway station the electrical distribution system and controllers need to be replaced because of advanced deterioration and safety concerns. They need to be installed on elevated concrete pads for protection of the equipment and safety. Lighting is deteriorated, inadequate and needs replacement. Repairs need to be made at the Causeway and Tank 774 stations. Pumps at Pump Stations 880 and 774 need to be operated and tested. Additional clearance is required in front of the controller in Building 880. No O&M is proposed for the station at Building 645 which is abandoned. A detailed inspection listing is provided in Appendix B-4.

Incorporating current redevelopment plans, estimated costs for pump stations failure correction is $43,000 in the current year (1997). A comprehensive listing by pump station is included on Appendix B-4.

2.2.2 MAINTENANCE AND REPAIR COST PROJECTIONS

The Potable Water system provides Potable Water from the City via the Causeway and a line crossing the Strait south of the finger piers. The pump station at the Causeway boosts pressure and flow in high demand situations, such as a major fire. The pump station at Building 880 lifts and pressurizes water from Tank 774. The other two pump stations at Building 774 and Building 645 discharge these tanks. The pump station at Building 645 is currently secured because the line feeding the tank it services leaks and has been isolated. Based on water system modeling results (Subsection 2.3), the following actions are required:

(1) A new 5.7 mg tank will have to be constructed at a location higher than existing tanks.

(2) When the new tank is on line, the pump station at the Causeway will not be needed. Repairs should be made to this station to support fire-fighting needs until the new tank is completed; then the pumpstation should be removed.

(3) The pump station at Building 645 is abandoned and will not be used. The associated tank will not be repaired and the pump station will be abandoned.

(4) Pump stations at Buildings 774 and 880 will be required until the new water tank is constructed. These stations will be reused to maintain pressures and flows in the higher-pressure zone by the Golf Course.

All stations except the one at Building 880 are old and in poor condition. This infrastructure study indicates repair, maintenance and correction of safety problems in year 1997, and life cycle replacement of equipment at Building 774 in year 2007 and at Building 880 in year 2017. Pump Station costs from Appendix B-4 are summarized below by phase:

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Operation and Maintenance (O&M)(Total)	$43,000	-	-
Capital Improvements		-	-
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	$126,000	$39,000
Capacity Upgrade (CU)	-	-	-
Capital Improvements (C)	-	-	-

The MIRIS Team also reviewed available Navy and City of Vallejo (Oct. 96 – Mar 97) maintenance records and have developed an estimate annual maintenance requirements. These costs are summarized in Table 2-5.

Table 2-5 Potable Water O&M Costs

Maintenance Activities	Rate	Total Hrs.	Material	Total Cost
Pump Station Checks	$ 43.70	390	$ 195	$ 17,238
Weekly Potable Water Sampling 7.1.3 (c)(2)(a)	$ 46.48	364	$ 1,820	$ 18,739
Weekly Test Operation of Pumps 7.1.3 (c)(2)(b)	$ 43.70	52	$ 104	$ 2,376
Quarterly Inspection of Tanks & Pumping Facilities 7.1.3 (c)(3)(a):	$ 46.76	40	$ 200	$ 2,070
Semiannual Lubrication of Pump Stations Pumps & Motors 7.1.3 (c)(4)(a)	$ 43.70	4.5	$ 23	$ 219
Annual Testing of BFP Devices 7.1.3 (c)(5)(a)	$ 40.87	540	$ 6,480	$ 28,550
Annual Calibration of Station Pressure Gauges 7.1.3 (c)(5)(b)	$ 43.70	6	$ 72	$ 334
Annual Fire Hydrant Flush/Maintenance 7.1.3 (c)(5)(c)	$ 40.87	585	$ 5,850	$ 29,759
Biennial Cleaning of underground valves and boxes 7.1.3 (c)(6)(a)	$ 40.87	660	$ 3,300	$ 30,274
Subtotal				**$ 129,560**
Minor Repairs				
Minor Repairs -Water System 2.1.5 (b):	$ 40.87	3120	$ 31,200	$ 158,714
Trouble Truck (partial coverage)	$ 40.87	1840	$ 3,680	$ 78,881
Minor Repairs - Building Isolation 2.1.5 (b):	$ 40.87	1200	$ 48,000	$ 97,044
Utility Locating Service	$ 40.87	360	$ 4,320	$ 19,033
Subtotal				**$ 353,670**
Major Work				

Table 2-5 Potable Water O&M Costs (cont'd)

Life Cycle Failures	$2,524,000	0.05	0	$ 126,200
Pump Stations	$ 43,040	1	0	$ 43,040
Subtotal				**$ 169,240**
Administration and Overhead (15%)				$ 97,870
TOTAL ANNUAL O&M COSTS				**$ 750,340**

2.3 SYSTEM ANALYSIS

2.3.1 MODELING

The City of Vallejo Department of Public Works currently operates CyberNet for their water system modeling requirements. As requested at the kick-off meeting, Reimer Associates worked with the Department of Public Works to expand the City's model to add the backbone water system at Mare Island[18]. Data for this revision included pipe location, material, size, roughness (C factor), and elevation, and were derived from the maps and database developed for the water system under Task B utility mapping activities. A schematic of the backbone of the existing Potable Water system, including the Salt Water system planned for conversion in 1997, is provided in Figure 2-3.

Reuse Areas 1 and 10 were isolated as separate service areas due to their location with respect to the service feeders and central pipe network. At the request of the Economic Development Division, Reuse Area 1 was initially modeled to determine system improvements required for redevelopment in accordance with proposed plans provided by Lincoln Properties, the City's selected developer for this area. The model was run using maximum day flows (1.6 times the average daily flow) for domestic and industrial water demands and then superimposing peak fires throughout the island as specified by the water demand model (Appendix A-2). The model assumed 1997 demands island-wide and then reset the demands in Reuse Area 1 to ultimate planned redevelopment levels. The final improvements required to eliminate substandard operating pressures and available fire flows resulting from this modeling run are provided in Set 3 of the Time Phased Capital Improvements and allocated solely to Reuse Area 1. A discussion of each improvement is provided in Subsection 2.5. All but one of the improvements are located within Reuse Area 1.

Reuse Areas 2, 3, 4, 5, 6, 7, 8, 9, 11, and 12 were then modeled using the same peak flow criteria while resetting these reuse areas to their ultimate domestic, industrial and fire demands. A number of system improvements were added to the model and the hydraulics were rerun. After all system failures[19] were eliminated, the improvements were reassessed and rationalized to provide the minimum number (and cost) of capital improvements needed to provide adequate service throughout the system.

[18] Prior to this, the Department of Public Works had assigned a demand factor to the two feeder lines crossing the strait to Mare Island and did not model fire flows on the island.

[19] Any drop in operating pressure below 20 psi or available fire flow below the required quantity constituted a failure of the system.

Next, a redevelopment plan was created for Reuse Area 10 and added to the system. This was necessary due to the complete redevelopment of the area and the small size and extremely poor condition of existing pipes throughout the area. The area was then modeled to ensure adequate service at ultimate development. The hydraulics for the complete water system were then rerun to assess and recheck the capacity of the entire system to meet ultimate redevelopment demands. The results of this final hydraulics and available fire flow model are presented in Appendix D-1[20]. A description of each improvement can be found in Section 2.5.

2.3.2 DEMANDS

The first set of demand projections to be run were for ultimate development in 20XX. The average water consumption demand, 1490 gpm, was then compared with other base conversions for overall average daily consumption per developed acre, per square foot and per capita (2300 gpa, 0.20 gpsf and 101 gpc respectively). Each of these compared favorably (within 10%) of actual gross consumption rates, and the total average daily consumption of 2.14 million gallons is within 5% of metered consumption in 1994 (prior to closure).

Using the same methodology described above, the two other timeframes (1997 and 2007) were calculated using the same factors applied against Set 1 attributes for each of these timeframes. Based on this assessment, 1997 average water consumption was projected to be 390 gpm. This figure was within 5% of actual metered consumption during the spring of 1997. Average water consumption for 2007 was projected to be 1050 gpm.

Fire flows were assigned for all three timeframes using the City of Vallejo's Fire Flow Requirements (listed in Set 2 spreadsheets). These were assigned to each of the land uses and intensities applicable for each reuse area, and the most critical demand was assigned to each reuse area. Overall fire flow demands for the entire island were calculated as the greater of either the City of Vallejo's requirements or the American Insurance Association's recommended formula for multiple fire requirements based on population:

$$Q = 1020 \times \text{SQRT}(P) \times (1 - 0.01 \times \text{SQRT}(P)); \quad T = Q/1000;$$

(P in thousands, Q in gpm, T in hours).

The peak fire flow requirement is 4500 gpm for four hours until the Mare Island resident population exceeds 2140. At this point, the population based factor becomes critical and impacts the ultimate development (20XX) timeframe with a fire demand of 4760 gpm for 4.8 hours.

Water storage requirements for the City of Vallejo are based on 24 hours of maximum day demand (1.6 x average daily demand) and fire flow storage for a peak flow event as defined above. In addition, due to the hydraulic gradient across the City during a maximum day, a factor for equalization storage was included to preclude overflowing of a gravity fed system during periods of minimum flow and reduced hydraulic gradients. Based on these factors, water storage requirements

[20] For this final run, a static peak fire flow of 4500 gpm was applied throughout the base to assess available fire flows basewide. Some figures are noted as below 4500 gpm, however they meet required fire flows within their respective areas.

for 1997 are 2.0 million gallons, for 2007 will be 4.1 million gallons and for ultimate development (20XX) will be 5.7 million gallons.

2.4 TIME PHASED CAPITAL IMPROVEMENTS

Capital improvements for the Potable Water system are summarized in Table 2-6 and presented in the first 2 pages of Appendix A3, Set 3 - Cost Analysis by System. Summation and land use cost allocations are included in the second half of Set 3 spreadsheets. Unit costs for all improvements are based on either local Department of Public Works actual costs, Vallejo utility Master Plan unit costs, or local Bay Area construction cost experience[21]. Costs for all improvements are indexed to 1997 and **do not include escalation factors** to the recommended construction date in order to provide a common baseline for analysis. While contingency, engineering design, construction management and soils investigations cost factors have been added, costs for local fees and financing costs have not been included. Costs do not include demolition or environmental cleanup work or related analysis, assessment, remediation or restoration. Detailed descriptions of each improvement, along with the basis for time phasing, are provided below. Figure 2-3 located at the back of this section, graphically displays the location and connection of each of these improvements.

Each of these items are discussed in the following sections based on their classification as either an on site system upgrade (to meet current operating standards), on site system expansion (to meet future development), or lifecycle replacement cost (until 2017). The following descriptions have been grouped into two timeframes: long term improvements (from present to 2007[22]) and ultimate improvements (from 2007 to 20XX[23]).

2.4.1 LONG TERM IMPROVEMENTS[24] (1997 - 2007)

The current water supply and distribution system contains a number of constraints precluding a simplified, low cost operation of the system. The improvements listed and discussed below first focused on removing operational blockages and system constrictions to provide adequate fire flow to developed areas of the island, then on rationalizing the operation and reducing the maintenance of these systems and, finally, on providing service to future redevelopment areas.

<u>**System Upgrades to Correct Deficiencies**</u>

W-1: New 5.7 MG Storage Tank - This tank is required to provide adequate water storage for domestic (maximum day) and maximum fire demands. Due to the size and location of the base (at the end of the city's Grid Zone), the island's water system must be capable of sustaining these demands separately from the City's main water system. In addition, present storage tanks are located at elevations too low to provide adequate pressure in peak demand situations. Key factors

21 Cost factors were escalated to 1997 using Engineering News Record cost indexes.

22 2007 equates to the Long Term development target date originally identified in the Final Reuse Plan and modified in the Economic Development Conveyance application and the Base Conversion Division of the City of Vallejo (see Chapter 1).

23 20XX is an indefinite date in the 21st century representing the date of ultimate redevelopment.

24 Although the period 1997-2007 would not normally be considered as "Long Term", this nomenclature is continued from the City's EDC Application to insure consistency.

in the siting and sizing of this tank are its outlet (top of tank) elevation, domestic and fire storage requirements and equalization storage (see Appendix A-2).

Equalization storage is the additional storage required to keep the top of tank at the peak system grade line (208' City elevation) ~~while providing the necessary~~ operating storage during a day of maximum demand when the overall hydraulic grade line of the system is reduced[25]. Assuming a 35 foot high tank and adding in the City's requirement for 5 feet of surfical soil removal prior to placing the base of a tank results in tank location in an area with ground elevation between 170 and 175 feet (NGVD). The site shown on Figure 2-3 meets this elevation criteria, requires the shortest pipeline connection, involves the least earthwork for site preparation, provides adequate area for the tank and service area around the tank, and is not currently planned for other development. If these conditions change, alternate locations are available, at a higher construction cost, in a band of similar elevations around the hills south of the golf course in Reuse Area 12 now planned as a regional park. Existing storage tanks provide marginal volumetric coverage for current reuse demands while further redevelopment will require additional water storage capacity (Appendix A-2). Due to this impending water storage deficiency as well as the low elevation of existing tanks, the new storage tank will be needed by 2000. This schedule allows time for funding, design and site preparation. These are preliminary steps toward tank construction which should be started immediately.

W-2: 20" Water Line Extension to Tank - This line is required to connect the new 5.7 MG tank to the 20" southern feeder and the Base water distribution system near Tank 188B. Costs for this line assume construction through open area (golf course); both the length and the unit cost will increase if an alternate tank location is selected at a later date. Timing for this line is the same as for the storage tank.

Capital Improvements for 1997 to 2007 Redevelopment

W-3: Replace Existing Main with 20" Water Main - This improvement replaces 600 feet of an existing 12" Cast Iron and Transite Water Main with a 20 inch Cast Iron line. Hydrants are not included since they presently exist and should be reconnected to the new line. This improvement removes a system constriction between the 20 inch Southern Feeder and a 16 inch service line to Tank 774 and to the Base Housing Areas. This constriction reduces pressures to the west side of the island and impacts the next phase of redevelopment after Area 1 by dropping available water pressure in the housing areas as domestic water demands increase. Current fire flow requirements in the housing area are marginally available at present demand rates. Consequently, any increase above 1997 domestic water demands anywhere on the base will drop fire flows below acceptable levels. Timing for this improvement is immediate to allow continued redevelopment and is recommended for 1998.

W-4: Replace Existing Main with 12" Water Main and Hydrants - This improvement replaces 1600 feet of existing 8 inch Cast Iron and Asbestos Cement Water Line with a 12 inch High Density Polyethylene (HDPE)[26] line from the North Gate west to Cedar Ave. along a proposed roadway

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[25] Estimates by the City of Vallejo Department of Public Works and Brown & Caldwell indicate that the hydraulic grade line at Mare Island would be reduced by 4-5 feet during peak summer flows.

[26] Replacement with metallic pipe would increase the unit cost and require installation of a cathodic protection system.

improvement to Reuse Area 1. It is required to provide adequate service pressures and fire flow to existing and proposed new facilities along Cedar Ave. and Acacia St. Material selection for this improvement is based on the unstable (large settlement potential) and highly corrosive soil conditions in the area. Hydrants are included since current fire protection is primarily provided through the phased-out Salt Water System. Phasing for this improvement is concurrent with new construction along Cedar Ave. and with expansion/improvement of Acacia St., currently planned for 1999.

W-5: Replace Existing Main with 12" Water Main and Hydrants - This improvement replaces 1300 feet of existing 8 inch Cast Iron and Water Line with a 12 inch HDPE[26] Line from the north gate southeast along Walnut Ave. to provide adequate service pressures and fire flow for existing and proposed new facilities along Walnut Ave. Material selection for this improvement is based on the unstable (large settlement potential) and highly corrosive soil conditions in the area. Hydrants are included since current fire protection is primarily provided through the existing Salt Water system. Phasing for this improvement is based on new construction along Walnut Ave., currently planned for 2001.

W-6: Replace Existing Main with 12" Water Main and Hydrants - This improvement replaces 850 feet of existing 8 inch Cast Iron Water Line with a 12 inch HDPE[26] Line from the North Gate southeast along Railroad Ave. to provide adequate service pressures and fire flow for existing and proposed new facilities along Railroad Ave. Material selection for this improvement is based on the unstable (large settlement potential) and highly corrosive soil conditions throughout the area. Hydrants are included since current fire protection is primarily provided through the existing Salt Water system. Phasing for this improvement reflects new facility construction and proposed expansion of Railroad Ave. currently planned for 2000.

W-7: New 20" Water Main and Hydrants - This improvement, 2800 feet of 20 inch Cast Iron Main, provides a new secondary connection from the proposed 5.7 MG water storage tank to the distribution network. This line follows Mesa Road around the west side of the island to the Coral Sea Housing Area. Operationally, it will stabalize water pressures throughout the central portion of the base and, along with improvements W-11 and W-12, alleviate pressure losses throughout the higher housing areas. Hydrants are included since fire protection is not currently provided in this area. Phasing for this improvement is based on completion of the new Water Storage Tank as well as occupancy in the Coral Sea housing area and increased domestic water demands in Reuse Areas 2 through 9 in 2001.

W-10: Replace Existing Main with 12" Water Main - This improvement replaces 3400 feet of 6 inch Cast Iron and Ductile Iron and 8 inch Transite Pipes with 12 inch HDPE[26] pipe along Cedar Ave. and C St. This project will remove another system constriction affecting fire flows within Reuse Areas 2 and 3 and will serve redevelopment along Cedar Ave. south of E St. Unit prices include trenching through asphalt. Material selection for this improvement is based on the corrosive soil conditions along Cedar Ave. near the dredge ponds and wetlands; hydrants are excluded since fire protection is currently provided and existing hydrants only need to be

[26] Replacement with metallic pipe would increase the unit cost and require installation of a cathodic protection system.

reconnected to the new main. Phasing for this improvement is correlated with redevelopment in Reuse Areas 2 and 3 between A and E St. and along Cedar Ave in Reuse Area 2, currently planned for 2005.

W-11: New 10" Water Main & Hydrants - This improvement, 450 feet of 10 inch HDPE[6] Main, provides a new secondary connection within the Coral Sea Housing Area. This line will run along the west side of Mesa Rd. between two segments of the Coral Sea Housing stabilizing water pressures within these segments and, along with improvements W-7 and W-12, alleviating pressure losses throughout the higher housing areas. Material selection for this improvement is based on the corrosive soil conditions in the area near the dredge ponds and wetlands; hydrants are included since fire protection is not currently provided in this area. Phasing for this improvement is based on completion of improvements W-7 and W-12 and increased occupancy in the Coral Sea housing area, currently projected for 2007.

W-12: New 10" Water Main & Hydrants - This improvement, 1700 feet of 10 inch HDPE[6] Main, provides a new secondary connection between the Farragut Village and Coral Sea Housing Areas. This line will run along the west side of the Island, through Reuse Area 7, stabilizing water pressures and, along with improvements W-7 and W-11, alleviating pressure losses throughout the housing areas. Material selection for this improvement is based on the corrosive soil conditions in the area near the dredge ponds and wetlands; hydrants are included since fire protection is not currently provided in this area. Phasing for this improvement is linked to completion of improvement W-7 as well as to increased occupancy in the Farragut Village and Coral Sea housing areas, currently projected for 2005.

W-13: Replace Existing Main with 10" Water Main - This improvement replaces 680 feet of 6 and 8 inch pipes with 10 inch HDPE[26] Pipe between California Ave. and Waterfront Ave. in Reuse Area 5. This project will remove a local constriction affecting fire flows near the waterfront in Reuse Area 5. Unit prices include trenching through asphalt and there is an additional line item for excavation and construction costs due to the structural, reinforced concrete slab between California Ave. and the seawall. Material selection for this improvement is based on the corrosive soil conditions along the waterfront; hydrants are excluded since fire hydrants are currently provided and only need to be reconnected to the new main. Time phasing for this improvement is based on reuse of existing facilities along the waterfront in Reuse Area 5, currently planned for 1998-1999.

W-14: Replace Existing Main with 10" Water Main & Hydrants - This improvement, 1100 feet of 10 inch HDPE[26] Main, provides a new secondary connection within the Farragut Village Housing Area. This line will run along the north side of Farragut Village, stabilizing water pressures in the western end of the housing area. Material selection for this improvement is based on the corrosive soil conditions in the area near the dredge ponds and wetlands; hydrants are included since fire protection is not currently provided along this corridor. Need for this improvement is driven by increased occupancy and absorption of the Farragut Village housing area, currently projected for 2007.

[26] Replacement with metallic pipe would increase the unit cost and require installation of a cathodic protection system.

W-16: Install New Backflow Devices (8" and under) - This improvement will provide correction of existing, undocumented cross-connections between the Potable Water system and industrial operations. Although no definitive number can be assigned to the number of missing backflow devices, we assumed that one unprotected connection would be discovered each year for the first 6 years as additional facilities are reopened for new tenants. Based on this projection, installation of backflow protection should be complete in 2003.

W-17: Remove Booster Pump Stations - This improvement will remove the existing booster pump stations on the Potable Water system. This project is the culmination of the replacement of existing inadequate storage tanks with a 5.7 MG Tank (W-1) which, along with pipe upgrades will provide adequate gravity service throughout the island, eliminating the need for booster pumps[29]. Timing for this improvement is linked to the completion of W-1 and W-2 in 2001.

O&M Cost Reduction Upgrades

No specific cost reduction upgrades have been identified. However deficiencies corrected by upgrades W-1, W-2 and W-17 will certainly simplify and reduce operating requirements and costs through the replacement of downstream mechanical controls and pump stations with a gravity operated system controlled at the main reservoir outlet.

2.4.2 ULTIMATE IMPROVEMENTS (2007 - 20XX)

The improvements discussed above correct the majority of systemic water distribution constraints. From 2007 out to ultimate development, the remaining improvements focus on correcting localized blockages and constrictions to provide adequate fire flow for smaller redevelopment areas and on providing service to Reuse Area 10. Lifecycle costs, although listed under ultimate development, should accrue on a straight line basis from 1997 through the entire assumed twenty year timeframe to 2017.

Capital Improvements for Ultimate Redevelopment

W-8: Replace Existing Main with 10" Water Main - This improvement replaces 460 feet of 8 inch cast iron and pipes with 10 inch HDPE[26] pipe between California Ave. and Waterfront Ave. in Reuse Area 3. This project, in conjunction with W-9, will remove a local constriction affecting fire flows along the waterfront in Reuse Area 3. Unit prices include trenching through asphalt and there is an additional line item for excavation and construction costs since structural, reinforced concrete is encountered between California Ave. and the seawall. Material selection for this improvement is based on the corrosive soil conditions along the waterfront; hydrants are excluded since fire hydrants are currently provided and only need to be reconnected to the new main. Time phasing for this improvement is based on reuse of existing facilities along the waterfront in Reuse Area 3, currently planned for 2009.

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26 Replacement with metallic pipe would increase the unit cost and require installation of a cathodic protection system.

29 Existing booster pumps at 880 and A-295 will continue to be used to provide adequate pressure to upper pressure zones in Reuse Areas 9 and 12 above elevation 190.

W-9: Replace Existing Main with 10" Water Main - This improvement replaces 580 feet of 4 inch Cast Iron Pipe with 10 inch HDPE[26] Pipe along B St. between California Ave. and Waterfront Ave. in Reuse Area 3. This project, in conjunction with W-8, will remove a local constriction affecting fire flows along the waterfront in Reuse Area 3. Unit prices include trenching through asphalt. There is an additional line item for excavation and construction costs since structural, reinforced concrete is encountered between California Ave. and the seawall. Material selection for this improvement is based on the corrosive soil conditions along the waterfront; hydrants are excluded since fire hydrants are currently provided and only need to be reconnected to the new main. Time phasing for this improvement is correlated with reuse of existing facilities along the waterfront in Reuse Area 3, currently planned for 2009.

W-15: Replace Existing Mains with 12" Water Main and Hydrants - This improvement replaces 4900 feet of existing 4 and 6 inch Cast Iron and Water Lines throughout Reuse Area 10 with a 12 inch HDPE[6] loop. This complete replacement is required to provide adequate service pressures and fire flow for proposed new facilities between Railroad Ave. and the waterfront. Material selection for this improvement is based on the unstable (large settlement potential) and highly corrosive soil conditions throughout the area. Hydrants are included since current fire protection is primarily provided through the existing Salt Water system scheduled for abondonment Phasing for this improvement is based on new construction within Reuse Area 10, currently planned for ultimate buildout in 20XX.

Lifecycle Repair and Replacement

W-18: Replace 6" Water Mains - These replacements are based on the age, material and condition for 30,300 feet of 6" Mains currently located on Base. 73% of pipes in this category are Cast Iron, 19% are Transite. Based on the average date of installation, location relative to highly corrosive soils (excluding water lines in Reuse Area 10 which will require complete replacement) and estimated remaining lifespan, an estimated 15% will need to be replaced due to corrosion, deposition or rupturing over the next twenty years (1997 to 2017).

W-19: Replace 8" Water Mains - These replacements are based on the age, material and condition of 55,100 feet 8" Mains currently located on base. Pipes in this category are primarily Cast Iron and Transite (51% and 45% respectively). Based on the average date of installation, location relative to highly corrosive soils and anticipated remaining lifespan, 15% will need to be replaced due to corrosion, deposition or rupturing over the next twenty years (1997 to 2017).

W-20: Replace 10" Water Mains - These replacements are based on the age, material and condition for 38,000 feet of 10" Mains currently located on Base. 58% of pipes in this category are PVC lines used on the southerly Salt Water system which is scheduled for conversion in 1997. However, the remainder of lines are Cast Iron and Transite (29% and 13% respectively) many of which were laid in the 1940's. Based on the average date of installation, the location of metal pipes relative to highly corrosive soils and estimated remaining lifespan, 10% will need to be replaced due to corrosion, deposition or rupturing over the next twenty years (1997 to 2017).

[26] Replacement with metal pipe will increase unit prices and require the installation of a cathodic protection system

W-21: Replace 12" Water Mains - These replacements are based on the age, material and condition for 33,700 feet of 12" Mains currently located on Base. 62% of pipes in this category are Cast Iron and 32% are PVC (converted Salt Water system). Only 5% of the pipes in this category are Transite. Based on the average date of installation, location relative to highly corrosive soils and estimated remaining lifespan, 10% will need to be replaced due to corrosion, deposition or rupturing over the next twenty years (1997 to 2017).

W-22: Replace 14" Water Mains - These replacements are based on the age, material and condition for 10,500 feet of 14" Mains currently located on Base. 74% of pipes in this category are Cast Iron or Steel (32% and 42% respectively); 26% of these lines are Transite. Based on the average date of installation, the location of metal pipes relative to highly corrosive soils, cathodic protection and estimated remaining lifespan, 15% will need to be replaced due to corrosion, deposition or rupturing over the next twenty years (1997 to 2017).

W-23: Replace 16" Water Mains - These replacements are based on the age, material and condition of nearly 3,000 feet 16" Mains currently located on Base. 85% of pipes in this category are Transite (installed in the 1940's) with the remaining 15% Steel. Based on the average date of installation, the location of metal pipes relative to highly corrosive soils and estimated remaining lifespan, 10% will need to be replaced due to corrosion, deposition or rupturing over the next twenty years (1997 to 2017).

W-24: Replace 20" Water Mains - These replacements are based on the age, material and condition for 10,000 feet of 20" Cast Iron Mains currently located on Base. Based on the average date of installation, the condition of the pipes, presence of cathodic protection systems, location of metal pipes relative to highly corrosive soils and estimated remaining lifespan, 5% will need to be replaced due to corrosion, deposition or rupturing over the next twenty years (1997 to 2017).

W-25: Replace Gate Valves (10" and under) - This replacement is for 871 smaller gate valves (10" and under) located throughout the backbone of the system. Based on failure rates noted during field inspections, an overall failure and replacement rate of 15% was assessed (the same as for W-26) until 2017; an effective replacement rate of 0.75% per year for annual budgeting.

W-26: Replace Gate Valves (12" and over) - This replacement is for 218 larger gate valves (12" and over) located throughout the backbone of the system. Based on failure rates noted during field inspections, an overall failure and replacement rate of 15% was assessed (the same as for W-25) until 2017; an effective replacement rate of 0.75% per year for annual budgeting.

W-27: Install Backflow Devices for common irrigation - This replacement program will provide taps and backflow protection at irrigation connections currently tied to fire hydrants. Although no definitive number was assigned, we assumed that for each common area there would be two improper irrigation connections discovered over the next twenty years, resulting in a total of 46 new taps.

35,262.53

Table 2-6
Potable Water Capital Improvements

PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST	UNITS	TOTAL COST
	ON-SITE SYSTEM UPGRADES (TO MEET CURRENT OPERATING STANDARDS)						
2000	NEW STORAGE TANK	W- 1	- NEW 5.7 MG TANK	ALL AREAS	$3,200,000 EA	1	$3,200,000
		W- 2	- 20" WATER LINE EXTENSION TO TANK	ALL AREAS	$90 LF	1,150	$104,000
	SUBTOTAL ON-SITE UPGRADES						$3,304,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 30% OF PIPELINES)						$9,400
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$4,572,000
	ON-SITE SYSTEM EXPANSION (TO MEET PROJECTED FUTURE DEVELOPMENT)						
1998	REPLACE MAIN	W- 3	- NEW 20" WATER MAIN & RECONNECTION	AREA 1	$100 LF	600	$60,000
1999	REPLACE MAIN	W- 4	- NEW 12" WATER MAIN & HYDRANTS	AREA 1	$65 LF	1,600	$104,000
2001	REPLACE MAIN	W- 5	- NEW 12" WATER MAIN & HYDRANTS	AREA 1	$65 LF	1,300	$85,000
2000	REPLACE MAIN	W- 6	- NEW 12" WATER MAIN & HYDRANTS	AREA 1	$65 LF	850	$55,000
2001	NEW MAIN	W- 7	- NEW 20" WATER MAIN & HYDRANTS	AREA 2,3,4,5,6,7,8,9,11	$105 LF	2,810	$295,000
	REPLACE MAIN		- NEW 12" WATER MAIN & RECONNECTION		$65 LF	460	$30,000
2009		W- 8	- REINFORCED CONCRETE EXCAVATION CST-NOTE#1	AREA 2,3,4,5,6,7,8,9,11	$150 LF	460	$69,000
	REPLACE MAIN		- NEW 12" WATER MAIN & RECONNECTION		$65 LF	580	$38,000
2009		W- 9	- REINFORCED CONCRETE EXCAVATION CST-NOTE#1	AREA 2,3,4,5,6,7,8,9,11	$150 LF	580	$87,000
2005	REPLACE MAIN	W- 10	- NEW 12" WATER MAIN & RECONNECTION	AREA 2,3,4,5,6,7,8,9,11	$65 LF	3,420	$222,000
2007	NEW MAIN	W- 11	- NEW 10" WATER MAIN & HYDRANTS	AREA 2,3,4,5,6,7,8,9,11	$60 LF	450	$27,000
2005	NEW MAIN	W- 12	- NEW 10" WATER MAIN & HYDRANTS	AREA 2,3,4,5,6,7,8,9,11	$60 LF	1,700	$102,000
	REPLACE MAIN		- NEW 10" WATER MAIN & RECONNECTION		$60 LF	680	$41,000
1999		W- 13	- REINFORCED CONCRETE EXCAVATION CST-NOTE#1	AREA 2,3,4,5,6,7,8,9,11	$150 LF	400	$60,000
2007	NEW MAIN	W- 14	- NEW 10" WATER MAIN & HYDRANTS	AREA 2,3,4,5,6,7,8,9,11	$60 LF	1,050	$63,000
20XX	NEW MAIN (NOTE #2)	W- 15	- NEW 12" WATER MAIN & HYDRANTS	AREA 10	$65 LF	4,900	$319,000
2003	BACKFLOW DEVICES	W- 16	- NEW BACKFLOW DEVICES (8" AND UNDER)	ALL AREAS	$6,000 EA	6	$36,000
2001	BOOSTER PUMPS	W- 17	- REMOVE BOOSTER PUMP STATIONS	ALL AREAS	$24,000 EA	3	$72,000
	SUBTOTAL ON-SITE EXPANSION						$1,765,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 30% OF PIPELINES)						$149,100
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$2,641,000

Table 2-6
Potable Water Capital Improvements

35,262.53

PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST		UNITS	TOTAL COST
	LIFE CYCLE REPLACEMENT COSTS (UNTIL YEAR 2017)							
	REPLACE PIPE SECTIONS	W- 18	- REPLACE WATER MAINS & RECONNECTION - 6"	ALL AREAS	$50	LF	4,500	$225,000
	EXCEEDING THEIR	W- 19	- REPLACE WATER MAINS & RECONNECTION - 8"	ALL AREAS	$55	LF	8,300	$457,000
	NORMAL LIFESPAN	W- 20	- REPLACE WATER MAINS & RECONNECTION - 10"	ALL AREAS	$60	LF	3,800	$228,000
		W- 21	- REPLACE WATER MAINS & RECONNECTION - 12"	ALL AREAS	$65	LF	3,400	$221,000
		W- 22	- REPLACE WATER MAINS & RECONNECTION - 14"	ALL AREAS	$75	LF	1,600	$120,000
		W- 23	- REPLACE WATER MAINS & RECONNECTION - 16"	ALL AREAS	$85	LF	300	$26,000
		W- 24	- REPLACE WATER MAINS - 20"	ALL AREAS	$100	LF	500	$50,000
	REPLACE FAILED VALVE	W- 25	- REPLACE GATE VALVES - (10" & UNDER)	ALL AREAS	$3,000	EA	130	$390,000
		W- 26	- REPLACE GATE VALVES - (12" & OVER)	ALL AREAS	$3,500	EA	33	$114,000
		W- 27	- NEW TAPS & BACKFLOW DEVICES FOR IRRIGATION	ALL AREAS	$1,600	EA	52	$83,000
	SUBTOTAL LIFE CYCLE COSTS							$1,914,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 30% OF PIPELINES & TAPS)							$127,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)							$2,817,000

	TOTAL WATER SYSTEM ESTIMATED COSTS (INC. ENG & CONT.)	**$10,030,000**

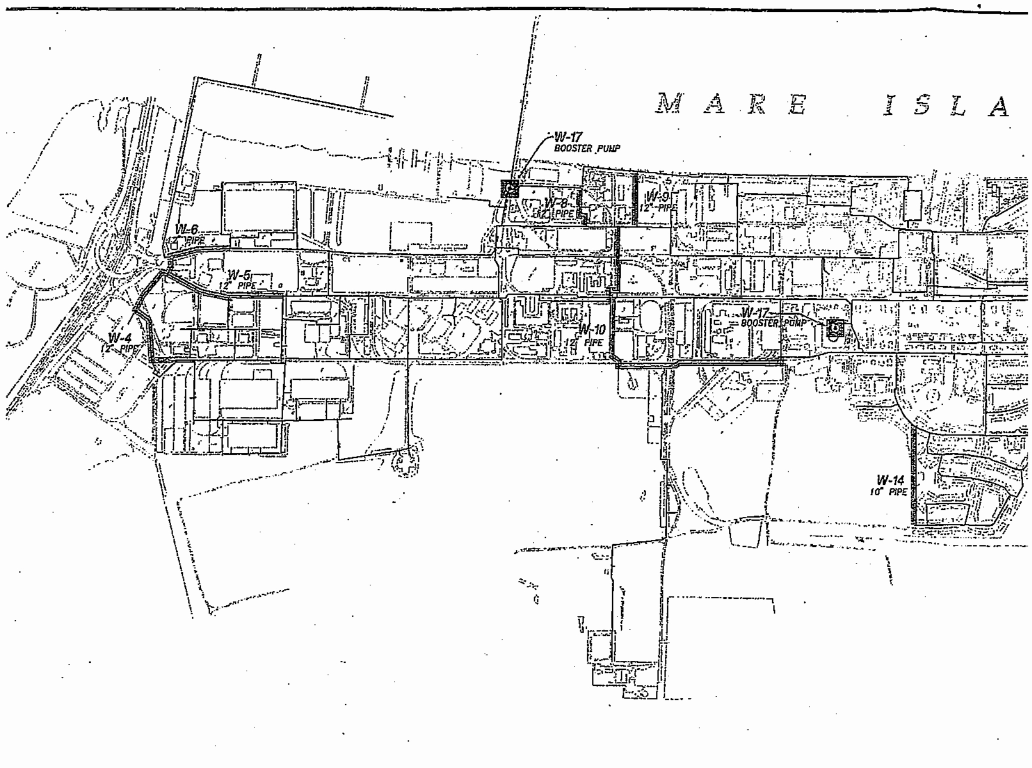
NOTE #1: *Cost for underground construction; Above ground construction would preclude these costs.*

NOTE #2: *Timeframe based on reuse development of Reuse Area #10.*

GENERAL A: *Costs based on Reimer Associates experience. These estimated costs do not include environmental related work - analysis, restoration or remediation.*

B: *All cost estimates are in 1997 dollars and no inflation has been added to improvement costs proposed in future years.*

Figure 2-3 Recommended Water Capital Improvements



MARE ISLA
W-17
BOOSTER PUMP
W-8
12" PIPE
W-9
12" PIPE
W-6
12" PIPE
W-5
12" PIPE
W-4
12" PIPE
W-10
12" PIPE
W-17
BOOSTER PUMP
W-14
10" PIPE

SECTION 3

SANITARY SEWER

SECTION 3
SANITARY SEWER

3.1 BACKGROUND

At the time of base closure in April 1996, there were two sewer systems installed at Mare Island. Only one of these, the sanitary sewer system, was operational while the other one, the industrial waste collection and pretreatment system, had been shut down and isolated over the previous 18 months. The industrial waste system was identified for remediation under existing environmental assessment and cleanup contracts through the Department of the Navy. The sanitary sewer is currently configured to collect wastes and pump them, through a 18" force main across Mare Island Srait to Vallejo Saitation and Flood Control District (VSFCD) Wilson Avenue trunk sewer. Treatment and disposal is accompliahed by VSFCD at their central treatment plant. The existing system uses a series of gravity lines and lift station. Although some system changes were allowable (channels, etc.) reconfiguration with vacuum extraction and other new gravity systems was deemed a design feature beyond the scope of this contract. Consequently, the scope of the MIRIS Study was limited to assessment of the existing sanitary sewer collection system as currently configured.

3.1.1 COLLECTION SYSTEM

The following discussions detail the existing conditions within each component of the sanitary sewer collection system.

Pipe Materials and Condition

Sanitary sewer mains at Mare Island consist of common commercial materials (reinforced concrete, cast iron and vitrified clay) as well as some less common grades of materials (corrugated metal and PVC). Table 3-1 breaks down the primary distribution piping by type, and shows the length and relative size of each type of pipe material used.

Table 3-1: Pipe Material Size and Distribution

PIPE MATERIAL	LENGTH	% OF TOTAL	AVERAGE SIZE
Vitrified Clay	22,900 ft.	33	10"
Reinforced Concrete	17,900 ft.	26	21"
Corrugated Metal	13,500 ft.	20	12"
Steel	7,400 ft.	11	8"
Polyvinyl Chloride	1,900 ft.	3	12"
Terra-cotta	2,600 ft.	3.5	10"
Cast Iron	2,500 ft.	3.5	10"
TOTAL	**68,700 ft.**	**100**	**12"**

The high percentage and large size of reinforced concrete pipe is due to its use as the primary trunk line pipe along Railroad Ave. One item of significance is the relatively high percentage of corrugated metal (steel) pipe (CMP) which is usually avoided in sanitary sewer construction. CMPs are common throughout Reuse Areas 1 and 10 and were installed in the 1930's and 1940's. One cause of this may be the temporary and exigent nature of military construction in wartime. However, regardless of the reason, the inclusion of CMP, as constituting 20% of the base-wide Sanitary Sewer System, is inapproprivate under municipal utility practices and replacement as a "cost to cure" is warranted.

The MIRIS Team located a number of video records of sewer pipes which displayed the interior condition of pipes. In addition, a series of video recordings were made at selected I&I sites and at suspected failed pipe locations. The recordings confirmed infiltration at joints and revealed the occasional use of slotted pipe for exfiltration. While it was considered acceptable to leach sewage flows in the past, this practice is now unacceptable near a major waterway. In addition, these slotted pipes were places in areas subject to tidal influence resulting in ground water infiltration to the system. Another condition revealed by video records was the deformation of CMP pipes into oval (and sometimes collapsed) cross-sections.

Another critical issue affecting the operation of the sanitary sewer system is the instability of soils in fill areas of the Base. These areas (i.e.: Reuse Areas 1 and 10) were created by filling in tidal wetlands and sloughs. Facilities and power utilities were constructed on piles while adjacent lands were essentially unconsolidated. This resulted in large settlement around (and under) facilities which impacted any utilities, pipes and roadways which were not pile supported. Historically, sewer pipes in Reuse Area 10 have flattened and reversed slopes. In addition oil seepage entering these lines forced the installation of three temporary pumps at existing manholes and on above gound steel force main. This temporary measure provides service from approximately half of the buildings in the NAD Area to DOM 9. In Reuse Area 1, pile supported lines and manholes are now surfacing and extend several feet above ground level. Section 3-2 discusses the modeling of the sanitary sewer pipes and Section 3-3 highlights areas of submerged and tidally influenced pipe, pipe with negative slope, and/or insufficient capacity as the basis for recommending capital improvements for the related problems.

Domestic Sewage Pump Stations

All of the DOM stations, except for DOM -18, were constructed before 1960 and are considered old. Eleven of the DOM stations have pumps in deep pits where access for maintenance is restricted and ventilation is poor. Extensive corrosion is seen at those locations. Table 3-2 lists the current conditions at each of the DOM pump stations. Permanent safety equipment should be installed at stations having deep pits as a cost savings item. Such equipment will allow one individual to independently service the pumps verses the three it presently takes due to OSHA requirements. Some pumps are now isolated and should be operated to assess their condition. Pump station DOM-12, located between Ways 1 and 2, services a rest room and should be removed. An additional pump is required at DOM-17 to supplement the one pump at that station in order to provide sufficient redundancy[2]. An additional pump at DOM-7 will be required to meet increased demand projected in 2017. The additional pump at DOM-7 should be installed by year 2007 because the remainder of equipment at that station will be scheduled for life cycle replacement at that time. By year 2017 an additional pump will also be required at DOM-9.

Table 3-2: Existing Pumphouse Conditions

STATION	MOTOR IN SUMP	PUMP IN SUMP	DEEP (FT) or SUMP (S)	DESCRIPTION
DOM-1 Pump 1	N	Y	NA	Wood shed, no fan needed
DOM-1 Pump 2	Y	Y	NA	Wood shed, no fan needed
DOM-2	N	N	15'	Concrete building enclosed. Has vent system.
DOM-3	N	N	15'	Concrete building enclosed. Has vent system.
DOM-4, W, 5, 6, 7, 8, 9	N	N	20'	Concrete building enclosed. Has vent system. Controls on upper level; pump on lower level.
DOM-10	Y	Y	NA	In basement of building M-37. No ventilation or ladder needed.
DOM-12	N	Y	NA	No building; in open.
DOM-16	N	N	10'	Concrete building above ground.
DOM-17	N	N	NA	Ground level; embanked 3 sides, open one side. Vent and ladder not needed.
DOM 18			NA	Secured

Other Sewage Pump Stations

The Sewage Pump Stations (SPS) stations are relatively new. SPS-1, 2 and 3 have extensive corrosion because of their exposed location on the North Pier and the poor condition of weather-stripping on their enclosing huts. SPS-4, just west of the North Pier, is subject to flooding during winter storms and should be raised to protect the equipment. Most of these stations have been isolated and should be operated to assess their condition. Sufficient capacity exists for future use. SPS-1 and SPS-2 will not be needed in the future due to the planned use of the North Pier as a recreation facility. SPS-5 has been removed from the system; piping to and from this station is currently being removed in conjunction with unexploded ordinance removal in the south end of the island. All of the remaining pumps will not be needed until 2004 to 20XX based on current reuse plans. The equipment should be repaired and maintained until needed; life cycle replacement should be planned for year 2017. Table 3-3 provides a summary of conditions in the SPS pump stations.

[2] Since DOM-17 serves the golf course and is not a part of the main sanitary sewer system, this improvement should be the responsibility of the golf course operator.

Table 3-3: Existing SPS Pumphouse Conditions

STATION	MOTOR IN SUMP	PUMP IN SUMP	DEEP (FT) or SUMP (S)	DESCRIPTION
SPS-1, SPS-2, SPS-3, SPS-4	N	N	S	Steel reinforced fiberglass hut. Ventilation is adequate. No ladder is required.
SPS-5	N	N	12'	Concrete pit pumphouse. (removed from system)
SPS-NAD-1, 2, 3	Y	Y	S	Temporary pumps and motors in manhole. Controls outside on post. Ladder in manhole. No lighting or ventilation.

Ship-To-Shore (STS) stations are also relatively new and are designed to allow large berthed ships to discharge their tanks. Stations STS-H, I, R, S, and T are all exposed to the weather and are heavily corroded. Pumps at stations STS-R, S and T could not be rotated by hand. All the STS pump stations (except STS-R) did not have power available to test pump operation. Annual testing should occur to assess their condition and maintenance needs. Stations STS-A, C, J, K, L, M, N, O, and V were not inspected. These stations are assumed to be the same because of their outward appearance. They also require confined entry into deep pits where safe access is difficult. Observed through overhead openings into STS-A and STS-C, the interior spaces looked clean and relatively new. Capacity is adequate for any forcelabor demands; however no uses requiring Ship to Shore facilities are projected in the Reuse Plan.

Stations STS-R, S and T are on the southern finger piers and may be used to support Marina functions at ultimate build-out in 20XX. In the meantime, they may also be used to service docked ships. Because of their poor condition and probable high cost of repair, they should be mothballed until future reuse is determined.

The remaining stations of this system are located between the Causeway and the finger piers and are not directly addressed in the reuse plan. The City should determine the future extent of use of these stations based on the need to service visiting ships along the waterfront of Reuse Areas 3 and 5. The stations should be tested and maintained. Permanent safety equipment should be installed at stations having deep pits as a cost savings item to allow one individual to independently service them verses the three it currently takes due to OSHA requirements. Life cycle replacement of equipment at station STS-H should occur by year 2007. Life cycle replacement of the remaining STS stations should occur when and if required by reuse activity.

Meters

The only recording sewage meters currently installed on the island are located at DOM-4 and measure the total discharge from the island. These meters are owned by the Navy, and are operated and maintained by The Vallejo Sanitation and Flood Control District (VSFCD). Sewage charges for individual users are presently assigned at a contract amount or as a percentage of water consumption. Based on operations throughout the VSFCD service area, this practice is planned to continue with meters installed only in unique, individual circumstances.

Emergency Overflows and Cross-connections

The construction pattern of the sanitary sewers on Mare Island makes it apparent that a large number of cross-connections exist between the sanitary and storm sewer systems. The vast majority of these have been identified and blocked by the Navy. However, some cross connections will continue to be identified as reuse activity progresses. As a part of this study, the MIRIS Team sought to identify additional cross-connections. The majority of these constituted emergency overflows from the sanitary system to prevent sewage from backing up onto open ground. In Reuse Area 10, nearly 50% of the manholes along the waterfront have high level emergency overflows to the strait. Although these were planned to be plugged by the PWC, a spot check in December 1996 revealed 3 that had either lost their plugs or were missed. An additional sanitary to storm cross-connection was discovered in front of the Rodman Center where a storm sewer manhole contained sanitary sewage.

Another type of observed cross-connection permits storm drainage into the sanitary system. Although such cross-connections are not as problematic as the reverse, they constitute inflow into the sanitary system during rainy periods. These cross-connected facilities were typically first constructed as part of a combined system. Later, when a separate storm drain was constructed, minor connections (downspouts) were left connected to the sanitary system. Two examples noted include the old hospital area (buildings with an H designation) where captured roof gutter rainfall is directed into sanitary sewers, and at M-37 where the sump pump for the building serves not only the internal plumbing but also the original soil and basement sump drainage around the building.

3.1.2 SUMMARY OF EXISTING CONDITIONS

The sanitary sewer system collects liquid waste from the developed sections of the base through a series of gravity mains, lift stations and force mains. The untreated wastewater is pumped along the Causeway across the Mare Island Strait discharging into the Vallejo Sanitation and Flood Control District's trunk line along Wilson Blvd. Originally, in keeping with the standards of the 1800's and early 1900's, the base's sewer system was constructed as a combined sewer system (sanitary and storm) which discharged into the Strait. Over the years, this system was separated and upgraded to bring it into compliance with modern standards, including a waste treatment plant on the island. This plant was eventually abandoned and transformed into an industrial waste pretreatment facility, and the sanitary sewage was pumped across the Causeway Bridge directly to the Vallejo Sanitation and Flood Control District for treatment and disposal. A schematic of the present backbone sanitary sewer collection system is provided in Figure 3-1.

The base sanitary system currently consists of a series of gravity lines boosted by 13 lift stations (designated as DOM's for DOMestic pump stations) scattered around the island. These feed into a central pump station, DOM-4 located on A St. DOM 4 contains four pumps which feed a 18 inch Steel Force Main running from DOM-4, across the Causeway Bridge, to the Wilson Ave collector in Vallejo. DOM-4 also has two emergency overflows. One discharges directly to Mare Island Strait and is currently sealed with a closed gate valve; the other is connected to Station W.

Station W pumps excess flow from DOM-4 westerly to the industrial waste treatment ponds through a 12 inch pipe[3]. These ponds then discharge back to DOM-4 through a 21 inch gravity line (which also contains the 12 inch force main), thus functioning as retention basins for excess sanitary sewer flows beyond the discharge capcity of DOM-4.

In addition to domestic sanitary sewage, the base system can accomodate ship-based sewage system discharges. Large vessels can empty waste tanks into the berth collection system. This system is powered by 14 Ship-To-Shore (STS) pump stations located along the berths and finger piers. These pump stations are augmented by 8 Sewage Pump Stations (SPS) which were installed most recently to expand sanitary sewage service to the North Pier and correct problems throughout the NAD area (Reuse Area 10).

3.1.3 CURRENT SYSTEM OPERATION AND CONSTRAINTS

Due to the age of the system, particularly in the central and southern end of the island, pipe materials vary from late 1800's era oval brick sewers to modern reinforced concrete trunk lines. The flat slope of the majority of the Base sewer lines requires many sections of pipe to extend below the water table. Figure 3-2 graphically portrays the sections of submerged and tidally influenced pipe. This feature, in conjunction with the use of inappropriate materials (such as corrugated metal pipe), slotted storm drain manhole cover on the sanitary system, and soil instability (settlement) problems, has resulted in very large inflow and infiltration (I&I), the single most demanding deficiency in the entire system.

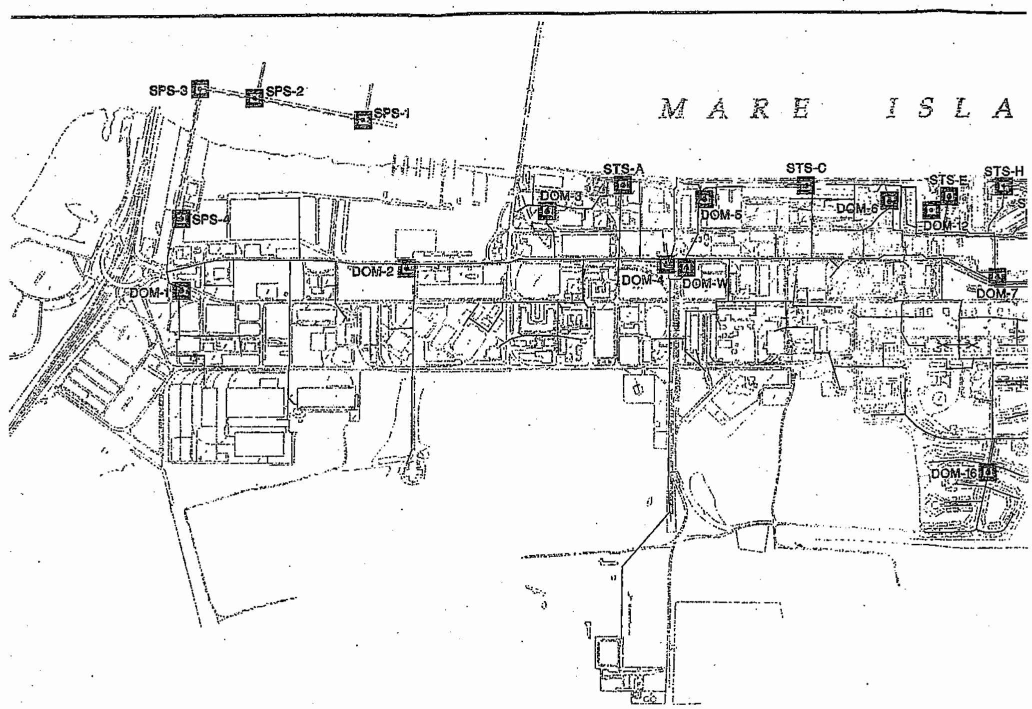
Prior to ceasing operations in October 1996, the PWC initiated a program of grouting manholes and installing pneumatic plugs in sewer lines to reduce the amount if I&I. Although partially successful, this only isolated portions of the system and did not allow resuming service if a facility was subsequently leased. In addition, a number of these plugs failed[4], requiring manpower to attempt to locate the plugs' origins. More recently, the Vallejo Sanitation and Flood Control District (VSFCD) has initiated a process of isolating pump stations to limit the flow from areas of low use and high I&I.

Another aspect of the high I&I is the shutdown and isolation of lift stations serving areas not currently leased or otherwise occupied. Although this is an effective short term elimination of the problem, it will resurface as additional tenants require these stations to be placed back in service. This is currently the issue at DOM-6 which has the second highest I&I rate on the island and which serves facilities now being prepared for a tenant in the summer of 1997. An additional implication is the increased maintenance required to reactivate and operate pump stations which have been shut down for an extended period of time (one year or more). Section 3.4.1 addresses long term corrections for these issues including reduction of I&I and pumphouse repairs.

[3] At present, meters at Station W show flows pumped to the IWTP but no flows have arrived there. This indicates a break in the 12" force main with flows returning to DOM 4 in the concentric 21" return line.

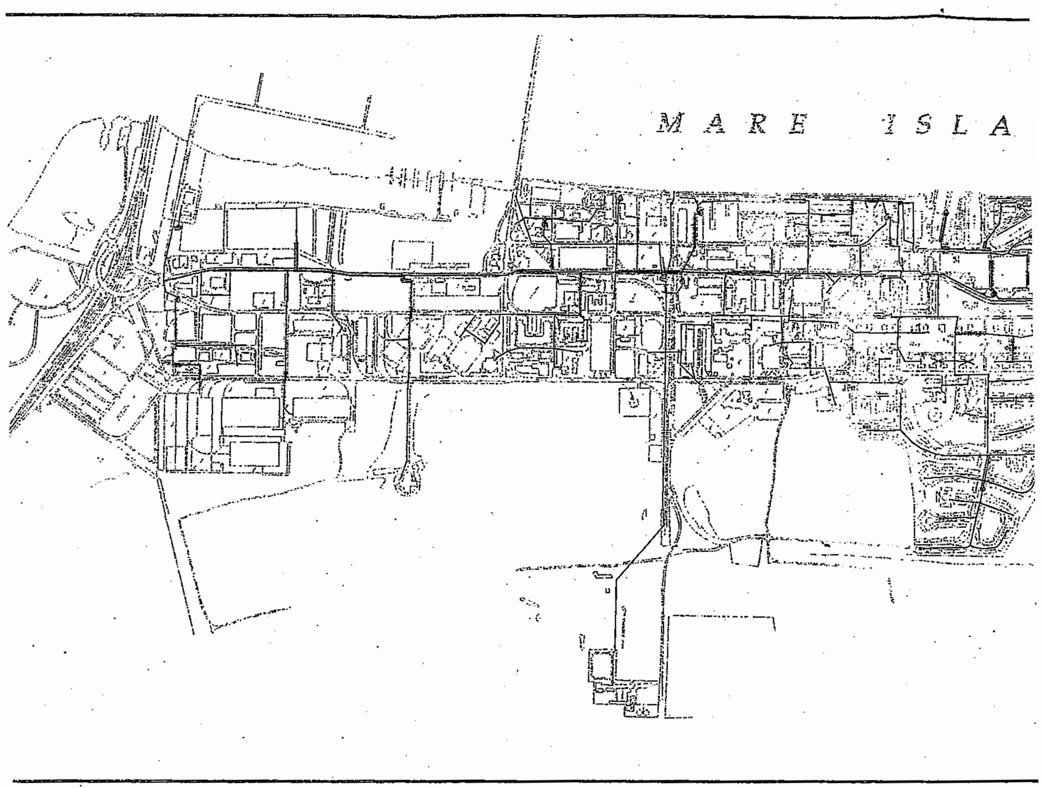
[4] As witnessed by maintenance staff in the occasional appearance of a plug in one of the operating lift stations.

Figure 3-1 Existing Sanitary Sewer System



MARE ISLA
SPS-3
SPS-2
SPS-1
SPS-4
STS-A
STS-C
STS-E
STS-H
DOM-1
DOM-2
DOM-3
DOM-4
DOM-5
DOM-6
DOM-W
DOM-7
DOM-12
DOM-16

Figure 3-2 Deficiencies


MARE ISLA

3.1.4 EXISTING O&M REQUIREMENTS

The corroded conditions found during the survey of pump houses for the sanitary sewer system are reported below. Pump houses where severe ~~or extensive~~ corrosion ~~exists~~ are identified as high maintenance areas. Logically enough, equipment installed outdoors, and in an environment where they are exposed to salt water, were found to have significantly more corrosion and rusting than those installed inside protective enclosures. The column on the right indicates whether or not the station has a protective enclosure.

System/Station	*Corroded Items*	*Enclosed?*
Ship To Shore STS-H	Pump pneumatic controls, inlet & outlet gate valves, air lines. Oiler station, bonnet of spring loaded diaphragm valve.	N
Ship To Shore STS-I	Sump pump, pump motor starters, terminal blocks inside starters, compressor unit.	N
Ship To Shore STS-O,M, S, & T	Sump covers, tank level switch linkages and rods, motors, valves, electrical conduit, electrical equipment supports, control panel exteriors.	N
DOM-2, 3 & 6	All pumps, piping, valves.	Y
DOM-4	Pumps #1 & 2	Y
DOM-5	Pumps #1 & 2, gauges, piping, foundation bolts.	Y
SPS-1, 2, & 3	Pumps and valves, overhead beams, exhaust fans, controllers.	Y

To assist in setting priorities for action, the following list of failure items was prepared. It includes items having missing, broken and seized parts.

DOM-2	Sump Pump is broken. A plugin type pump is being used.
DOM-4	Pump #3 motor has a cracked housing.
DOM-4	The automatic transfer switch failed to operate when the engine generator was tested.
DOM-4	The 200 kW Katolight generator unit coolant sensor is broken.
DOM-16	#1 Pump check valve is broken.
DOM-18	Counterbalance for #2 Pump discharge check valve is missing.
SPS-5	Pump #1 is frozen - will not rotate.
STS-O,M, S, & T	All six pump/motors could not be turned by hand. Two had power and only one of those two would rotate (noisily) with electrical power.

Three categories of pump stations are included in the sanitary sewer system; the Domestic Pump Station (DOM), Sewage Pumping Stations (SPS) and Ship to Shore (STS). Removal of corrosion, painting, correction of electrical safety problems, repair of couplings, leaking seals, bearing noise, pipe leaks and packing, refurbish or overhaul equipment, install missing parts, replace broken and deteriorated parts, and testing the operation of pumps/motors to better assess condition are all included as O&M actions. SPS-1, SPS-2 and SPS-5 stations are not included because they are recommended for abandonment. Only preservation costs are included for STS-R, S and T stations. Detailed listing of repairs required by pump station are shown in Appendix B-4.

3.1.5 MAINTENANCE AND REPAIR COST PROJECTIONS

As described in Section 3.1.2, three systems collect sanitary sewage. The Domestic (DOM) sewage system collects waste-water from the other two pier-side systems as well as from the base-wide collection system and delivers the combined flow to the VSFCD trunk sewer via a force main across the Causeway. The Sewage Pumping System (SPS) serves the North Pier and Reuse Area 10, which was formally the Naval Ammunition Depot. The Ship to Shore (STS) Sewage System delivers wastewater from ships dry-docked or docked along the waterfront from the Causeway through the south side of the finger piers. Total costs, by phase, for all sanitary pump station improvements are:

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	$300,000	-	-
Capital Improvements	-	-	-
Cost Reduction (CR)	$312,800	-	-
Life Cycle Replacement (L)	-	$1,330,000	$2,620,000
Capacity Upgrade (CU)	$ 45,700	$ 25,000	-
Other Capital Improvements (C)	$ 6,400	-	$ 22,800

Domestic Pump Stations: The DOM system collects wastewater from a main line which runs north along Railroad Avenue from Reuse Area 10 (formerly the Naval Ammunition Depot) and south along Railroad Avenue from Reuse Area 1. Stations DOM-7 and 9 boost sewage along the main from the south to DOM-4 which pumps the wastewater to the VSFCD. Pump Station DOM-1 and 2 boost sewage from the north to DOM-4. The other DOM stations collect flows from various areas on the Island and discharge to the main trunk line along Railroad Avenue. Numerous gravity sewer lines as well as discharge lines from the SPS and STS systems also enter the main line.

As described previously, most of the stations are old and in varying states of disrepair. Because of extensive corrosion DOM-2, 3, 4, 5 and 6 are designated as High Maintenance Areas. Failed equipment was found in DOM-2, 4, 16 and 18. Repairs, maintenance and safety problems are recommended for 1997. Life cycle replacement of equipment varies with estimated useful remaining life and are phased from 2007 to 2017.

DOM-2, 3, 4, 4W, 5, 6, 7, 8, 9, 16 and 18 are located in pits ranging from 10 feet to 20 feet below grade. All except DOM-5, 16 and 18 require three persons with safety equipment to enter for maintenance and testing due to OSHA confined entry requirements. A cost reduction modification which installs permanent ventilation and testing equipment for pits below ground level has been included to reduce O&M costs at these stations. These modifications are recommended for 1997 to provide maximum savings.

Costs for the repaired upgrade of DOM pump stations are summarized below by phase:

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	$197,000	-	-
Capital Improvements	-	-	-
Cost Reduction (CR)	$ 74,300	-	-
Life Cycle Replacement (L)	-	$1,255,000	$768,000
Capacity Upgrade (CU)	$ 45,700	$ 25,000	-
Other Capital Improvements (C)	-	-	-

Sewage Pump Stations: The Sewage Pumping System (SPS) serves the North Pier in Reuse Area 1, the pier and adjacent areas in Reuse Area 12 and Reuse Area 10 and is described previously on page 3-3 as part of the base-wide collection system.

Stations SPS-1, 2, 3 and 4 are linked in series with SPS-1 at the furthest end of the North Pier and SPS-3 on the corner of the pier closest to land. SPS-4 is on land and discharges to the DOM main line on Railroad Avenue. Minor demand is expected on the pier for a rest room, fish and bait preparation and water fountain. These uses are projected for the period 2000 to 2007. Because of minor demand SPS-1 and SPS-2 should be abandoned. SPS-3 and SPS-4 are recommended for repair, maintenance and correction of safety problems in the near term. These stations contain relatively new equipment and are phased for life cycle replacement by year 2017. SPS-4 equipment is subject to flooding during heavy rainstorms and must be elevated. This modification is phased for the near term.

Station SPS-5 is isolated and lines to and from the station are being removed as a part of unexploded ordinance removal on the south end of the island.

Stations SPS-NAD-1, 2 and 3 serve what will be the Marina/Residential area in 20XX and pump wastewater from this area to the DOM system at DOM-9. These stations are phased for repair, maintenance and correction of a safety problem in year 1997 to retain service to this area. Life cycle replacement of this relatively new equipment is scheduled for 2017.

Costs for the repair and upgrade of SPS pump stations are summarized below:

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	$14,700	-	-
Capital Improvements	-	-	-
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	$554,000
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	$6,400	-	-

Ship to Shore Pump Stations: The Ship to Shore (STS) System, previously described on page 3-4, delivers wastewater from ships at Berths along the waterfront from the Causeway through the south side finger piers. The reuse plan does not mention docking of ships as a planned reuse activity in these areas. However, STS-A and STS-C are currently being prepared for use by docking ships. STS-A will serve the new Vallejo Baylink Ferry Service. All of these pumps have been included in the estimates for O&M and capital costs.

STS- H, I, J, K, L, M, N, O and V should be repaired or moth balled until tenants and/or ship berths require their activation. STS-A, C, J, K, L, M, N, O and V are assumed to be all similar in configuration. Of this group, only STS-A and STS-C were observed (through overhead hatch doors). Equipment is installed in deep pits; for stations required for use by tenants installation of permanent safety equipment will reduce costs by allowing singular entry.

STS-R, S and T are on the finger piers in Reuse Areas 5 and 10. These are planned to service the Marina in the far future and should be preserved until redevelopment occurs. No repairs or resolution of safety problems are recommended due to their projected need after their lifecycle replacement date in 2017. The stations have extensive corrosion, which should be cleaned-up, equipment painted and a temporary cover installed over each station. This is recommended for year 1997. Costs for the repairs and upgrades of STS pump stations are summarized below:

Time Phased Costs ($)	**Current** 1997	**Long Term** 2007	**Ultimate** 2017
Repair (O&M) (Total)	$88,000	-	-
Capital Improvements	-	-	-
Cost Reduction (CR)	$236,000	-	-
Life Cycle Replacement (L)	-	$78,800	$1,294,000
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	$ 23,000

The MIRIS Team also reviewed available Navy and City of Vallejo (Oct. 96 – Mar 97) maintenance records and have developed an estimate annual maintenance requirements. These costs are summarized in Table 3-4.

Table 3-4 Sanitary Sewer O&M Costs

Maintenance Activities	Rate	Total Hrs.	Material	Total Cost
Pump Station Checks	$ 36.21	390	$ 195	$ 14,317
Weekly Test of Station Alarm 7.3.3 (c)(3)(d)	$ 36.21	187	$ 936	$ 7,715
Weekly Test Operation of Bldg. 839				
Generator 7.3.3 (c)(3)(e):	$ 36.21	78	$ 390	$ 3,214
Monthly Inspection of Wetwells 7.3.3 (c)(4)(a)	$ 36.21	43	$ 86	$ 1,651
Monthly Calibration of Hydrocarbon Unit 7.3.3 (c)(4)(b)	$ 36.21	2	$ 24	$ 111
Quarterly Lubrication of Station Ventilation Unit 7.3.3 (c)(5)(a)	$ 36.21	35	$ 174	$ 1,434

Table 3-4 Sanitary Sewer O&M Costs (cont'd)

Check Air Compressor Controls 7.3.3 (c)(5)(b)	$ 36.21	288	$ 3,456	$ 13,884
Quarterly Calibration of Domestic Pump Station Monitors 7.3.3 (c)(5)(c)	$ 200.00	1	$ -	$ 200
Semiannual Lubrication of Pumps and Motors 7.3.3 (c)(6)(a)	$ 36.21	25	$ 252	$ 1,164
Semiannual Test of Station W 7.3.3 (c)(6)(b)	$ 36.21	8	$ 80	$ 370
Semiannual Compressor Oil Change 7.3.3 (c)(7)(a)	$ 36.21	9	$ 90	$ 416
Annual Structural Inspection of Pump Station 7.3.3 (c)(6)(b)	$ 36.21	29	$ 290	$ 1,340
Annual Maintenance of Bldg. 839 Generator 7.3.3 (c)(7)(c):	$ 36.21	16	$ 80	$ 659
Annual Inspection of Sanitary Sewer Manholes	$ 36.21	453	$ 2,265	$ 18,668
Annual Cleaning of Manholes per Inspection	$ 36.21	453	$ 9,060	$ 25,463
Subtotal				**$ 90,600**
Minor Repairs				
Clear Blockages in Mains	$ 36.21	416	$ 4,992	$ 20,055
Hydro-flushing of Sewers	$ 36.21	208	$ 416	$ 7,948
Clear/Repair Plugged Laterals	$ 36.21	416	$ 2,080	$ 17,143
Utility Locating Service	$ 36.21	360	$ 4,320	$ 17,356
Perform Navy Requested Sampling	$ 36.21	180	$ 3,600	$ 10,118
Subtotal				**$ 72,600**
Major Work				
Life Cycle Failures	$2,042,000	0.05	0	$ 102,000
Pump Stations	$ 300,000	1	0	$ 300,000
Subtotal				**$ 402,000**
Administration and Overhead (15%)				$ 84,700
TOTAL ANNUAL O&M COSTS				**$ 650,000**

3.2 SYSTEM ANALYSIS

3.2.1 MODELING

As a part of MIRIS, CH2M Hill developed a PC-based model for the sanitary sewer system on Mare Island. The model was run for the ultimate build-out land use scenario. The physical data used to develop the model came from the mapping and survey tasks of this project The model has been developed only for the backbone pipeline systems. Therefore, as quantified below, not all pipelines on Mare Island were included in the model:

	Total Pipe Length (ft.)	Modeled Pipe Length (ft.)	Percent of Pipe in Model
Sanitary Sewers	139,199	57,832	42%

The model resides in the EXCEL 6.0 environment. We chose to use a spreadsheet model in order to simplify the City's efforts to use the model for later analysis. The spreadsheet environment provides the City with a model which can be used by a person with a good understanding of hydraulics and average spreadsheet capabilities. This eliminates the need for a user to be highly skilled with model software such as SWMM or MOUSE.

The model accumulates peak flows down through the system. Pipeline flow capacities are computed using Manning's equation. The roughness coefficient for Manning's equation computations are based on accepted roughness values. The Manning's roughness coefficient are listed by pipe material in Table 1. Pipes exceeding capacity and pipes at negative slopes have been noted in the model. Capacity deficiencies are identified in the model by pipelines having percent flow capacities greater than 100 percent in the column labeled "Over Cap."

Table 3-5
Manning's Roughness Values
("n")
for Sanitary and Storm Systems

Pipe Material Designation	Pipe Description	"n" Value
CMP	corrugated metal pipe	0.024
CIP	cast iron pipe	0.015
VCP	vitrified clay pipe	0.014
RCP	reinforced concrete pipe	0.013
TC	terra cotta	0.013
PVC	polyvinyl chloride	0.012
ABS	plastic	0.012
STL	steel	0.015
BRK	brick	0.014
ACP	asbestos cement pipe	0.012
BOX	wood box	0.016

The sanitary sewer model is capable of modeling design sanitary (SAN), tidally influenced groundwater (TIG), groundwater infiltration (GWI), and rainfall-dependent inflow (RDI) flows entering the collection system. Each flow component is allocated to the pipelines at the downstream structure for each pipeline. The magnitude of each flow component is computed from the proportion of the total flow in the development area, as determined by the length of pipelines upstream of the subject pipeline compared with the total length of pipe in the area. For example, if the total flow in a basin is 0.5 mgd, the total length of pipe in the development area is 3,000 feet, and the length of upstream pipeline for this example is 750 feet, the pipeline will be allocated 25 percent (750 feet divided by 3,000 feet) of the flow, or 0.125 mgd. This computation is carried through for each flow component allocated to each pipeline.

The SAN flow component is further modified by applying the peaking factor to the flow. Applying the peaking factor provides a degree of dynamic flow routing to the model. The peaking factors were taken from the Vallejo Sanitation and Flood Control District's (VSFCD) design standards as listed below:

For SAN flow less than or equal to 0.1 mgd:

$$\text{Peak SAN flow} = \text{SAN} * 2.7183$$

For SAN flow greater than 0.1 mgd:

$$\text{Peak SAN flow} = (\text{SAN})^{0.97} * (2.7183)^{0.33}$$

The model accounts for flow generated within each basin. Some basins were excluded in the allocation of groundwater-related flows since the pipelines within these development areas were not susceptible to infiltration flows. A summary listing of the flows distributed to each development area is provided in Table 3-6.

The TIG flow was determined based on observations of low flows at the Domestic 4 Pump Station during high and low tide conditions.

The magnitude of the RDI flow component was determined based on scaling of a storm event measured at the Domestic 4 Pump Station. The event occurred on December 8, 1996. This event had a duration of 6 hours with a total depth of 0.7 inches, and produced a peak flow of 2.3 mgd. This event was scaled up to estimate the peak of a 5-year, 4-hour storm event. The scale up was based on the ratio of the December 1996 event and the design event total rainfall depth.

Table 3-6 Sanitary System Flow Components by Development Area*

Area	Description	SAN (mgd)	TIG (mgd)	GWI (mgd)	RDI (mgd)
1	No. Light Industry	0.29	0.36	0.15	0.53
2	Neighborhood Center	0.15	0.06	0.10	0.38
3	Mixed Use	0.22	0.13	0.22	0.78
4	Historic District	0.10	0.05	0.07	0.26
5	Heavy Industry	0.21	0.14	0.20	0.72
6	Farragut Village	0.09	0.01	0.17	0.60
7	Developed Recreation	0.00	0.01	0.00	0.00
8	Coral Sea Village	0.07	0.01	0.13	0.46
9	Education/Office	0.22	0.03	0.16	0.59
10	Marina/Residential	0.19	0.02	0.00	0.00
11	Golf Course	0.00	0.00	0.00	0.00
12	Regional Park	0.00	0.00	0.00	0.00
13	Recreation/Open Space	0.00	0.00	0.00	0.00

**SAN = design base sanitary flow; TIG = tidally influenced groundwater;*
GWI = groundwater infiltration; RDI = rainfall-development inflow

The Tidally-Influenced Groundwater (TIG) flow was determined based on observations of low flows at the Domestic Pump Station (DOM) 4 during high and low tide conditions.

The magnitude of the Rainfall-Development Inflow (RDI) flow component was determined based on scaling of a storm event measured at the Domestic Pump Station (DOM) 4. The event occurred on December 8, 1996. This event had a duration of 6 hours with a total depth of 0.7 inches, and produced a peak flow of 2.3 mgd. This event was scaled up to estimate the peak of a

5-year, 4-hour storm event. The increase was based on the ratio of the December 1996 event and the design event as to total rainfall depth.

3.2.2 DEMANDS

The first set of demand projections to be run for the sanitary sewer system were for ultimate development in 20XX. Factors for domestic were derived using standard return percentages for water consumption based on type of use. Factors for infiltration, a major source of wastewater on the island, were determined by measurement and observation at each of the operating pump stations. Based on these observations, average infiltration flows were divided by the applicable developed service areas to derive localized infiltration rates reflecting pipe conditions, placement and actual flow information. The remaining infiltration was averaged among the remaining developed areas taking into account soil conditions and elevations. Finally, the infiltration rate was broken down into a base rate (constant regardless of time or tide level) and a variable rate per developed acre. For current conditions this resulted in a base flow of 1.2 million gallons per day (MGD) and a peak variable flow of 1.76 MGD (2 x 0.88 MGD average rate) during the highest tides[5].

Rainfall derived inflow was determined by comparing actual metered discharges at DOM 4, the final pumping station across the strait, on two low use days; one dry and the other with a 0.7 inch rainstorm. These days were selected to match numerous variables including high tide (6.7 ft.), time of high tide (11:43 and 12:14), and low tides (0.7 ft.). Measurements collected throughout each day at 90 second intervals were compared after offsetting the histograms (shown in Figures 3-3 and 3-4) by 30 minutes to match tidal infiltration influence. Based on these observations, an average inflow of 2.3 MGD was observed with a peak inflow addition of 4.3 MGD. Vallejo Sanitation and Flood Control District criteria recommends the use of a 5 year (1.6 inch, 4 hour) event for sizing sewers. Applying this same criteria to actual sanitary inflow measured during the 0.7 inch event would extrapolate to a 5.26 MGD (2.3 x 1.6 / 0.7) average inflow rate.

This inflow rate compares to the recorded actual peak inflow during the 0.7 inch event of 5.3 MGD; therefore this was the factor which was applied across developed portions of the base as rainfall derived inflow into the sanitary system model.When these factors were applied to each of the assessment timeframes, instantaneous peak sanitary flows for the base were 8.2 MGD in 1997, 9.2 MGD in 2007 and 10.3 MGD in 20XX[6].

[5] Since December 1996 when these measurements were taken, VSFCD has undertaken a number of steps and actions to reduce effective infiltration and inflow by shutting down nonessential pump and lift stations and installing reduced orifice plugs in low use lines to limit peak flows.

[6] These peak flows assume current infiltration and inflow (I&I) rates through ultimate development in 20XX; 2007 figures reflect modest reductions due to isolation of undeveloped areas.

8 Dec. 1996

DOM 4 - 0.7" Rain - High Tide 6.7' at 12:14

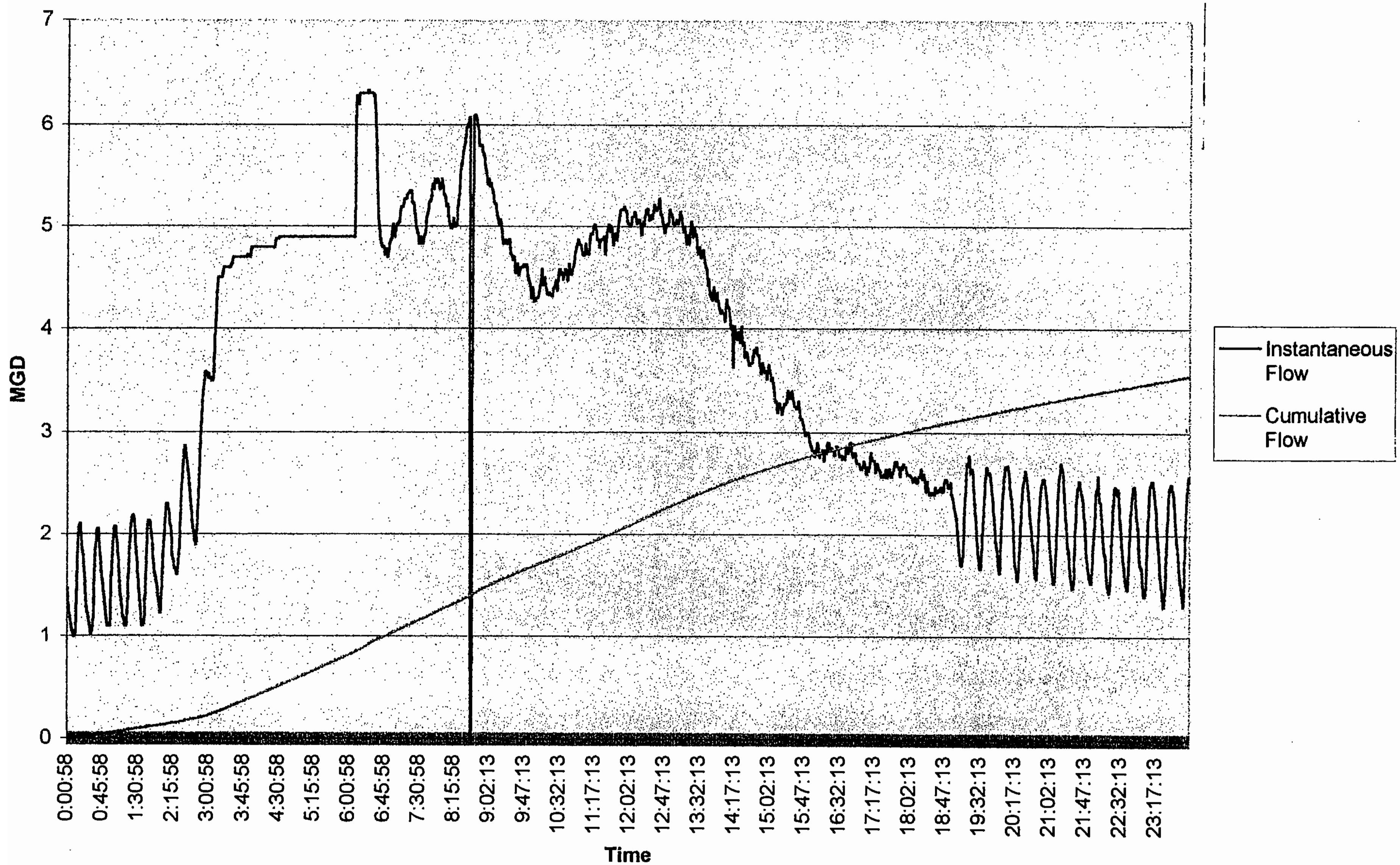


Figure 3-3

23 Dec. 1996

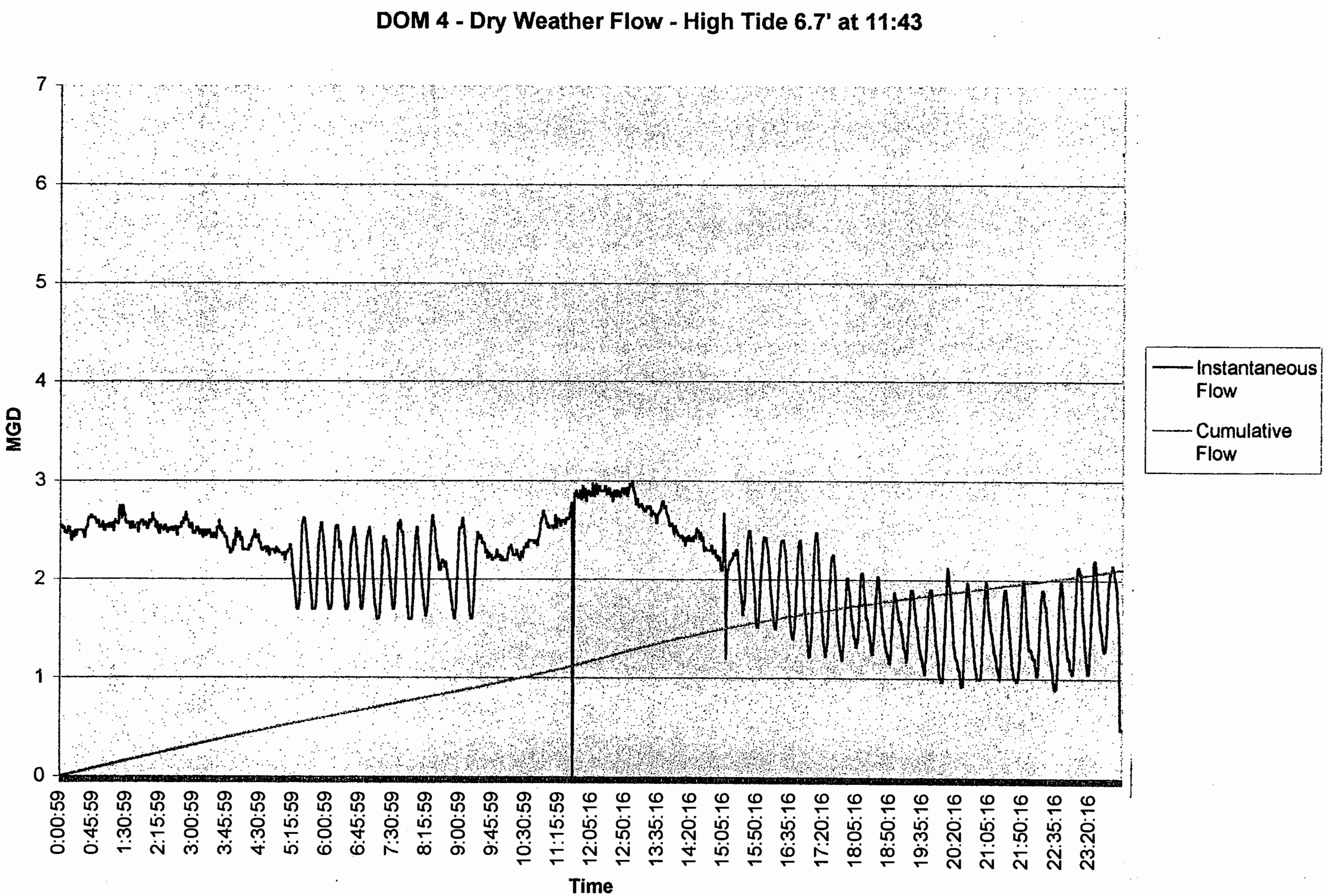


Figure 3-4

Average daily flows for the 1997 timeframe were estimated at 2.27 MGD; within 10% of actual metered dry weather flows (2.11 MGD) which did not include additional leases and activities through mid 1997 which were accounted for in the model. Under this same model, average daily flows for 2007 and 20XX are projected to be 2.9 MGD and 3.55 MGD respectively. Section 3.1.4 presents a detailed discussion of existing system components and conditions.

For the pumping stations, peak flows at each station were computed using Average Daily Flow (Total) and Average Daily Flow by Acre (AC) data from Set 2 of the demand spreadsheets (listed in Appendix A-2) for Ultimate Build-out, Long Term Build-out and Current conditions. The peak pump station flow was computed using the following formula:

$$F_p = \left(F_{tot} - F_{ac}\right)^{0.97} e^{0.33} + (2.1)F_{ac}$$

Where: F_p is the peak flow for the pump station.

F_{tot} is the Average Daily Flow (total) for the entire service area.

F_{ac} is the Average Daily Flow by Acre (infiltration) for the entire service area.

The system layout was overlaid on a map of the Island showing the reuse areas. The areas tributary to each pump station were then estimated and flows adjusted to reflect only the tributary areas. This was done by multiplying the total flow for each reuse Area by a ratio of the tributary area divided by the total area of each reuse Area. The peak flow for each pumping station is obtained by summing tributary portions of all reuse Areas flowing to each station. Appendix A-2 shows the computations and results.

3.3 SYSTEM IMPROVEMENTS

Table 3-7 at the end of this section, summarizes the proposed capital improvements for the sanitary sewer system. Each of these items are discussed in the following sections based on their classification as either an onsite system upgrade (to meet current operating standards), onsite system expansion (to meet future development), or lifecycle replacement cost (until 2017). The following descriptions have been grouped into two timeframes: long term improvements (from present to 2007) and ultimate improvements (from 2007 to 20XX). Figure 3-5 located at the end of this section, shows the location, or proposed location, of each of these improvements[7].

3.3.1 LONG TERM IMPROVEMENTS[8] (1997 - 2007)

As discussed in Subsection 3.1.4, the existing sanitary sewer collection system contains a number of constraints precluding the simplified, low cost operation of the system. Consequently, the

[7] Lifecycle repairs and replacements are based on the length, type and age of existing pipe materials and are not shown due to the statistical nature of their estimated failure and need for replacement basewide.

[8] Although the period 1997-2007 would not normally be considered as "Long Term", this nomenclature is continued from the City's EDC Application to insure consistency.

listed improvements are focused, first, on providing basic service to tenants while isolating or reducing inflow and infiltration and reducing the number of lift stations; second, on rationalizing the collection system and reducing infiltration through a program of pipe replacement, especially in areas where pipes lay at tidally influenced or constantly submerged elevations. Costs for manhole construction have been included in the unit price for pipe replacement.

O&M Cost Reduction Upgrades

Numerous minor cost reduction repairs have been identified in Appendix B (Pump Station Analysis). The majority of these improvements are focused on reducing and eliminating the need for confined space entry into pump and lift stations on the sanitary sewer system

System Upgrades to Correct Deficiencies

WW-1: Isolation and Removal of DOM-1 - This upgrade, in conjunction with WW-8, eliminates one lift station at the far north end of the, island replacing it with a gravity main from the northwest corner of the Base directly into DOM-2. Phasing for this upgrade is based on completion of WW-8 recommended for 1998.

WW-2: Replace Pump at DOM-2 - This upgrade corrects a deficiency within DOM-2. According to records and as confirmed by field inspection, the sump pump at this lift station is severely degraded and in urgent need of replacement in order to prevent flooding of the drywell and ensure the operation of this critical lift station serving almost all of Reuse Area 1. Timing of this upgrade is urgent and should be accomplished in 1997.

WW-3: Repair Electrical Distribution System at SPS-3 - This upgrade, along with WW-4, corrects deficiencies at SPS-3 providing service to the northeast corner of the Base. Field inspection confirms that the electrical connections are exposed and severely corroded and in need of replacement. Timing for this upgrade is based on reuse of the North Pier and the area surrounding it, currently projected for 2001.

WW-4: Replace Controllers at SPS-3 - This upgrade, along with WW-3, corrects deficiencies at SPS-3 providing service to the northeast corner of the base. According to field inspection reports, the controllers are corroded and appear to be inoperative. Timing for this upgrade is driven by reuse of the North Pier and completion of WW-6 and WW-7, currently projected for 2001.

WW-5: Isolation and Removal of SPS-1 and SPS-2 - This upgrade removes and salvages equipment at SPS-1 and SPS-2 on the North Pier. Based on projected reuse as a public pier for recreation, only minimal facilities (restroom and cleaning station) are needed and these can be provided by STS-3 at the corner of the pier. Removal of SPS–1&2 in 1998 will eliminate a maintenance problem (confined space access) and permit the possible salvage of existing equipment for reuse in other lift stations.

WW-6: Install Transformer on Pad at SPS-4 - This upgrade, along with WW-7, will allow this existing Pump Station to be reactivated and provide service to the area leading to the North Pier. At present the transformer and switchgear are set on the same pad as the pumphouse shelter, which is subject to flooding and currently protected by a series of sandbags. Timing for this upgrade is responds to occupancy and use of the northeast corner of Reuse Area 1 projected for 2000.

WW-7: Raise Equipment at SPS-4 - This upgrade, along with WW-6, will allow this Pump Station to be reactivated, providing service to the area leading to the North Pier. At present the pumphouse shelter and pumps are set on a pad which is protected from local flooding by sandbags. Timing for this upgrade is based on occupancy and use of the northeast corner of Reuse Area 1 projected for 2000.

WW-8: Install New Sewer Main - This upgrade, installation of 900 feet of 12 inch High Density Polyethylene (HDPE) Sewer Line, will isolate an area of high inflow and infiltration (I&I) and permit removal of a lift station, DOM-1 under WW-1. Due to the current occupancy of facilities served by this line, and the high I&I experienced, this project is recommended for immediate construction in 1997.

WW-9: Replace 21" Sewer Main - This upgrade replaces 1200 feet of an existing 21 inch gravity sewer leading to DOM-2 with a 21" welded seam High Density Polyethylene (HDPE) pipeline. This section of sewer is submerged and subject to constant hydrostatic pressures contributing to high I&I rates. Unit prices for this upgrade are based on asphalt construction; (trenching through existing pavement) however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this upgrade corresponds to development of the north end of Reuse Area 1 and reconstruction of Railroad Ave. in 1998.

WW-10: Replace 12" Sewer Main - This upgrade replaces 1000 feet of an existing 12 inch gravity sewer leading to DOM-2 with a 12" welded seam HDPE pipeline. This section of sewer is tidally influenced (submerged during high tide) and subject to variable hydrostatic pressures contributing to a high I&I rate. Unit prices for this upgrade reflect trenching through existing pavement, however they also assume major earthwork will be done in conjunction with planned roadway improvements along I St. Phasing for this upgrade is based on development of the central portion of Reuse Area 1 and upgrade of I St. in 1999.

WW-11: Replace 12" Sewer Main - This upgrade replaces 700 feet of an existing 12 inch gravity sewer leading to Railroad Ave. with a 12" welded seam HDPE pipeline. This section of sewer is submerged and subject to constant hydrostatic pressures contributing to high I&I rates. Unit prices for this upgrade include trenching through pavement, however they also assume major earthwork will be done in conjunction with planned roadway improvements along L St. Timing for this upgrade corresponds to reuse of the north end of Reuse Area 1 and reconstruction of L St. in 2000.

WW-12: Replace 10" Sewer Main - This upgrade replaces 1000 feet of an existing 10 inch gravity sewer serving the northwest corner of Reuse Area 1 with a 10" welded seam HDPE pipeline. This section of sewer is tidally influenced (submerged during high tide) and subject to variable hydrostatic pressures contributing to a high I&I rate. Unit prices for this upgrade are based on trenching through pavement, however they also assume major earthwork will be done in conjunction with planned roadway improvements along I St. Phasing for this upgrade is based on reuse of the north-central portion of Reuse Area 1 along Cedar Ave. in 2000.

WW-13: Replace 21" Sewer Main - This upgrade replaces 1000 feet of an existing 21 inch gravity sewer leading from DOM-2 with a 21" welded seam HDPE pipeline. This section of sewer is subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices for this upgrade are based on through asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this upgrade is driven by expanded redevelopment of Reuse Area 1 and reconstruction of Railroad Ave. in 2001.

WW-14: Replace 18" Sewer Main - This upgrade replaces 900 feet of an existing 18 inch gravity sewer leading to DOM-2 with a 18" welded seam HDPE pipeline. This section of sewer is submerged and subject to constant hydrostatic pressures contributing to high I&I rates. Unit prices for this upgrade are based on trenching through asphalt, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this upgrade is based on development of the north end of Reuse Area 1 and reconstruction of Railroad Ave. in 2001.

WW-15: Replace 15" Sewer Main - This upgrade replaces 400 feet of an existing 15 inch gravity sewer from SPS-4 to, and along, Railroad Ave. with a 15" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to a high I&I rate. In addition, differential settlement has created negative slope in the existing section of pipe. Unit prices for this upgrade are based on through asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements along Railroad Ave. Phasing for this upgrade reflects final redevelopment of the north end of Reuse Area 1 in 2007.

Capital Improvements for 1997-2007 Redevelopment

WW-18: Replace 21" Sewer Main - This improvement replaces 790 feet of an existing 21 inch gravity sewer leading from DOM-2 to DOM-4 with a 21" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. Unit prices for this upgrade reflect trenching through asphalt, however they also assume major earthwork will be done in conjunction with any planned roadway improvements. Timing for this improvement is based on expanded redevelopment of Reuse Areas 1, 2 and 3 and possible reconstruction or expansion of Railroad Ave. in 2004.

WW-19: Replace 10" Sewer Main - This improvement replaces 300 feet of an existing 10 inch gravity sewer leading from Reuse Area 3 to Railroad Ave. with a 10" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer is subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices for this upgrade are based on through asphalt construction, however they also assume major earthwork will be done in conjunction with any planned roadway improvements. Phasing for this improvement corresponds to expanded redevelopment of Reuse Area 3 and planned redevelopment along E St. in 2004.

WW-20: Replace 8" Sewer Main - This improvement replaces 620 feet of an existing 8 inch gravity sewer in Reuse Area 3 leading to DOM-3 with a 8" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete is encountered between California Ave. and the seawall. Timing for this improvement is based on expanded redevelopment of Reuse Area 3 and planned redevelopment along E St. in 2006.

WW-21: Replace 24" Sewer Main - This improvement replaces 880 feet of an existing 24 inch gravity sewer, between Reuse Areas 2 and 3, leading to DOM-4 with a 24" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. Unit prices for this upgrade include trenching through existing pavement, however they also assume major earthwork will be done in conjunction with any planned roadway improvements. Phasing for this improvement reflects expanded redevelopment of Reuse Areas 1, 2 and 3 and possible reconstruction or expansion of Railroad Ave. in 2004.

WW-24: Replace 10" Sewer Main - This improvement replaces 1270 feet of an existing 10 inch gravity sewer in Reuse Area 3 leading to and from DOM-5 with a 10" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete encountered between California Ave. and the seawall. Phasing for this improvement is based on expanded redevelopment of Reuse Area 3 in 2002.

WW-26: Replace 27" Sewer Main - This improvement replaces 1100 feet of an existing 27 inch gravity sewer leading to DOM-4 with a 27" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. Unit prices for this upgrade reflect trenching through existing paveing, however they also assume major earthwork will be done in conjunction with any planned roadway improvements. Timing for this improvement is consistent with expanded redevelopment of Reuse Areas 3, 4, 5, and 9 and possible reconstruction or expansion of Railroad Ave. in 2004.

WW-27: Replace 12" Sewer Main - This improvement replaces 1440 feet of an existing 12 inch gravity sewer in Reuse Area 3 leading to DOM-6 with a 12" welded seam HDPE pipeline. This section of sewer is submerged or tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices include trenching through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete encountered between California Ave. and the seawall. Timing for this improvement is based on high I&I flows through the lift station and planned reuse and redevelopment of Reuse Area 3 facilities around DOM-6 before 2000.

WW-31: Replace 27" Sewer Main - This improvement replaces 710 feet of an existing 27 inch gravity sewer leading to DOM-7 with a 27" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. Unit prices for this upgrade are based on through asphalt construction, however they also assume major earthwork will be done in conjunction with any planned roadway improvements. Phasing for this improvement reflects expanded redevelopment of Reuse Areas 5, 8 and 9 and possible reconstruction or expansion of Railroad Ave. around 2003.

WW-32: Replace 12" Sewer Main - This improvement replaces 1800 feet of existing 12 inch gravity sewer in Reuse Area 5 leading to Railroad Ave. with a 12" welded seam HDPE pipeline. This section of sewer is submerged or tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the dry-docks is subject to differential settlement of unstable soils which can cause invert and slope problems. Unit prices include trenching through existing pavement; however there is an additional line item for excavation and construction costs since structural, reinforced concrete encountered between California Ave. and the dry-docks. Timing for this improvement is based on planned reuse of Reuse Area 5 facilities in 2001.

WW-33: Replace 21" Sewer Main - This improvement replaces 1640 feet of an existing 21 inch gravity sewer leading to DOM-7 with a 21" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. Unit prices for this upgrade are based on through asphalt construction, however they also assume major earthwork will be done in conjunction with any planned roadway improvements. Phasing for this improvement is driven by expanded redevelopment of Reuse Areas 5, 8 and 9 and possible reconstruction or expansion of Railroad Ave. around 2003.

3.3.2 ULTIMATE IMPROVEMENTS (2007 - 20XX)

The improvements discussed above correct the majority of systemic problems by upgrading lift stations and reducing I&I. From the 1997-2007 timeframe out to ultimate development, the remaining improvements focus on correcting localized infiltration and improvements to provide service to future redevelopment areas (i.e.: Reuse Area 10).Costs for manhole construction have been included in the unit price for pipe replacement. Lifecycle costs, although listed under ultimate development, should accrue on a straight line basis from 1997 through the entire assumed twenty year timeframe to 2017.

Capital Improvements for Ultimate Redevelopment

WW-16: Replace Pumps at DOM-2 - This improvement, replacement of all mechanical and electrical equipment in DOM-2, in conjunction with WW-17, completely reconstructs DOM-2 as the central receiving and pump station for Reuse Area 1. These improvements will be needed by 2008, unless redevelopment plans in the area require earlier construction.

WW-17: Replace Pumphouse at DOM-2 - This improvement, in conjunction with WW-16, completely reconstructs DOM-2 as the central receiving and pump station for Reuse Area 1. This project provides a complete new pumphouse along with new wet and dry well structures. These improvements will be needed by 2008, unless redevelopment plans in the area permit earlier construction and cost sharing.

WW-25: Replace Pumps at DOM-4 - This improvement involves removal and replacement of all 4 pumps and switchgear along with inspection and repair of wet and dry wells. Based on major pump overhauls planned in 1997, replacement of electrical controllers in 1997-1998 estimated remaining lifespan and the criticality of this station, timing for this replacement and upgrade is recommended for 2008.

WW-22: Replace 10" Sewer Main - This improvement replaces 820 feet of an existing 10 inch gravity sewer in Reuse Area 3 leading to Railroad Ave. with a 10" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices include trenching through existing paving; however there is an additional line item for excavation and construction costs since structural, reinforced concrete encountered between California Ave. and the seawall. Phasing for this improvement is based on continued redevelopment of Reuse Area 3 and planned redevelopment along B and C St. in 2007.

WW-23: Replace 10" Sewer Main - This improvement replaces 750 feet of an existing 10 inch gravity sewer in Reuse Area 3 leading to DOM-2 with a welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices include through asphalt (construction); however there is an additional line item for excavation and construction costs since structural, reinforced concrete encountered between California Ave. and the seawall. Timing for this improvement correlates with buildout of redevelopment of Reuse Area 3 and redevelopment along A St. in 2010.

WW-28: Replace 12" Sewer Main - This improvement replaces 1100 feet of an existing 12 inch gravity sewer in Reuse Area 4 leading to DOM-7 with a 12" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement which can cause invert and slope problems in less flexible pipes. Unit prices reflect trenching through paving; however there is an additional line item for excavation and construction costs since structural, reinforced concrete encountered between California Ave. and the seawall. Phasing for this improvement is based on planned reuse and redevelopment of Reuse Area 4 facilities around DOM-7 after 2010.

WW-29: Replace 15" Sewer Main - This improvement replaces 450 feet of an existing 15 inch gravity sewer in Reuse Area 4 leading to DOM-7 with a 15" welded seam HDPE pipeline. This section of sewer is submerged or tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement which can cause invert and slope problems in less flexible pipes. Unit prices include trenching through existing pavement. Timing for this improvement reflects planned reuse of Reuse Area 4 facilities around DOM-7 in 2010.

WW-30: Replace 12" Sewer Main - This improvement replaces 1040 feet of existing 12 inch gravity sewer in Reuse Area 5 leading to Railroad Ave. with a 12" welded seam HDPE pipeline. This section of sewer is submerged or tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices include trenching through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete is encountered between California Ave. and the seawall. Timing for this improvement is based on planned reuse of Reuse Area 5 facilities around DOM-7 in 2010.

WW-34: Replace 12" Sewer Main - This improvement replaces 2200 feet of existing 12 inch gravity sewer in Reuse Area 5 leading to and from DOM-8 with a 12" welded seam HDPE pipeline. This section of sewer is submerged or tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement of unstable soils which can cause invert and slope problems. Unit prices include trenching through existing paving; however there is an additional line item for excavation and construction costs because of the structural, reinforced concrete encountered between California Ave. and the seawall. Cost savings are possible in conjunction with a water line improvement recommended for this area. Phasing for this corresponds to redevelopment of Reuse Area 5 around DOM-7 in 2008.

WW-35: Replace 15" Sewer Main - This improvement replaces 580 feet of existing 15 inch gravity sewer in Reuse Area 5 leading to Railroad Ave. with a 18" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. In addition, this section of sewer near the waterfront is subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices include trenching through existing paving. Timing for this improvement is based on planned reuse of Reuse Area 5, 8 and 9 facilities in 2012.

WW-36: Replace 18" Sewer Main - This improvement replaces 1440 feet of an existing 18 inch gravity sewer leading to DOM-7 with a 18" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. Unit prices for this upgrade reflect trenching through existing paving, however they also assume major earthwork will be done in conjunction with any planned roadway improvements. Timing for this improvement reflects expanded reuse of facilities in Reuse Areas 5, 8 and 9 and possible expansion or reconstruction of Railroad Ave. in 2010.

WW-37: Replace 15" Sewer Main - This improvement replaces 1620 feet of an existing 15 inch gravity sewer leading from DOM-9 with a 15" welded seam HDPE pipeline. Portions of this section of sewer are tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. Unit prices for this upgrade are based on trenching through existing paving, however they also assume major earthwork will be done in conjunction with any planned roadway improvements. Phasing for this improvement is based in preparation for redevelopment of Reuse Area 10 and possible expansion or reconstruction of Railroad Ave. in 2016.

WW-39: Replace 15" Sewer Main - This improvement replaces 1480 feet of an existing 15 inch gravity sewer leading to DOM-9 with a 15" welded seam HDPE pipeline. This section of sewer is submerged or tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. This section of sewer is also subject to differential settlement of unstable soils which can cause invert and slope problems in less flexible pipes. Unit prices for this upgrade are based on through asphalt construction, however they also assume major earthwork will be done in conjunction with any planned redevelopment. Timing for this improvement corresponds to preparation for redevelopment of Reuse Area 10 and possible expansion or reconstruction of Railroad Ave. after 2017.

WW-40: Replace 12" Sewer Main - This improvement replaces 1240 feet of an existing 12 inch gravity sewer leading to DOM-9 with a 12" welded seam HDPE pipeline. This section of sewer is tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. Unit prices for this upgrade reflect cost of trenching through existing paving, however they also assume major earthwork will be done in conjunction with any planned redevelopment. Phasing for this improvement is based on redevelopment of Reuse Area 10 in 20XX.

WW-41: Replace 8" Sewer Main - This improvement replaces 950 feet of an existing 8 inch gravity sewer leading from the southern portion of the island towards DOM-9 with a 8" welded seam HDPE pipeline. Portions of this section of sewer are tidally influenced and subject to variable hydrostatic pressures contributing to increased I&I rates. Unit prices for this upgrade are based through asphalt construction, however they also assume major earthwork will be done in conjunction with any planned roadway improvements. Phasing for this improvement is based in preparation for redevelopment of Reuse Area 10 in 20XX.

Lifecycle Repair and Replacement

WW-54: Replace Pumps at SPS-3 - This replacement will provide long term service to the north pier in Reuse Area 1. Based on current reuse projections, recommended repair actions in 2001 and anticipated lifespan, timing for replacement of all pumps and electrical equipment can be deferred until 2017.

WW-55: Replace Pumps at SPS-4 - This replacement will provide long term service to the northeast corner of the Base near and on the north pier. Given current reuse projections, recommended repairs in 2000 and anticipated lifespan, timing for replacement of all pumps and electrical equipment can be deferred until 2017.

WW-42: Replace Pumps at DOM-3 - This improvement replaces the electrical panels, controllers and 2 pumps at DOM-3. Timing for this replacement is based on the anticipated remaining lifespan and its service of Reuse Area 3 in 2009.

WW-43: Replace Pumps at DOM-5 - This improvement replaces the electrical panels, controllers and 2 pumps at DOM-5. Timing for this replacement is based on its anticipated remaining lifespan and its service of Reuse Area 3 in 2008.
WW-44: Replace Pumps at DOM-6 - This improvement replaces the electrical panels, controllers and 2 pumps at DOM-6. A major overhaul planned for 1997 will extend operations an estimated 10 years and permit timing for this replacement to be deferred until 2006.

WW-45: Replace Pumps at DOM-7 - This improvement replaces the electrical panels, controllers and 3 pumps at DOM-7. Due to the location of this pump station on the main trunk line, timing for this replacement is recommended in 2005 prior to the end of its expected lifespan.

WW-46: Replace Pumps at DOM-8 - This improvement replaces the electrical panels, controllers and pumps at DOM-8. A major overhaul planned for 1997 will extend operations an estimated 12-15 years and permit timing for this replacement to be deferred until 2007.

WW-38: Replace Pumps at DOM-9 - This improvement replaces the electrical panels, controllers and upgrades pumps and wet wells at DOM-9. Due to its service area (Reuse Area 10) and the need for major redevelopment, replacement of this pump station is not recommended until 2017.

WW-47: Replace VCP Sewer Mains - These replacements are based on the age and condition of nearly 22,900 feet of VCP Sewer Mains currently in use on base. The average size of this type of pipe for cost estimating purposes is 10". Based on the amount of pipe replaced by previous capital improvements, average date of installation, location relative to unstable soils and estimated remaining lifespan, 5% will need to be replaced due to deposition or failure over the next twenty years (1997 to 2017).

WW-48: Replace TC Sewer Mains - These replacements are based on the age and condition of nearly 2,600 feet of TC Sewer Mains currently in use on base. The average size of this type of pipe for cost estimating purposes is 10". Based on the amount of pipe replaced by previous capital improvements, average date of installation, but reflecting favorable slope and bedding conditions only 5% will need to be replaced due to deposition or failure over the next twenty years (1997 to 2017).

WW-49: Replace Steel Sewer Mains - These replacements are based on the age and condition of nearly 7,400 feet of Steel Sewer Mains currently in use on base. The average size for this type of pipe for cost estimating purposes is 8". Based on the amount of pipe replaced by previous capital improvments, average date of installation, location relative to highly corrosive or unstable soils and estimated remaining lifespan, 5% will need to be replaced due to corrosion, deposition or failure over the next twenty years (1997 to 2017).

WW-50: Replace RCP Sewer Mains - These replacements are based on the age and condition of nearly 17,900 feet of RCP Sewer Mains currently in use on base. The average size of this type of pipe for cost estimating purposes is 21". Based on the amount of pipe replaced by previous capital improvements, average date of installation, location relative to highly corrosive or unstable soils and estimated remaining lifespan, 5% will need to be replaced due to deposition or failure over the next twenty years (1997 to 2017).

WW-51: Replace PVC Sewer Mains - These replacements are based on the age and condition of nearly 1,900 feet of PVC Sewer Mains currently in use on base. The average size of this type of pipe for cost estimating purposes is 12". Based on the amount of pipe replaced by previous capital improvements, average date of installation, and potential hydrocarbon exposure 30% will need to be replaced over the next twenty years (1997 to 2017).

WW-52: Replace CMP Sewer Mains - These replacements are based on the age and condition of nearly 13,500 feet of CMP Sewer Mains currently in use on base. The average size for this type of pipe, for cost estimating purposes and based on its application and effective length, is 12". Based on the average amount of CMP to be replaced by specific capital improvements, 30% will need to be replaced due to corrosion, deposition or failure over the next twenty years (1997 to 2017).

WW-53: Replace CIP Sewer Mains - These replacements are based on the age and condition of nearly 2,500 feet of CIP Sewer Mains currently in use on base. The average size of this type of pipe for cost estimating purposes is 10". Based on the amount of pipe replaced by previous capital improvements, average date of installation, location relative to highly corrosive or unstable soils and estimated remaining lifespan, 5% will need to be replaced due to corrosion, deposition or failure over the next twenty years (1997 to 2017).

Table 3-7
Sanitary Sewer Capital Improvements

35,282.53

PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST		UNITS	TOTAL COST
	ON-SITE SYSTEM UPGRADES (TO MEET CURRENT OPERATING STANDARDS)							
1998	DOM 1 - DOMESTIC SEWAGE PUMP STATION	WW- 1	- ISOLATION & REMOVAL OF DOM 1	AREA 1	$5,000	LS		$5,000
1997	DOM 2 - DOMESTIC SEWAGE PUMP STATION	WW- 2	- REPLACE SUMP PUMP	AREA 1	$2,500	LS		$2,500
2001	SPS-1, SPS-2, SPS-3	WW- 3	- SPS3: REPAIR ELECTRICAL DISTRIBUTION SYS	AREA 1	$1,500	LS		$1,500
2001	SHIP TO SHORE	WW- 4	- SPS3: REPLACE CONTROLERS	AREA 1	$2,500	LS		$2,500
1998	SEWAGE PUMP STATION	WW- 5	- ISOLATION & REMOVAL OF SPS1 AND SPS2	AREA 1	$10,000	LS		$10,000
2000	SPS-4	WW- 6	- INSTALL TRANFORMER ON PAD & SAFETY IMPS.	AREA 1	$3,200	LS		$3,200
2000	SEWAGE PUMP STATION	WW- 7	- RAISE EQUIPMENT TO AVOID FLOODING	AREA 1	$2,960	LS		$3,000
1997	NEW SEWER MAIN	WW- 8	- NEW 12" MAIN & MANHOLES	AREA 1	$55	LF	900	$49,500
1998	SEWER MAIN	WW- 9	- REPLACE 21" MAIN & MANHOLES	AREA 1	$100	LF	1,200	$120,000
1999	REPLACEMENT	WW- 10	- REPLACE 12" MAIN & MANHOLES	AREA 1	$55	LF	1,000	$55,000
2000	*(NOTE #1)*	WW- 11	- REPLACE 12" MAIN & MANHOLES	AREA 1	$55	LF	700	$38,500
2000		WW- 12	- REPLACE 10" MAIN & MANHOLES	AREA 1	$50	LF	1,000	$50,000
2001		WW- 13	- REPLACE 21" MAIN & MANHOLES	AREA 1	$100	LF	1,000	$100,000
2001		WW- 14	- REPLACE 18" MAIN & MANHOLES	AREA 1	$85	LF	900	$76,500
2007		WW- 15	- REPLACE 15" MAIN & MANHOLES	AREA 1	$70	LF	400	$28,000
	SUBTOTAL ON-SITE UPGRADES							$545,200
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 10% OF PIPELINES)							$15,500
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)							$774,000
	ON-SITE SYSTEM EXPANSION (TO MEET PROJECTED FUTURE DEVELOPMENT)							
2008	DOM2	WW- 16	- NEW 500 HP PUMP & ELECTRICAL COMPONENTS	AREA 1	$700,000	EA	1	$700,000
2008		WW- 17	- NEW PUMP HOUSE	AREA 1	$150,000	EA	1	$150,000
2004	SEWER MAINS	WW- 18	- NEW 21" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$100	LF	790	$79,000
2004		WW- 19	- NEW 10" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$50	LF	300	$15,000
			- NEW 8" MAIN & MANHOLES		$45	LF	620	$27,900
2006		WW- 20	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	AREA 2,3,4,5,6,7,8,9,11	$150	LF	620	$93,000
2004		WW- 21	- NEW 24" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$115	LF	880	$101,200
			- NEW 10" MAIN & MANHOLES		$50	LF	820	$41,000
2007		WW- 22	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	AREA 2,3,4,5,6,7,8,9,11	$150	LF	240	$36,000
			- NEW 10" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$50	LF	750	$37,500
2010		WW- 23	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	AREA 2,3,4,5,6,7,8,9,11	$150	LF	400	$60,000

Table 3-7
Sanitary Sewer Capital Improvements

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PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST		UNITS	TOTAL COST
	ON-SITE SYSTEM EXPANSION cont'd							
	SEWER MAINS		- NEW 10" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$50	LF	1,270	$63,500
2002		WW- 24	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	AREA 2,3,4,5,6,7,8,9,11	$150	LF	800	$120,000
2004		WW- 26	- NEW 27" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$135	LF	1,100	$148,500
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	1,440	$79,200
2000		WW- 27	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	AREA 2,3,4,5,6,7,8,9,11	$150	LF	1,440	$216,000
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	1,110	$61,050
2011		WW- 28	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	AREA 2,3,4,5,6,7,8,9,11	$150	LF	550	$82,500
2009		WW- 29	- NEW 15" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$70	LF	450	$31,500
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	1,040	$57,200
2009		WW- 30	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	AREA 2,3,4,5,6,7,8,9,11	$150	LF	550	$82,500
2003		WW- 31	- NEW 27" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$135	LF	710	$95,850
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	1,820	$100,100
2001		WW- 32	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	AREA 2,3,4,5,6,7,8,9,11	$150	LF	150	$22,500
2003		WW- 33	- NEW 21" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$100	LF	1,640	$164,000
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	2,220	$122,100
2008		WW- 34	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	AREA 2,3,4,5,6,7,8,9,11	$150	LF	700	$105,000
2012		WW- 35	- NEW 15" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$70	LF	580	$40,600
2010		WW- 36	- NEW 18" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$85	LF	1,440	$122,400
2016		WW- 37	- NEW 15" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$70	LF	1,620	$113,400
2017		WW- 39	- NEW 15" MAIN & MANHOLES	AREA 10	$70	LF	1,480	$103,600
20XX		WW- 40	- NEW 12" MAIN & MANHOLES	AREA 10	$55	LF	1,240	$68,200
20XX		WW- 41	- NEW 8" MAIN & MANHOLES	AREA 10	$45	LF	950	$42,750
2017	DOM9	WW- 38	- UPGRADE TO PUMP STATION	AREA 10	$130,000	EA	1	$130,000
	SUBTOTAL ON-SITE EXPANSION							$3,513,100
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 10% OF PIPELINES)							$76,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)							$4,953,000

Table 3-7
Sanitary Sewer Capital Improvements

35,262.53

PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST		UNITS	TOTAL COST
	LIFE CYCLE REPLACEMENT COSTS (UNTIL YEAR 2017)							
	DOM4		- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$320,000	EA	1	$320,000
2008		WW- 25	- NEW 21" MAIN & MANHOLES	ALL AREAS	$100	LF	190	$19,000
2009	DOM3	WW- 42	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$160,000	EA	1	$160,000
2008	DOM5	WW- 43	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$115,000	EA	1	$115,000
2006	DOM6	WW- 44	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$130,000	EA	1	$130,000
2005	DOM7	WW- 45	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$130,000	EA	1	$130,000
2007	DOM8	WW- 46	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$130,000	EA	1	$130,000
	SEWER MAINS	WW- 47	- REPLACE 10" VCP LINE	ALL AREAS	$40	LF	1,000	$40,000
		WW- 48	- REPLACE 10" TC LINE	ALL AREAS	$40	LF	130	$5,200
		WW- 49	- REPLACE 8" STL LINE	ALL AREAS	$35	LF	400	$14,000
		WW- 50	- REPLACE 21" RCP LINE	ALL AREAS	$90	LF	900	$81,000
		WW- 51	- REPLACE 12" PVC LINE	ALL AREAS	$45	LF	600	$27,000
		WW- 52	- REPLACE 12" CMP LINE	ALL AREAS	$45	LF	4,000	$180,000
		WW- 53	- REPLACE 10" CIP LINE	ALL AREAS	$40	LF	130	$5,200
	SPS-3	WW- 54	- REPLACE ALL EQUIPMENT	ALL AREAS	$44,800	LS		$44,800
	SPS-4	WW- 55	- REPLACE ALL EQUIPMENT	ALL AREAS	$78,500	LS		$78,500
	SUBTOTAL LIFE CYCLE COSTS							$1,479,700
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 10% OF PIPELINES)							$11,100
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)							$2,057,000

TOTAL SANITARY SEWER SYSTEM ESTIMATED COSTS (INC. ENG & CONT.)	**$7,784,000**

NOTE #1: *Phasing for sewer trunk line replacement along Railroad Avenue should be adjusted to watch future road construction.*

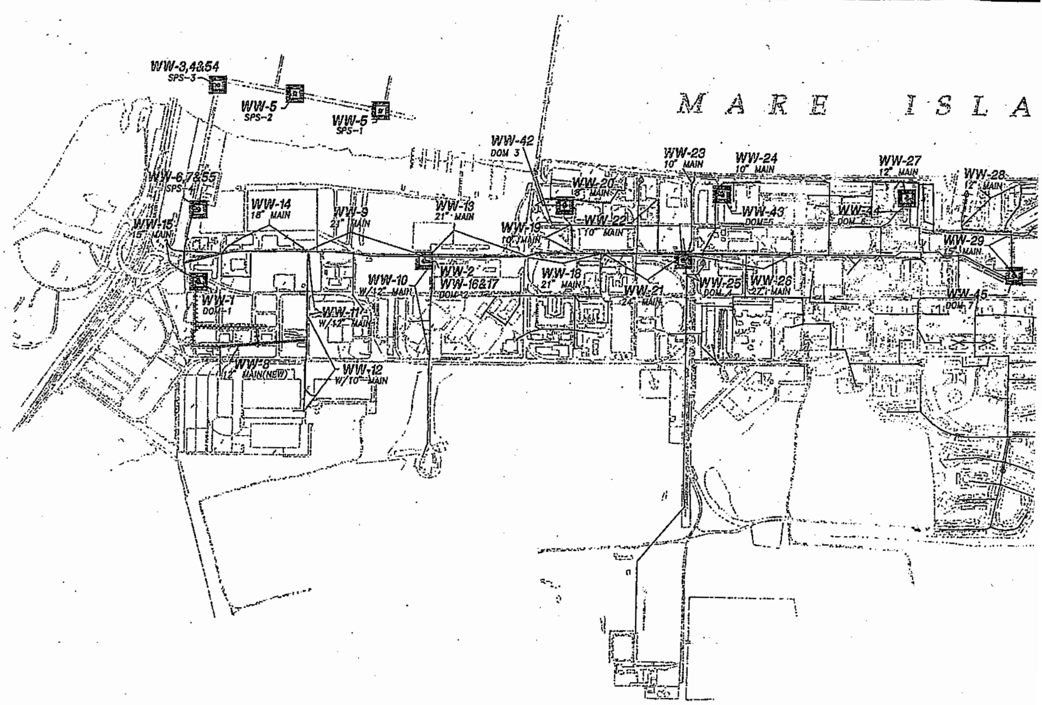
NOTE #2: *Cost for underground construction; Above ground construction would preclude these costs.*

GENERAL A: *These estimated costs do not include environmental related work - analysis, restoration or remediation.*

B: *Costs based on Reimer Associates experience and cross referenced with J.M. Montgomery 1987 Report with allowance for inflation.*

C: *All cost estimates are in 1997 dollars and no inflation has been added to improvement costs proposed in future years.*

Figure 3-5 Sanitary Sewer Capital improvement (map)


M A R E I S L A
WW-3,4&54
SPS-3
WW-5
SPS-2
WW-6
SPS-1
WW-42
DOM 3
WW-23
10" MAIN
WW-24
10" MAIN
WW-27
12" MAIN
WW-14
18" MAIN
WW-9
21" MAIN
WW-13
21" MAIN
WW-15
15" MAIN
WW-1
DOM-1
WW-10
WW-2
WW-16&17
WW-18
21" MAIN
WW-21
WW-25
WW-26
WW-29
WW-43
WW-45
WW-11
WW-12
W/10" MAIN
WW-8
12" MAIN(NEW)

SECTION 4

STORM DRAINAGE

SECTION 4
STORM DRAINAGE

4.1 BACKGROUND

At the time of base closure in April 1996, there were over 68 individual storm water collection and discharge systems in place at Mare Island. Of these individual systems, 42 of the discharge points were identified and permitted under National Point Discharge Effluent Standards (NPDES) Act, which was recently renegotiated by the Navy to reduce monitoring requirements due to change in use. The remaining systems were either single catchbasins discharging into adjacent areas (including Mare Island Strait) or were small collection systems (less than 6 catch basins) draining into adjacent lowlands (wetlands or dredge ponds). In addition, there were 18 known culverts controlling water flow between diked ponds on the west side of the island. As a part of this study the MIRIS Team was tasked with rationalizing these systems and consolidating the number outfalls to a total of 10 as a maximum.

4.1.1 COLLECTION SYSTEMS

The following discussions detail existing conditions within each of the components of the existing storm drainage systems.

Catchbasins and Manholes

Over 50% of the roads and paved areas on base are unrestrained by curbs. As a result, many catchbasins are either located in low spots in parking lots or along roads and shallow earthen ditches beside paved areas. This allows an excessive amount of soil, gravel and other solids to enter and potentially clog drainage pipes. Vallejo Sanitation Flood Control District (VSFCD) which has now assumed maintenance responsibility for the drainage systems on Mare Island, should require that agencies and firms involved in redevelopment activities design and construct facilities to either take advantage of local overland flow attentuation opportunities or require construction of curbs and gutters to capture storm drainage prior to contact (and transport) of soils and other debris.

Manholes throughout the base appear in good to excellent condition and were not recommended for replacement in the capital improvements listed in Subsection 4.3. (Time Phased Capital Improvements) However some of the manholes inspected are showing signs of clogging with debris, mud, silt and gravel. A list of blocked manholes was provided to the Navy in October 1996 to prioritize their cleaning. Another problem noted during this study was the intermingling of manhole covers between sanitary and storm manholes. This not only increases the inflow into the sanitary system where perferated covers have been interchanged, but limits the effectiveness of storm manholes to act as catchbasins and provide drainage where solid covers have been erroneously placed.

Pipe Materials and Condition

Storm drainage mains at Mare Island consist of common commercial materials (Reinforced Concrete, Cast Iron and Vitrified Clay) as well as some less common types of materials (Redwood Box and Brick).. Table 4-1 breaks down the primary distribution piping by type, and shows the length and relative size of each type of pipe material used.

Table 4-1: Pipe Material Size and Distribution

PIPE MATERIAL	LENGTH	% OF TOTAL	AVERAGE SIZE
Asbestos Cement	300 ft.	0.5	18"
Redwood Box	1,400 ft.	2.5	18"
Brick	1,600 ft.	3	18"
Cast Iron	1,400 ft.	2.5	18"
Corrugated Metal	17,500 ft.	31	18"
Reinforced Concrete	16,200 ft.	29	18"
Terra-cotta	2,700 ft.	5	18"
Vitrified Clay	14,500 ft.	26	18"
TOTAL	**55,600 ft.**	**100**	**18"**

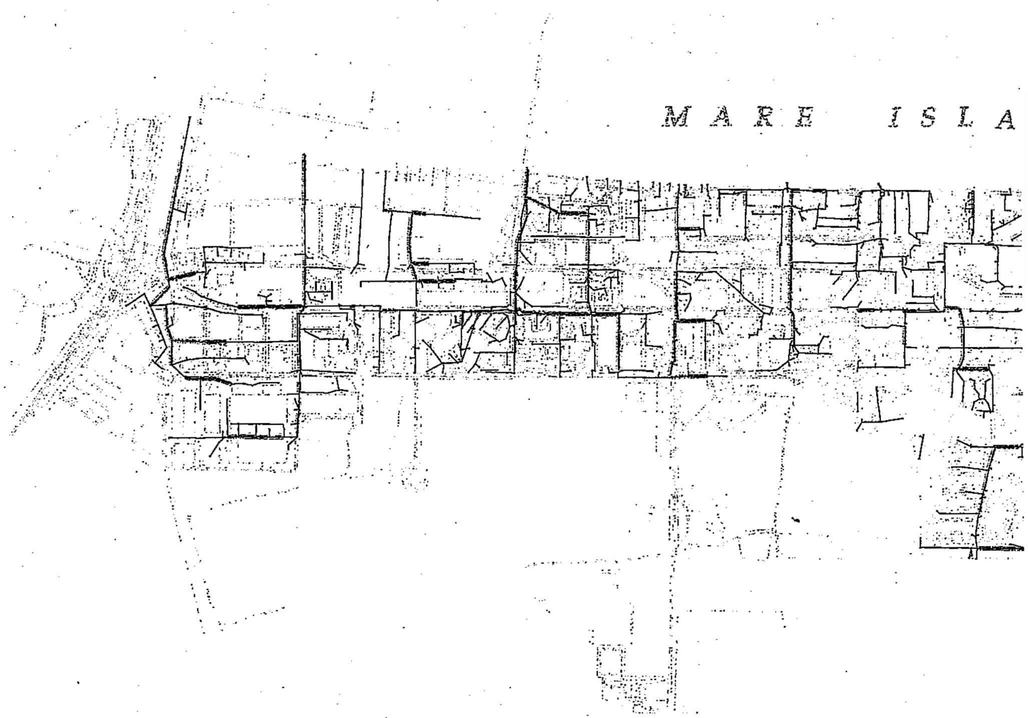
One item of significance is the high percentage of corrugated metal pipe (CMP) which is usually avoided in low slope drainage construction. CMP pipes are common throughout Reuse Areas 1 and 10 and were installed in the 1930's and 1940's. While use of CMP may have been necessitated by military construction in wartime, its application is not appropriate for future drainage on Mare Island low-land areas where every flow advantage is needed. Redwood box pipes and brick pipes, although limited in overall length, present the potential for unexpected pipe failures and should also be replaced in advance of reuse activities.

Another issue affecting the operation of the storm drainage system is the instability of soils in fill areas of the base. These areas (i.e.: Reuse Areas 1 and 10) were created by filling in tidal wetlands and sloughs. Facilities and power utilities were constructed on piles while adjacent lands were essentially unconsolidated. This resulted in large settlement around (and under) facilities which impacted any utilities and pipes which were not pile supported. A number of storm drainage pipes in Reuse Areas 1 and 10 have reversed slope. Figure 4-1 graphically portrays the location of pipes with such a condition. Subsection 4.3 outlines the use of open channels and overland flow to a limited set of collector pipes in order to optimize the storm drainage in Reuse Areas 1 and 10. In addition, capital improvements to further consolidate outfalls and replace other storm drainage pipes, particually those with negative slope and insufficient capacity, are identified in Subsection 4.3.

Lift Stations

The SDPS (Storm Drain Pump Station)-13 services the Education complex at the south end of the Island in Reuse Area 9. It is currently equipped with one small (estimated less than 250 gpm) pump where 800 gpm capacity would be required to meet projected future demands. To

Figure 4-1


MARE ISLA

accommodate demand and necessary redundancy, two 800 gpm pumps should replace the one small pump. This expansion should occur when the educational facilities west of Railroad Ave. are reused or redeveloped. The existing pump should be maintained until changes are completed. Life cycle replacement will be required by 2017 unless redevelopment upgrades are completed earlier.

The SDPS-14, located in Reuse Area 1, currently has two 300-gpm pumps which do not meet future demands of 9443 gpm. The SDPS-15, also in Reuse Area 1, station has adequate capacity but insufficient redundancy to meet current demands. Subsection 4.3 of this report recommends installing a new detention basin and regional pump station with three pumps each having a capacity on the order of 5000 gpm and abandoning SDPS-14 and 15. However, if this is not accomplished, an additional 4200 gpm pump in a new pump house will be required at SDPS-15. The replacement alternative is recommended as the least costly method as it will require a new pump station with smaller pumps to empty the detention pond within twenty-four hours verses attempting to accommodate peak flows during a storm. The existing stations SDPS-14 and SDPS-15 should be repaired and maintained then subsequently demolished when the new station is on line. Life cycle replacement of all SDPS-14 and 15 equipment will be required by 2017 if these pump stations are retained.

Outfalls and Tide Gates

In October and November 1996, the MIRIS Team conducted an inspection of all visible outfalls discharging into Mare Island Strait. These inspections were conducted by boat at low tide over several days. The purpose of this inventory was to assess the condition, elevation, degree of siltation, and operation of outfalls and any associated tide gates field notes and photographs taken by the inspection team can be found in the MIRIS reference Library. Overall, outfalls with tide gates (50% of the outfalls along the seawall between the Causeway and the finger piers) were in fair condition. Where tidegates were operable, they appeared to provide some degree of protection from tidal siltation. Outfalls and manholes next to Dry Dock 2 have been permanently sealed by the Navy due to PCB contamination. Storm drainage outfalls located above and below the central seawall exhibited signs of advanced deterioration including heavy corrosion, collapsed pipe, sagging between supports, joint separation, and sections of missing pipe.

Outfalls along the seawall were also assessed for their potential (invert elevation, distance, slope, and capacity) for consolidation with adjacent outfalls. Nearly half of these outfalls drain areas via inflow from one to four catchbasins and have been recommended for elimination. In addition, two sets of three outfalls along the central seawall were suitable, and have been recommended for consolidation (see Subsection4.3). Due to the poor condition of outfalls north and south of the seawall, consolidation of these areas was achieved through complete replacement and integration of drainage within these basins. Subsection 4.3 provides individual descriptions of capital improvements to eliminate minor outfalls and consolidate remaining outfalls.

Isolated Collection Systems and Overland Flow

A number of areas drain naturally, by overland flow, into surrounding wetlands and waterways. Figure 4-2 graphically portrays these areas designated with an '-OL' suffix to indicate overland flow verses inclusion in a collection drainage basin. These occur in small areas along the seawall and existing wetlands on Mare Island Strait. The majority of overland flow occurs from undeveloped areas (Reuse Areas 11, 12 and 13) into surrounding wetlands or dredge ponds.

Minor outfalls identified for elimination under the outfall consolidation actions in Subsection 4.3; will revert to overland flow into the Strait until redevelopment of these areas requires installation of storm water collection and drainage systems. New drainage systems to serve redevelopment should be connected into existing outfalls.

4.1.2 SUMMARY OF EXISTING CONDITIONS

The storm water systems collect surface water from most of the developed sections of the Base through a series of catch basins, collection laterals, gravity mains, and three lift stations. Storm Water is discharged primarily into Mare Island Strait. Most of the western discharge points (into the San Pablo Bay wetlands) have been removed[1] in conjunction with wetland restoration efforts or abandoned in place as military activities were removed from the areas drained.

After consolidating areas of natural overland flow and accounting for abandoned or removed discharge points, 16 major drainage basins (labeled as Basins A through P) were identified throughout the developed portions of the base. A schematic showing the backbone protion of the major storm water collection and discharge systems serving the 16 tributary drainage basins is provided in Figure 4-3. Each of these basins was reviewed for redevelopment plans, consolidation potential and estimated upgrade consolidation cost. An inspection of each of the existing outfalls was conducted to assess their condition, elevation, degree of siltation, capacity and the operation of tidegates. Due to the lead time required to clean a number of blocked storm lines, planned video recording of the prime consolidation outfalls was not conducted.

Due to its flat topography and elevation (below 10' NGVD), storm drainage in Reuse Area 1 is the most critical. At present, the existing systems and pump stations are incapable of providing adequate storm drainage in this area. In 1984, a dike break during the rainy season caused the area to flood extensively (to a level of 6'-7' NGVD). Contributing to the Area 1 problem is settlement of low-lying areas to elevations below 1' and subsequent seepage of groundwater and tidal backup through leaking sewer lines. As this area is planned for early redevelopment, construction of a drainage system to match specific reuse plans has a high priority.

Reuse Area 10 represents the other main area of concern. Due to its construction on fill material and the presence of older interconnected sanitary and storm drainage systems, it is a prime candidate for reconstruction in conjunction with future redevelopment.

[1] With the exception of storm water overflows from the Farragut and Coral Sea housing areas which continue to drain into adjacent dredge ponds.

Drainage systems throughout the remainder of the Base appear capable of supporting redevelopment as planned in the Final Reuse Plan. Only spot deficiencies were identified during modeling and corrections to these problems are provided in Subsection 4.3 of this report.

4.1.3 CURRENT SYSTEM OPERATION AND CONSTRAINTS

As noted in Subsection 4.1.2 (Summary of Existing Conditions), the current storm drainage systems on base operate with reasonable efficiency. Notable exceptions to this statement occur in Reuse Area 1 which floods daily from inflow and seepage during high tides. This is compounded during storms when pooling and flooding become prevalent. At present, this area is relatively unoccupied with facilities constructed on piles and roads elevated out of the flood plain. However, expanded reuse of this area will compound this problem and require action to correct flooding. The other exception to this generally favorable drainage evaluation is the lack of storm line cleaning over the past five years (2 years in Reuse Area 5). Most of the storm outfalls along the strait are at or below low tide levels with resulting backwash during high tide and deposition of bay mud and silts in the pipes. Over time, these deposits develop a cementitious cohesion and become all but impossible to remove. Such deposition reduces effective flow capacity and leads to blockages further up the drainage pipeline. In the spring of 1997, VSFCD started a program of inspecting and cleaning storm drain manholes to reverse this process. This maintenance function, which was previously conducted by the Navy on an as needed basis, should continue in order to recover and retain the capacity of existing drainage systems.

4.1.4 EXISTING O&M REQUIREMENTS

The deficient conditions found during the survey of pump houses for the storm drainage systems were reviewed. Pump houses where severe or extensive corrosion exists are identified as high maintenance areas. As expected, equipment installed outdoors, and in an environment where they are exposed to salt water, was found to have significantly more corrosion and rusting than that installed inside protective enclosures. The column on the right indicates whether or not a Storm Drainage Pump Station has a protective enclosure.

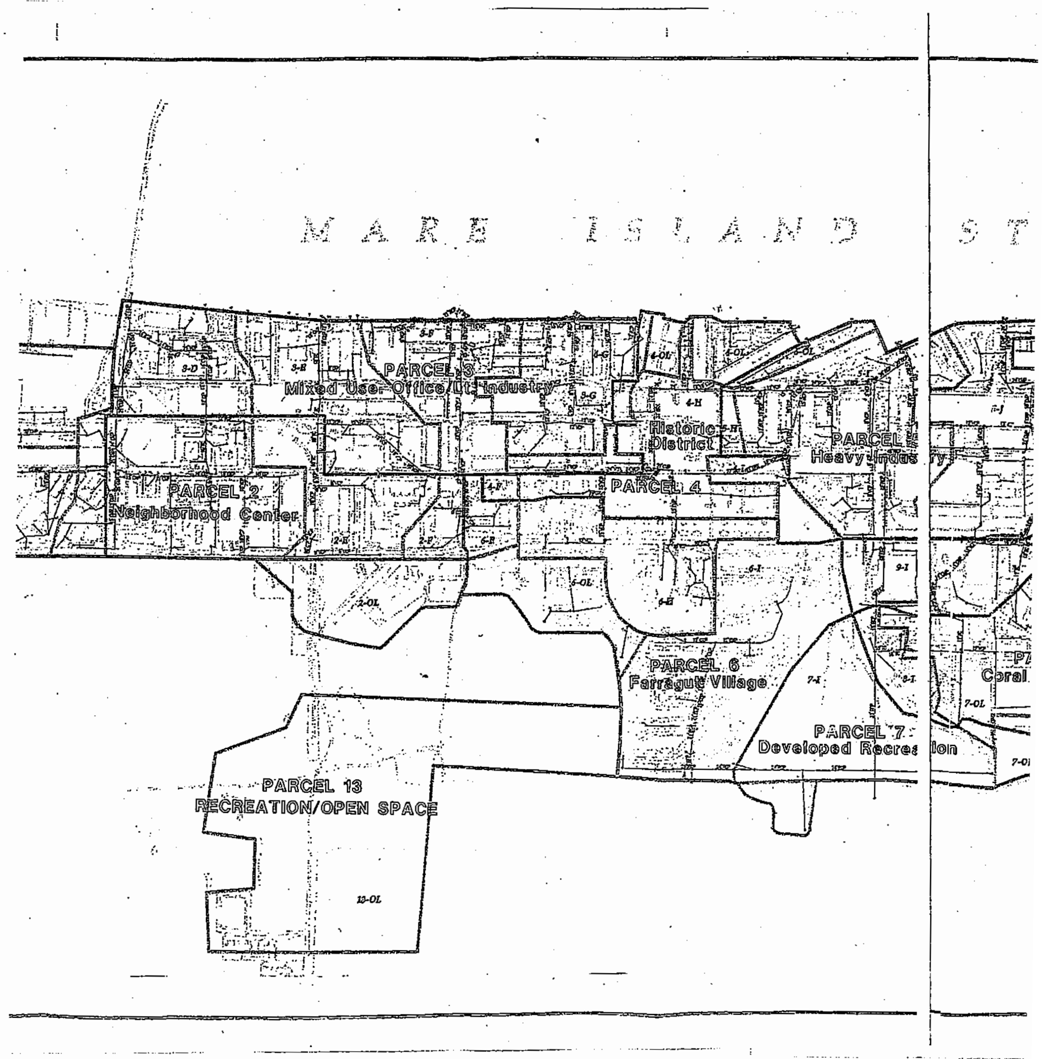
System/Station	*Corroded Items*	*Enclosed?*
SDPS-13	Piping and valves.	Y
DPS-14	Pump #1 not working, in poor condition, coupling is unstable and pedestal bearing is in bad condition.[2]	
DPS-15	Pump #2 is not working, seals leaking.[3]	

Removal of corrosion and painting at all three pump stations, testing the operation of pumps to assess their condition at stations SDPS-14 and SDPS-15, refurbishing #2 pump at station SDPS-

[2] SDPS-14 pumps are currently being overhauled by VSFCD uner their Caretaker Agreement with the Navy.

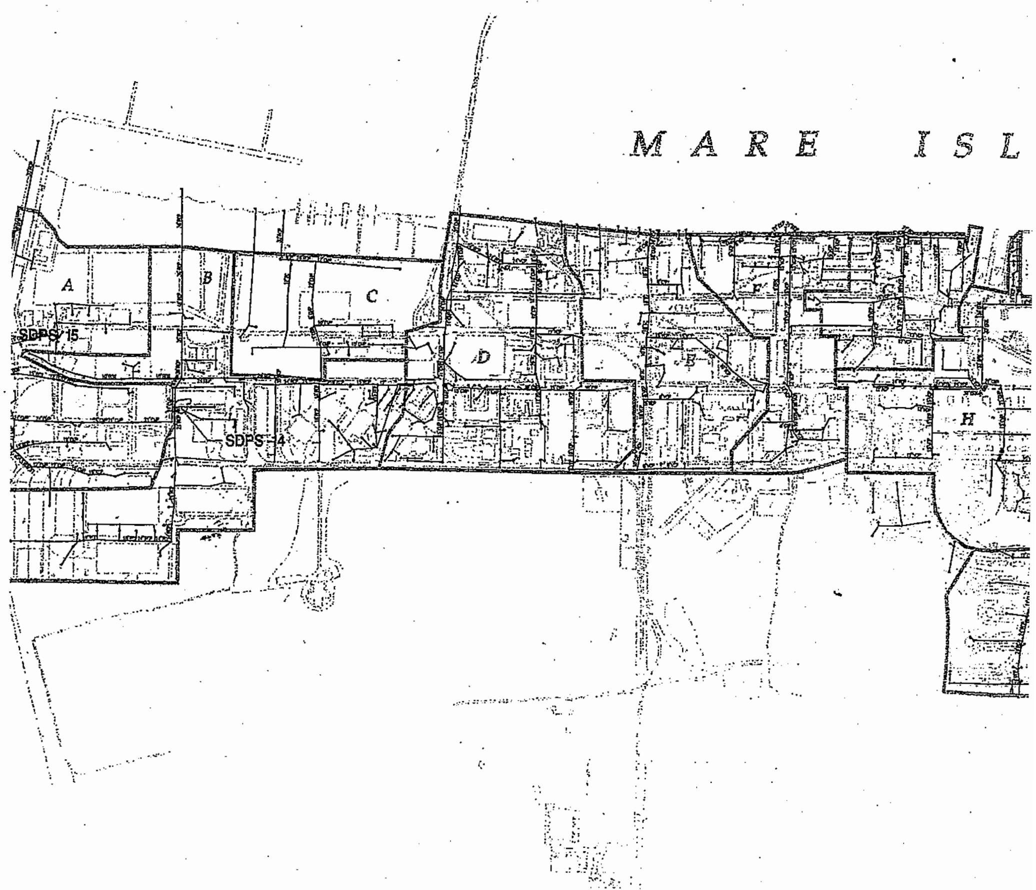
[3] SDPS-15 pumps are currently being replaced by VSFCD under the Caretaker Agreement.

Figure 4-3



MARE ISLAND
PARCEL 3
Mixed Use-Office/Lt. Industry
Historic
District
Heavy Industry
PARCEL 2
Neighborhood Center
PARCEL 4
PARCEL 6
Farragut Village
PARCEL 7
PARCEL 13
RECREATION/OPEN SPACE
13-OL

Figure A-3



MARE ISL
A
B
C
D
E
H
SDPS-15
SDPS-14

4.1.5 MAINTENANCE AND REPAIR COST PROJECTIONS

As reported on page 4-2, there are three pump stations on the storm drainage systems. Each lifts storm water to piping which conducts flow to discharge into the Mare Island Strait. Station SDPS-13 serves a small portion of Reuse Area 9, below the old Hospital. Station SDPS-14 and SDPS-15 serve portions of Reuse Area 1, at the north end of the island. This area is planned to be redeveloped in the near future. All stations currently have insufficient capacity and repairs are required to meet current demands. SDPS-13 will need to have the one pump replaced with two 800 gpm pumps as the area is redeveloped. In their present configuration, SDPS-14 may need a new pump station installed with three 5000 gpm pumps and SDPS-15 may need an additional 4200 gpm pump with a new pump house. These requirements will become unecessary after reconfiguration of drainage in Reuse Area 1 as described in Subsection 4.3. Existing pumps should be repaired and maintained. Life cycle replacement occurs in year 2017. Costs for pump station repairs are summarized below by phase:

Storm Water System	**Current**	**Long Term**	**Ultimate**
Time Phased Costs ($)	1997	2007	2017
Repair (O&M) (Total)	$37,000	-	-
Capital Improvements	-	-	-
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	$208,000
Capacity Upgrade (CU)	$1,140,000	-	-
Other Capital Improvements (C)	-	-	-

The MIRIS Team also reviewed available Navy and City of Vallejo (Oct. 96 – Mar 97) maintenance records and have developed an estimate annual maintenance requirements. These costs are summarized in Table 4-2.

Table 4-2 Storm Drainage O&M Costs

Maintenance Activities	Rate	Total Hrs.	Material	Total Cost
Pump Station Checks	$ 36.21	390	$ 195	$ 14,317
Monthly Pump Station Alarm and Check Valve Test 7.4.3 (c)(4)(a)&(b)	$ 36.21	10.8	$ 180	$ 571
Quarterly Lubrication of Station Ventilation Units, Pumps, & Motors 7.4.3 (c)(5)(a)	$ 36.21	3.6	$ 72	$ 202
Annual Inspection/Cleaning of Pump Station Wetwells 7.4.3 (c)(6)(a)	$ 36.21	12	$ 144	$ 578
Annual Inspection of Storm Drain Manholes & Catch Basins (to determine cleaning requirements) 7.4.3 (c)(7)(a)	$ 36.21	510	$ 2,550	$ 21,017
Annual Cleaning of Manholes per Inspection Results 7.3.3 (c)(7)(a)	$ 36.21	1530	$ 61,200	$ 116,601
Inspection of Storm Drain System (per agreed upon portions of Navy Storm Water Pollution Prevention Plan) 7.4.3 (c)(8)(a)	$ 36.21	128	$ 640	$ 5,275
Subtotal				**$ 58,600**

TABLE 4-2 STORM DRAINAGE O&M COSTS (cont'd)

Minor Repairs				
Minor Repairs -Pump Station Equipment 2.1.5 (b):	$ 36.21	288	$ 3,456	$ 13,885
Minor ~~Repairs – Cleaning of Plugged Storm Drain~~ Lines 2.1.5 (b):	~~$ 36.21~~	~~192~~	$ 3,840	$ 10,792
Minor Repairs - Storm Water Collection System Piping 2.1.5 (b):	$ 36.21	192	$ 3,840	$ 10,792
Utility Locating Service (Storm Drain System)	$ 36.21	240	$ 3,600	$ 12,290
Subtotal				**$ 47,800**
Major Work				
Life Cycle Failures	$ 1,311,000	0.05	0	$ 66,000
Pump Stations	$ 37,440	1	0	$ 37,000
Subtotal				**$ 103,000**
Administration and Overhead (15%)				$ 31,400
TOTAL ANNUAL O&M COSTS				**$ 241,000**

4.2 SYSTEM ANALYSIS

4.2.1 DRAINAGE SYSTEM MODELING

As a part of MIRIS, CH2M Hill developed a PC-based static model for the storm system on Mare Island. The model was run for the ultimate build-out land use scenario. The physical data used to develop the model came from the mapping and survey tasks of this project. The model was developed within the intent of only modeling the trunk line systems. Therefore, not all pipelines on Mare Island were included in the model, as indicated below.

	Total Pipe Length (ft.)	Modeled Pipe Length (ft.)	Percent of Pipe in Model
Storm Drain System	177,998	65,631	37%

The drainage model resides in the EXCEL 6.0 environment. A spreadsheet format was chosen in order to simplify the City's efforts to use the model for later analysis. The model can be used by a person with a good understanding of hydraulics and with usual spreadsheet capabilities. This eliminates the need for a future user to be highly skilled with model software such as SWMM or MOUSE.

The model accumulates peak flows down through the system. Pipeline flow capacities are computed using Manning's equation. The roughness coefficient for Manning's equation computations are based on accepted roughness values. The Manning's roughness coefficients are listed by pipe material in Table 4-3. Pipes exceeding capacity and pipes at negative slopes have been noted in the model. Capacity deficiencies are identified in the model by pipelines having percent flow capacities greater than 100 percent in the column labeled "Over Cap."Graphic representations of these system deficiencies are provided in Figure 4-1 in Subsection 4.1.1.

4.2.2 STORM EVENT AND PEAK RUNOFF CONSIDERATION

The drainage system model defines 16 drainage basins. These basins were identified as the major systems likely ~~to remain in service~~ as the redevelopment occurs on the island. The drainage system model routes peak runoff flows through the pipeline system. The flows were computed using a 15-year return period design storm event, as prescribed in VSFCD's design standards. The flows were computed in the Demand Generation (Set 2 spreadsheets) presented in Appendix A-2.

The Rational Method for computing peak stormwater runoff requires drainage area, runoff coefficient, and rainfall intensity. The drainage area and runoff coefficients were determined from the ultimate build-out scenarios documented in Set 2 (Appedix A-2) of the InfraStrategy Analysis. The rainfall intensity was determined by the storm event return frequency and the event duration. In the Rational Method, the event duration corresponds to the time of concentration, or the time required for the most distant part of the drainage area to contribute to the flow. The time of concentration for each drainage area was determined for each drainage system. The design storm event intensity was determined using VSFCD's Depth-Duration-Frequency curves, The design storm flow for each outfall is shown in Table 4-4.

In the MIRIS analysis of the storm drainage system influence of the tides in Mare Island Strait was considered. The tidal condition used in the design scenario is the mean higher high water (MHHW) tide elevation. MHHW at Mare Island varies from 106.1 feet (Mare Island vertical datum) at the south end of the island to 106.3 feet at the north end. In areas where downstream rim elevations are relatively low, the hydraulic grade line profile was checked to ensure that the pipes would be capable of conveying the storm flows. In cases where the existing pipe configuration (in terms of pipe diameter, material, and slope) resulted in a water elevation higher than the rim elevation, pipe improvements were recommended.

Table 4-3 Manning's Roughness Values ("n") for Sanitary and Storm Systems

Pipe Material Designation	Pipe Description	"n" Value
CMP	corrugated metal pipe	0.024
CIP	cast iron pipe	0.015
VCP	vitrified clay pipe	0.014
RCP	reinforced concrete pipe	0.013
TC	terra cotta	0.013
PVC	polyvinyl chloride	0.012
ABS	plastic	0.012
STL	steel	0.015
BRK	brick	0.014
ACP	asbestos cement pipe	0.012
BOX	wood box	0.016

Table 4-4 Stormwater Peak Runoff by Watershed Basin

Storm System Watershed	Basin Storm Runoff (cfs)
A	37.2
B	37.9
C	17.6
D	43.4
E	10.9
F	15.1
G	10.2
H	31.4
I	75.1
J	23.6
K	6.1
L	30.7
M	39.8
N	22.5
O	27.6
P	14.3
TOTAL	**443.4**

Influence of the tides in Mare Island Strait has been considered in the analysis of the storm drainage system and in the selection of recommended improvements. The tidal condition used in the design scenario is the mean higher high water (MHHW) tide elevations. MHHW at Mare Island varies from 106.1 feet (Mare Island vertical datum) at the south end of the Island to 106.3 feet at the north end. In areas where downstream rim elevations are relatively low, the hydraulic grade line profile was checked to ensure that the pipe configuration (in terms of pipe diameter, material, and slope) resulted in a water elevation lower than the rim elevation. Otherwise, pipe improvements were recommended.

In order to assess the capacity of existing drainage systems, Set 2 spreadsheets for storm water are split into two parts. In the first part, the base reuse map was divided into drainage basins labeled by existing major outfalls (A through P), and then subdivided into reuse areas within each drainage basin (see Figure 4-2). This permitted the determination of average C values within each reuse area, based on type and intensity of use and coverage, and then calculation of the relative contribution of each reuse area subbasin to each drainage system. In the second part of Set 2, these subbasins, their areas and C values, were aggregated based on each drainage basin's individual area, time of concentration and intensity using a 5 year, 1.3 inch storm of 4 hour duration (.33 inch / hour) based on time-intensity-duration curves provided in the Vallejo Sanitation and Flood Control District (VSFCD) Storm Drainage Master Plan.

These subbasin flows were then allocated against the backbone of the system based on the length of pipe in each subbasin and aggregated at nodes (manholes) based on the drainage pattern within each drainage basin. This provided the basis of input into model runs for each of these major drainage basins and for existing and proposed lift stations.

At present, the base drains an estimated 370 cubic feet per second (cfs) through 16 significant outfalls scattered along Mare Island Strait. In 2007, the base will have an estimated 400 cfs of flow through these outfalls, with most of the additional flow (22 cfs) attributed to Reuse Area 1, north of the causeway. Ultimate development in 20XX will create an additional 20 cfs of flow for a peak total discharge of 420 cfs. A detailed discussion of existing system components and conditions is provided in Subsection 4.1.2.

For storm water pumping stations, the instantaneous storm water flow in cubic feet per second for each drainage basin was obtained from Set 2 of the demand spreadsheets for peak stormwater flow. The system layout was overlaid on a map of the Island showing the drainage basins (Figure 4-3). The areas tributary to each pump station were then estimated and flows adjusted to reflect only the tributary areas. This was done by multiplying the total flow for each drainage basin by a ratio of the tributary area divided by the total area of each reuse area. Appendix A-2, Set 2, shows the computations and results.

At the time of base closure in April 1996, there were over 68 individual storm water collection and discharge systems in place at Mare Island. Of these individual systems, 42 of the discharge points were identified and permitted under National Point Discharge Effluent Standards (NPDES) Act, which was recently renegotiated. The remaining systems were either single catchbasins discharging into adjacent areas (including Mare Island Strait) or were small collection systems (less than 6 catch basins) draining into adjacent lowlands (wetlands or dredge ponds). In addition, there were 18 known culverts controlling water flow between diked ponds on the west side of the island. As a part of this study the MIRIS Team was tasked with rationalizing these systems and consolidating the number outfalls down to 10.

4.3 TIME PHASED CAPITAL IMPROVEMENTS

Table 4-5 at the end of this Section, summarizes the proposed capital improvements for the storm drainage systems. Each of these items are discussed in the following sections based on their classification as either an on site system upgrade (to meet current operating standards) on site system expansion (to meet future development) lifecycle replacement cost (until 2017) or outfall consolidation. The following descriptions have been grouped into two timeframe; long term improvements (from present to 2007) and ultimate improvements (from 2007 to 20XX). Figure 4-4 also located at the end of this Section, shows the location, or proposed location, of each of these improvements[4].

4 Lifecycle repairs and replacements are based on the length, type and age of existing pipe materials and are not shown due to the statistical nature of their estimated failure and need for replacement basewide.

4.3.1 LONG TERM IMPROVEMENTS[5] (1997 - 2007)

As discussed in Subsection 4.1.2, the existing storm drainage collection systems contain a number of constraints precluding the simplified, low cost operation of the system. The improvements listed and discussed below focused, first, on providing essential drainage to existing tenants and on reducing lift stations, second, on providing effective, low maintenance drainage systems for redevelopment areas through a program of channel construction and pipe replacement, especially in areas where land is at or below elevation 8.5' (mean higher high tide); and, finally, on limiting and consolidating the number of outfalls and monitoring points. Costs for manhole replacement have been included in the unit price for new pipe installation but not in pipeline replacement. Catch basin costs are excluded, as they are a cost element in road and parking lot construction.

System Upgrades to Correct Deficiencies

SD-1: Repair Pump 1; SDPS-15 - This upgrade is for the replacement of piping and valves and repair of pump #1 at SDPS-15. Timing for this upgrade is immediate due to the low elevation of the land serviced by this pump station (Drainage Basin A) which floods through ground seepage and sewer backflow during high tides. Based on current tenants and planned redevelopment, this upgrade should be accomplished in 1997.*

SD-2: Refurbish Pump 2; SDPS-15 - This upgrade is for the repair of pump #2 at SDPS-15. It has been separated in order to repair the pumps sequentially if necessary due to financial limitations and the estimated high cost of overhaul; however timing on this upgrade is also based on the low elevation of the land serviced (as SD-1). Based on current tenants and planned redevelopment, this upgrade should also be accomplished in 1997.*

SD-3: Repair Pump 1; SDPS-14 - This upgrade is for the replacement of piping and valves and repair of pump #1 at SDPS-14. Timing on this upgrade is based on the low elevation of the land serviced by this pump station (Drainage Basin B; center of Reuse Area 1) which floods through ground seepage during high tides. This upgrade should be accomplished in 1998 to serve current tenants and planned redevelopment.*

SD-4: Refurbish Pump 2; SDPS-14 - This upgrade is for the repair of pump #2 at SDPS-14. It has been separated in order to repair the pumps sequentially if necessary however timing on this upgrade is also based on the low elevation of the land serviced (as SD-3). This upgrade should also be accomplished in 1998 along with SD-3.*

Capital Improvements for 1997-2007 Redevelopment

SD-7: Construct 4'x2'Channel - This improvement consists of 800 feet of an open, concrete-lined Collector Channel for storm drainage along Railroad Ave. in Reuse Area 1. (Covered box

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[5] Although the period 1997-2007 would not normally be considered as "Long Term", this nomenclature is continued from the City's EDC Application to insure consistency.

* These improvements and repairs are currently in progress by VSFCD under their Caretaker Agreement with the Navy. Actual costs were substantially below the mechanical/electrical estimate.

culverts coukld be used in this area depending on design layout and grading plans). In conjunction with SD-8 and 9, it forms a consolidated outfall for this area, combining drainage basins A, B and C. Timing for this improvement is based on redevelopment along Railroad Ave. currently planned for 2003.

SD-8: Construct 6'x5' Channel - This improvement will provide of 1000 feet of an open, concrete-lined Collector Channel for storm drainage from Railroad Ave. to Mare Island Strait in Reuse Area 1. In conjunction with SD-7, 9 and 16, it forms a consolidated outfall for this area, combining drainage basins A, B and C. 1998 phasing for this improvement reflects redevelopment within the center of Reuse Area 1, preceding other collector improvements, including SD-16, 17, 18, and 19, currently planned for 2000.

SD-9: Construct 4'x2' Channel - This improvement calls for 1400 feet of an open, concrete-lined Collector Channel for storm drainage along Railroad Ave. in Reuse Area 1. (Covered box culverts coukld be used in this area depending on design layout and grading plans). In conjunction with SD-7 and 8, it forms a consolidated outfall for this area, combining drainage basins A, B and C. Timing for this improvement is based on redevelopment along Railroad Ave. currently planned for 2003

SD-10: Construct 18" Collector - This improvement provides 300 feet of 18" RCP Collector Pipe draining into the channel to be constructed along Railroad Ave. Along with improvements SD-11, 12, 13, 14, and 15, these Collectors provide direct gravity drainage for storm water flows in the eastern third of Reuse Area 1. Unit prices for this upgrade are based on trenching through existing paving; however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is related to completion of SD-7 and 8 and is based on redevelopment of the service area, currently projected for 2005.

SD-11: Construct 18" Collector - This improvement consists of 200 feet of 18" RCP Collector Pipe draining into the channel to be constructed along Railroad Ave. Along with improvements SD-10, 12, 13, 14, and 15, these Collectors provide direct gravity drainage for storm water flows in the eastern third of Reuse Area 1. Unit prices for this upgrade are based on through-asphalt trenching: however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on the completion of SD-8 and 9 and is driven by redevelopment of the service area, projected for 2006.

SD-12: Construct 18" Collector - This improvement results in200 feet of 18" RCP Collector Pipe draining into the channel to be constructed along Railroad Ave. Along with improvements SD-10, 11, 13, 14, and 15, these Collectors provide direct gravity drainage for storm water flows in the eastern third of Reuse Area 1. Unit prices for this upgrade reflect trenching through existing paving: however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement follows completion of SD-8 and 9 and is based on redevelopment of the service area, one of the last, projected for 2007.

SD-13: Construct 24" Collector - This improvement constructs 500 feet of 24" RCP Collector Pipe draining into the channel to be constructed along Railroad Ave. Along with improvements

SD-10, 11, 12, 14, and 15, these Collectors provide direct gravity drainage for storm water flows in the eastern third of Reuse Area 1. Unit prices for this upgrade are based on through-asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on the completion of SD-7 and 8 and reflects redevelopment of the service area, currently projected for 2004.

SD-14: Construct 24" Collector - This improvement will provide 500 feet of 24" RCP Collector Pipe draining into the channel to be constructed along Railroad Ave. Along with improvements SD-10, 11, 12, 13, and 15, these Collectors provide direct gravity drainage for storm water flows in the eastern third of Reuse Area 1. Unit prices for this upgrade reflect trenching through existing paving, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement related to the completion of SD-8 and 9 and is based on redevelopment of the service area, currently projected for 2003.

SD-15: Construct 24" Collector - This improvement consists of 500 feet of 24" RCP Collector Pipe draining into the channel to be constructed along Railroad Ave. Along with improvements SD-10, 11, 12, 13, and 14, these Collectors provide direct gravity drainage for storm water flows in the eastern third of Reuse Area 1. Unit prices for this upgrade are based on through-paving trenching, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on the completion of SD-8 and 9 and reflects redevelopment of the service area, currently projected for 2003.

SD-16: Construct 36" Force Main - This improvement, along with SD-17, 18 and 19 establishes a central storm water collection, detention and drainage facility for the western two-thirds of Reuse Area 1. These improvements will eliminate two current lift stations and allow smaller pumps to be used to drain the Detention Basin. This project is for the construction of 1850 feet of 36" high density polyetheleue (HDPE) Force Main from the new pump station, across the Island's drainage divide, into the head of a new drainage channel (SD-8). Material selection for this line is based on the high corrosivity and the unstable (differential settlement potential) nature of local soils. Alternative material selection using metal pipe would require the installation of a cathodic protection system. This improvement is based on completion of SD-8, and should precede significant redevelopment along Cedar Ave. in 2000.

SD-17: Install New Pumps and Equipment - This improvement, along with SD-16, 18 and 19 establishes a central storm water collection, detention and drainage facility for the western two-thirds of Reuse Area 1. These improvements will eliminate two current lift stations and allow smaller pumps to be used to drain the Detention Basin. This project is for the installation of four new Pumps and related equipment in a new Pump Station located by the Detention Basin. This improvement is based on completion of SD-8, and should be performed in conjunction with SD-18 in 2000.

SD-18: Construct New Pumphouse - This project consists of a new pumphouse with wet and dry wells located next to the proposed Detention Basin. This improvement is preceeded by completion of SD-8 and SD-16. It should be constructed in conjunction with SD-17 in 2000.

SD-19: Dredge Detention Basin - This improvement, along with SD-16, 17 and 18 establishes a central Storm Water Collection, Detention and Drainage Facility for the western two-thirds of Reuse Area 1. These improvements will eliminate two current lift stations and allow smaller pumps to be used to drain the Detention Basin. This project includes dredging a 400 foot by 500 foot Detention Basin to elevation 0.0 (NGVD) in the remnant of a closed dredge pond immediately west or Reuse Area 1 (see Figure 4-3). This area will provide detention for a 15 year storm; in addition the remaining freeboard above elevation 5.0 (level of current dredge fill) throughout the dredge pond will provide adequate storage for a 100 year FEMA storm. Phasing for this improvement should closely follow completion of SD-8 in 1998, and should be constructed prior to SD-16, 17 and 18 in 1999.

SD-20: Construct 3'x5' Channel - This improvement consists of 2400 feet of an open, concrete lined Collector Channel for storm drainage from Cedar Ave. west along the base boundary into, and through, the closed dredge pond immediately west of Reuse Area 1. This Channel will divert storm waters from the northern 40% of Reuse Area 1 into the Detention Basin (SD-19). Phasing for this improvement is based on redevelopment along Cedar Ave. and should be constructed in conjunction with SD-19 in 1999.

SD-21: Construct 36" Trunk Line - This improvement constructs 600 feet of 36" RCP drainage pipeline along the north end of Cedar Ave. This Trunk Line provides direct gravity drainage for storm water flows into drainage channels on the north end of the area (SD-20). Unit prices for this upgrade are based on trenching through existing paving; however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement reflects completion of SD-20 and redevelopment of the service area, currently projected for 2000.

SD-22: Construct 24" Trunk Line - This improvement provides 600 feet of 24" RCP drainage pipeline along the north end of Cedar Ave. This Trunk Line provides direct gravity drainage for storm water flows into drainage channels on the north end of the area (SD-20 and 21). Unit prices for this upgrade reflect trenchingthrough paving; however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is based on the completion of SD-21 and redevelopment of the service area, currently projected for 2001.

SD-23: Construct 30"Trunk Line - This improvement consists of 1500 feet of 30" RCP drainage pipeline along the central portion of Cedar Ave. into the Detention Basin west of Reuse Area 1. This Trunk Line provides direct gravity drainage for storm water flows from the central 25% of the Reuse Area into the Detention Basin (SD-19). Unit prices for this upgrade are based on trenching through paving; however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement follows completion of SD-19 and is driven by redevelopment of the service area, currently projected for 2001.

SD-24: Construct 24" Trunk Line - This improvement constructs 500 feet of 24" RCP drainage pipeline along the central portion of Cedar Ave. to a detention basin west of Reuse Area

1. Along with SD-23, this trunk line provides direct gravity drainage for storm water flows from the central 25% of the Reuse Area into the Detention Basin (SD-19). Unit prices for this upgrade are based on through-asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is based on the completion of SD-23 and redevelopment of the service area, currently projected for 2001.

SD-25: Construct 3'x2' Channel - This improvement will add of 1200 feet of an open, concrete lined Collector Channel for storm drainage along the northern end of Reuse Area 1. It provides surface drainage from the lowest elevations in the area into the Detention Basin (SD-19). This improvement serves redevelopment along Acacia St. currently projected for 2003.

SD-26: Construct 24" Collector - This improvement provides 1000 feet of 24" RCP drainage pipeline across Cedar Ave. along proposed new roadways into redevelopment parcels in Reuse Area 1. This Collector will provide gravity storm water drainage from the central 25% of the Reuse Area to the Detention Basin. Unit prices for this upgrade are based on trenching through existing paving; however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement matches completion of SD-21 and redevelopment of the service area, currently projected for 2002.

SD-27: Construct 18" Collector - This improvement constructs 400 feet of 18" RCP drainage pipeline across Cedar Ave. along proposed new roadways into redevelopment parcels in Reuse Area 1. This Collector will provide gravity storm water drainage from the central 25% of the Reuse Area to the Detention Basin. Unit prices for this upgrade reflect trenching through asphalt; however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement corresponds to completion of SD-23 and redevelopment of the service area, currently projected for 2001.

SD-28: Construct 18" Collector - This improvement consists of 400 feet of 18" RCP drainage pipeline across Cedar Ave. along proposed new roadways into redevelopment parcels in Reuse Area 1. This Collector will provide gravity storm water drainage from the south central 25% of the Reuse Area to the Detention Basin. Unit prices for this upgrade are based on trenching through existing paving; however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on the completion of SD-23 and final redevelopment of the service area, currently projected for 2001.

SD-29: Construct 4'x3' Channel - This improvement will add 300 feet of an open, concrete lined Storm Water Discharge Channel from California Ave. into Mare Island Strait. This channel will provide a low maintenance outfall for Drainage Basin D. Timing for this improvement reflects redevelopment along Causeway Road (G St.) and should be performed prior to other basin improvements in 1999.

SD-30: Construct 15" Collector - This improvement constructs 100 feet of 15" RCP drainage pipeline along Cedar Ave. in Reuse Area 1. This collector will provide gravity storm water drainage from the southwest corner of Reuse Area 1 into Drainage Basin D. Unit prices for this upgrade are based on trenching through asphalt; however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on proposed early redevelopment of the service area, currently projected for 1998.

SD-31: Construct 24" Trunk Line - This improvement constructs 550 feet of 24" RCP drainage pipeline along Cedar Ave. in Reuse Area 1. This Collector will complete gravity storm water drainage from the southwest corner of Reuse Area 1 into Drainage Basin D. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement corresponds to proposed final redevelopment of the service area, currently projected for 1999.

SD-34: Construct 30" Trunk Line - This improvement replaces 1350 feet of RCP drainage pipeline along G St. This Trunk Line provides gravity storm water drainage into Drainage Basin D. Unit prices for this upgrade are based on trenching through existing paving; however they also assume major earthwork will be done in conjunction with planned roadway improvements. This improvement is based on potential redevelopment of the northern end of Reuse Areas 2 and 3 in 2004.

SD-35: Construct 27" Collector - This improvement replaces 350 feet of RCP drainage collector along Walnut Ave. The new Collector will provide gravity storm water drainage from the northern end of Reuse Area 2 into Drainage Basin D. Unit prices for this upgrade are based on through-asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is based on potential redevelopment of Reuse Area 2 in 2005.

SD-36: Construct 24" Collector - This improvement replaces 750 feet of RCP drainge pipeline along Walnut Ave. This Collector will provide gravity storm water drainage from the northern end of Reuse Area 2 into drainage basin D. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing is the same as for SD-35.

SD-37: Construct 18" Collector - This improvement replaces 600 feet of RCP collector along the west end of C St. This collector will provide gravity storm water drainage from the northern end of Reuse Area 2 into drainage basin D. Unit prices for this upgrade reflect the cost of trenching through existing paving; however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is based on potential redevelopment of Reuse Area 2 in 2005.

SD-38: Construct 15" Collector - This improvement replaces 1100 feet of RCP collector along A St. This collector will provide gravity storm water drainage from the central portion of Reuse Area 2 into Drainage Basin E. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on potential redevelopment of Reuse Area 2 in 2006.

SD-39: Construct 18" Collector - This improvement replaces 600 feet of RCP collector along A St. to Mare Island Strait. This collector will provide gravity storm water drainage from the central portions of Reuse Areas 2 and 3 into drainage basin E. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete is used for ground construction between California Ave. and the seawall. Timing for this improvement is based on potential redevelopment of Reuse Areas 2 and 3 in 2005.

SD-40: Construct 12" Collector - This improvement replaces 700 feet of RCP collector along Cedar Ave. This collector will provide gravity storm water drainage from the central portion of Reuse Area 2 into drainage basin E. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on potential redevelopment of Reuse Area 2 in 2006.

SD-41: Construct 12" Collector - This improvement replaces 700 feet of RCP collector along Walnut Ave. This collector will provide gravity storm water drainage from the central portion of Reuse Area 2 into drainage basin E. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is based on potential redevelopment of Reuse Area 2 in 2006.

SD-46: Construct 36" Collector - This improvement replaces 600 feet of RCP collector along Walnut Ave. This collector will provide gravity storm water drainage from the central portion of Reuse Area 4 into drainage basin H. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on projected increased demands in Reuse Area 4 by 2001.

SD-47: Construct 18" Collector - This improvement replaces 600 feet of RCP collector along Cedar Ave. This collector will provide gravity storm water drainage from the central portion of Reuse Area 4 into drainage basin H. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is based on projected increased demands in Reuse Area 4 by 2002.

SD-49: Construct 33" Collector - This improvement replaces 1550 feet of RCP collector along the western edge of Reuse Area 6. This collector will provide gravity storm water drainage from Reuse Area 6 into drainage basin I. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with construction through dikes around the dredge ponds to the west. Phasing for this improvement is based on projected increased demands in Reuse Area 6 by 2006.

SD-50: Construct 42" Trunk Line - This improvement replaces 1000 feet of RCP trunk line between Reuse Areas 7 and 8. This improvement will provide adequate gravity storm water drainage from the Reuse Areas 6 and 7 into drainage basin I. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with construction through earth dikes surrounding Reuse Area 7. Timing for this improvement is based on projected increased demands in Reuse Area 4 by 2006.

SD-51: Construct 18" Collector - This improvement replaces 800 feet of RCP collector along and west of California Ave. This collector will provide gravity storm water drainage from the northern portion of Reuse Area 5 into drainage basin I. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements and facility demolition. Phasing for this improvement is based on projected increased demands in Reuse Area 5 by 2006.

SD-52: Construct 48" Trunk Line - This improvement replaces 650 feet of RCP trunk line along California Ave. This improvement will provide adequate gravity storm water drainage from Reuse Areas 6 and 7 and the northern portion of Reuse Area 5 through drainage basin I. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete is encountered between California Ave. and the seawall. Timing for this improvement is based on potential redevelopment of Reuse Areas 5 and 6 by 2006.

SD-53: Construct 18"Collector - This improvement replaces 500 feet of RCP collector along 12th St. west of Railroad Ave. This collector will provide gravity storm water drainage from the northern portion of Reuse Area 5 into drainage basin I. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements and facility demolition. Phasing for this improvement is based on projected redevelopment in this portion of Reuse Area 5 by 2004.

SD-54: Construct 60" Trunk Line - This improvement replaces 300 feet of RCP trunk line between Dry-Docks 3 and 4 along Mare Island Strait. This improvement will provide adequate gravity storm water drainage from the southern portions of Reuse Areas 5, 6 and 7 through drainage basin I. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete is encountered near the seawall. Timing for this improvement is based on potential redevelopment of Reuse Areas 5 in 2002.

SD-55: Construct 36" Trunk Line - This improvement replaces 1600 feet of RCP trunk line south of Dry-Dock 4. This improvement will provide adequate gravity storm water drainage from the central portion of Reuse Areas 5 through drainage basin J. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete is encountered between California Ave. and the seawall. Phasing for this improvement is based on potential reuse and redevelopment of the central portion of Reuse Area 5 by 2003.

SD-59: Construct 30" Trunk Line - This improvement replaces 750 feet of RCP trunk line along 14th St. This improvement will provide adequate gravity storm water drainage from the

Reuse Areas 5 and 8 into drainage basin K. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements and facility demolition. Timing for this improvement is based on projected increased demands in Reuse Areas 5 and 8 by 2006.

SD-60: Construct 42" Trunk Line - This improvement replaces 350 feet of RCP trunk line along 14th St. This improvement will provide adequate gravity storm water drainage from the Reuse Areas 5 and 8 into drainage basin K. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements and facility demolition. Phasing for this improvement is based on projected increased demands in Reuse Areas 5 and 8 by 2006.

Outfall Consolidation

SD-5: Isolation and Removal of SDPS-15 - This upgrade removes and salvages equipment at SDPS-15 on the north end of Reuse Area 1. Removal of these facilities in 2003 will eliminate a maintenance problem, reduce the number and size of storm water lift stations and permit the possible salvage of existing equipment for reuse in other lift stations.

SD-6: Isolation and Removal of SDPS-14 - This upgrade removes and salvages equipment at SDPS-14 in the central portion of Reuse Area 1. Removal of these facilities in 2003 will eliminate a maintenance problem, reduce the number and size of storm water lift stations and permit the possible salvage of existing equipment for reuse in other lift stations.

SD-70: Plug Manholes and Outfalls (GL002, 3, 4, 11, 12, 13, 15, 17, and 18) - This project isolates and removes minor storm water outfalls along the seawall between 1st St. and D St. Due to the limited service area of these outfalls, this improvement can either be accomplished immediately or in conjunction with demolition and redevelopment of facilities in this part of Reuse Area 3, currently projected for 2000.

4.3.2 ULTIMATE IMPROVEMENTS (2007 - 20XX)

The improvements discussed above correct the majority of systemic problems by reducing the number of lift stations and increasing the capacity of lines in long term development areas. From the long term timeframe to ultimate development in 20XX, the remaining improvements focus on correcting localized slope and capacity restrictions to provide service to smaller redevelopment areas, outyear redevelopment areas (i.e.: Reuse Area 10) and completing additional, high cost, outfall consolidations. Costs for manhole and catch basin replacement are excluded from pipe replacement costs as they will become a factor of in-tract development. Lifecycle costs, although listed under ultimate development, should accrue on a straight line basis from 1997 through the entire assumed twenty year timeframe to 2017.

Capital Improvements for Ultimate Redevelopment

SD-32: Construct 18" Collector - This improvement constructs 150 feet of 18" RCP collector along G St. This collector will provide gravity storm water drainage from the southwest corner Reuse Area 1 into drainage basin D. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on potential redevelopment of, and around, the Rodman Center in 20XX.

SD-33: Construct 21" Collector - This improvement replaces 150 feet of RCP collector along G St. This collector will provide gravity storm water drainage from the southwest corner the reuse area into drainage basin D. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on potential redevelopment of, and around, the Rodman Center in 20XX.

SD-42: Construct 18" Collector - This improvement replaces 1650 feet of RCP collector along 3rd St. This collector will provide gravity storm water drainage from the southern portions of Reuse Areas 2 and 3 through drainage basin F. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete is used for ground construction between California Ave. and the seawall. Timing for this improvement is based on potential redevelopment of Reuse Areas 2 and 3 in 2009.

SD-43: Construct 10" Collector - This improvement replaces 50 feet of RCP collector along California Ave. in Reuse Area 3. This collector will provide gravity storm water drainage from the southwest corner the reuse area into drainage basin G. Unit prices for this upgrade are based on asphalt construction. Timing for this improvement is based on potential redevelopment of, and around, the Power Plant in 20XX.

SD-44: Construct 18" Collector - This improvement replaces 400 feet of RCP collector along Walnut Ave. This collector will provide gravity storm water drainage from the central portion of Reuse Area 4 into drainage basin H. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on projected increased demands in Reuse Area 4 by 2007.

SD-45: Construct 18" Collector - This improvement replaces 400 feet of RCP collector along 6th St. This collector will provide gravity storm water drainage from the central portion of Reuse Area 4 into drainage basin H. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is based on projected increased demands in Reuse Area 4 by 2007.

SD-48: Construct 21" Collector - This improvement replaces 1000 feet of RCP collector along 9th St. This collector will provide gravity storm water drainage from the central portion of Reuse

Area 6 into drainage basin I. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on projected increased demands in Reuse Area 6 by 2007.

SD-56: Construct 18" Collector - This improvement replaces 400 feet of RCP collector in Reuse Area 8. This collector, along with SD-57 and 58, will provide gravity storm water drainage from Reuse Area 8 into drainage basin K. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is based on projected increased demands in Reuse Area 8 by 2007.

SD-57: Construct 15" Collector - This improvement replaces 300 feet of RCP collector in Reuse Area 8. This collector, along with SD-56 and 58, will provide gravity storm water drainage from Reuse Area 8 into drainage basin K. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on projected increased demands in Reuse Area 8 by 2007.

SD-58: Construct 21" Collector - This improvement replaces 1200 feet of RCP collector in Reuse Area 8. This collector, along with SD-56 and 57, will provide gravity storm water drainage from Reuse Area 8 into drainage basin K. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on projected increased demands in Reuse Area 8 by 2007.

SD-61: Construct 36" Trunk Line - This improvement replaces 200 feet of RCP trunk line along 15th St. east of California Ave. This improvement will provide adequate gravity storm water drainage from the southern portion of Reuse Area 5 through drainage basin L. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete is encountered near the seawall. Timing for this improvement is based on potential redevelopment of Reuse Area 5 in 2012 and may be accelerated by proposed demolition in this area.

SD-62: Construct 18" Collector - This improvement replaces 400 feet of RCP collector north of the finger piers. This collector will provide gravity storm water drainage from the southern portion of Reuse Area 5 through drainage basin L. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete is encountered between California Ave. and the seawall. Timing for this improvement is based on potential redevelopment of Reuse Area 5 in 2012 and may be accelerated by proposed demolition in this area.

SD-63: Construct 27" Collector - This improvement replaces 400 feet of RCP collector in Reuse Area 9. This collector, along with SD-64 and 65, will provide gravity storm water drainage from Reuse Areas 5 and 9 into drainage basin M. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on projected increased demands in Reuse Area 9 by 2014.

SD-64: Construct 33" Collector - This improvement replaces 300 feet of RCP collector along Railroad Ave. in Reuse Area 9. This collector, along with SD-63 and 65, will provide gravity storm water drainage from Reuse Areas 5 and 9 into drainage basin M. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Phasing for this improvement is based on projected increased demands in Reuse Area 9 and possible roadway improvements in 2014.

SD-65: Construct 33" Collector - This improvement replaces 300 feet of RCP collector leading to the seawall in Reuse Area 5. This collector, along with SD-63 and 64, will provide gravity storm water drainage from Reuse Areas 5 and 9 into drainage basin M. Unit prices for this upgrade are based on asphalt construction, however they also assume major earthwork will be done in conjunction with planned roadway improvements. Timing for this improvement is based on projected increased demands in Reuse Areas 5 and 9 by 2014.

SD-66: Construct 3'x4' Channel - This improvement is for construction of 1500 feet of an open, concrete lined collector channel for storm drainage along Blake Ave. in Reuse Area 10. In conjunction with SD-67, 68 and 69, it forms a consolidated outfall for this area, combining existing drainage basins N, O and P. This improvement is based on redevelopment of Blake Ave. and Reuse Area 10 currently planned for 20XX.

SD-67: Construct 3'x2' Channel - This improvement is for construction of 1300 feet of an open, concrete lined collector channel for storm drainage along Railroad Ave. in Reuse Area 10. In conjunction with SD-66, 68 and 69, it forms a consolidated outfall for this area, combining existing drainage basins N, O and P. This improvement is based on redevelopment of Railroad Ave. and Reuse Area 10 currently planned for 20XX.

SD-68: Construct 5'x4' Channel - This improvement is for construction of 400 feet of an open, concrete lined channel for storm drainage from Blake Ave. to Mare Island Strait in Reuse Area 10. In conjunction with SD-66, 67, and 69, it forms a consolidated outfall for this area, combining drainage basins N, O and P. This improvement is based on redevelopment of Reuse Area 10, preceding other collector improvements, including SD-66, 67 and 69, currently planned for 20XX.

SD-69: Construct 3'x4' Channel - This improvement is for construction of 1500 feet of an open, concrete lined collector channel for storm drainage along Blake Ave. in Reuse Area 10. In conjunction with SD-66, 67 and 68, it forms a consolidated outfall for this area, combining drainage basins N, O and P. This improvement is based on redevelopment of Blake Ave. and Reuse Area 10 currently planned for 20XX.

Lifecycle Repair and Replacement

SD-75: Replace ACP Storm Drainage Pipe Mains - These replacements are based on the age and condition of nearly 300 feet of asbestos cement storm sewers currently in use on base. The average size of this type of pipe, for cost estimating purposes is 18". Based on the number pipes replaced by individual capital improvements, the average date of installation, location relative to unstable soils and estimated remaining lifespan, 30% will need to be replaced due to deposition or failure over the next twenty years (1997 to 2017).

SD-76: Replace Redwood Drainage Boxes - These replacements are based on the age and condition of nearly 1,400 feet of redwood box storm sewers currently in use on base. The average size of the redwood boxes is 18". Based on the number pipes replaced by individual capital improvements, the average date of installation, location relative to other improvements or unstable soils and estimated remaining lifespan, 30% will need to be replaced due to deposition, rotting or failure over the next twenty years (1997 to 2017).

SD-77: Replace Brick Storm Sewers - These replacements are based on the age and condition of nearly 1,600 feet of brick storm sewers currently in use on base. The average size for this type of pipe, for cost estimating purposes and based on its application and effective length, is 18". Based on the average date of installation, location relative other improvements or unstable soils and estimated remaining lifespan, 30% will need to be replaced due to deposition or mortar failure over the next twenty years (1997 to 2017).

SD-78: Replace CIP Storm Sewer Pipes - These replacements are based on the age and condition of nearly 1,400 feet of cast iron storm sewers currently in use on base. The average size for this type of pipe, for cost estimating purposes and based on its application and effective length, is 18". Based on the number pipes replaced by individual capital improvements, the average date of installation, location relative to highly corrosive or unstable soils and estimated remaining lifespan, 10% will need to be replaced due to corrosion or failure over the next twenty years (1997 to 2017).

SD-79: Replace CMP Sewer Mains - These replacements are based on the age and condition of nearly 17,500 feet of corrugated metal storm sewers currently in use on base. The average size for this type of pipe, for cost estimating purposes and based on its application and effective length, is 18". Based on the average date of installation, location relative to highly corrosive or unstable soils and estimated remaining lifespan, 40% will need to be replaced due to corrosion, deposition or failure over the next twenty years (1997 to 2017).

SD-80: Replace RCP Sewer Mains- These replacements are based on the age and condition of nearly 16,200 feet of reinforced concrete storm sewers currently in use on base. The average size for this type of pipe, for cost estimating purposes and based on its application and effective length, is 18". Based on the average date of installation, location relative to highly corrosive or unstable soils and estimated remaining lifespan, 5% will need to be replaced due to deposition or failure over the next twenty years (1997 to 2017).

SD-81: Replace TC Sewer Mains - These replacements are based on the age and condition of nearly 2,700 feet of terra-cotta storm sewers currently in use on base. The average size for this type of pipe, for cost estimating purposes and based on its application and effective length, is 18". Based on the average date of installation, location relative to highly corrosive or unstable soils and estimated remaining lifespan, 10% will need to be replaced due to aging, deposition or failure over the next twenty years (1997 to 2017).

SD-82: Replace VCP Sewer Mains - These replacements are based on the age and condition of nearly 14,500 feet of vitrified clay storm sewers currently in use on base. The average size for this type of pipe, for cost estimating purposes and based on its application and effective length, is 18". Based on the average date of installation, location relative to highly corrosive or unstable soils and estimated remaining lifespan, 5% will need to be replaced due to deposition or failure over the next twenty years (1997 to 2017).

SD-83: Replace Pumps 1 & 2; SDPS-13 - This improvement replaces the two existing pumps at SDPS-13. This lift station serves a small drainage area in the hospital complex in Reuse area 9 and discharges into drainage basin L Timing on this upgrade is based on the condition and redundancy of the existing pumps, limited area served by this lift station, and planned reuse or redevelopment of the area, currently planned for 2006.

Outfall Consolidation

SD-71: Install New 18" Interceptor - This improvement constructs an interceptor line to capture and divert storm water discharge from 2 outfalls along the seawall between A St. and B St. and divert them into Drainage Basin E. Unit prices include construction through asphalt; however there is an additional line item for excavation and construction costs since structural, reinforced concrete encountered between California Ave. and the seawall. Due to the larger service area of these outfalls, this improvement should be accomplished in conjunction with facility demolition and redevelopment in 20XX.

SD-72: Plug Manholes and Outfalls (GL010 and 16) - This improvement isolates and removes 2 storm water outfalls along the seawall between A St. and B St. Due to the larger service area of these outfalls, this improvement should be accomplished in conjunction with SD-71 in 20XX.

SD-73: Install New 36" Interceptor - This improvement constructs an HDPE interceptor line to capture and divert storm water discharge from outfalls for Drainage Basins J, K and L along the face of the seawall under the dock "lip". Unit prices exclude excavation and backfill, however they include added costs for construction along the seawall. Timing for this improvement is based on availability of funds (20XX).

SD-74: Construct Storm Water Monitoring Station - This improvement provides a monitoring station in conjunction with outfall consolidation for drainage basins J, K and L (SD-73). Timing for this improvement should coincide with consolidation of the outfalls in 20XX.

Table 4-5
Storm Drainage Capital Improvements

PROJECT PHASING	BASIN	PRJ ID	IMPROVEMENT DESCRIPTION	UNIT COST		UNITS	TOTAL COST
	SYSTEM UPGRADES (TO MEET CURRENT STANDARDS)						
1997	A (SDPS15)	SD- 1	- REPAIR PUMP 1 VALUES & PIPES	$5,800	LS		$5,800
1997		SD- 2	- REFURBISH PUMP 2	$12,700	LS		$12,700
1998	B (SDPS14)	SD- 3	- REPAIR PUMP 1 SEALS, VALUES & PIPES	$5,600	LS		$5,600
1998		SD- 4	- REFURBISH PUMP 2	$12,700	LS		$12,700
	SUBTOTAL EXISTING SYSTEM MODIFICATIONS COSTS						$36,800
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 5% OF PIPELINES)						$0
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$51,000
	SYSTEM EXPANSION (TO MEET PROJECTED FUTURE DEVELOPMENT)						
2003	A-C	SD- 7	- CONSTRUCT 4'x2' CHANNEL (NOTE #2)	$200	LF	800	$160,000
2000	*(NOTE #1)*	SD- 8	- CONSTRUCT 6'x5' CHANNEL	$500	LF	1,000	$500,000
2003	MAIN CHANNEL	SD- 9	- CONSTRUCT 4'x2' CHANNEL (NOTE #2)	$200	LF	1,400	$280,000
2005		SD- 10	- 18" COLLECTOR TO MAIN CHANNEL & MANHOLES	$85	LF	300	$25,500
2006		SD- 11	- 18" COLLECTOR TO MAIN CHANNEL & MANHOLES	$85	LF	200	$17,000
2007		SD- 12	- 18" COLLECTOR TO MAIN CHANNEL & MANHOLES	$85	LF	200	$17,000
2004		SD- 13	- 24" COLLECTOR TO MAIN CHANNEL & MANHOLES	$115	LF	500	$57,500
2003		SD- 14	- 24" COLLECTOR TO MAIN CHANNEL & MANHOLES	$115	LF	500	$57,500
2003		SD- 15	- 24" COLLECTOR TO MAIN CHANNEL & MANHOLES	$115	LF	500	$57,500
2000	A-C FORCE MAIN	SD- 16	- 36" HDPE FORCE MAIN	$110	LF	1,850	$203,500
2000	A-C	SD- 17	- NEW PUMP AND EQUIPMENT	$700,000	EA	2	$1,400,000
2000	PUMP STATION	SD- 18	- NEW PUMP HOUSE	$150,000	LS		$150,000
1999		SD- 19	- DREDGE DETENTION BASIN - 400'X500'X5'	$2.36	CY	111,000	$262,200
1999	A-C	SD- 20	- 3'x5' CHANNEL	$400	LF	2,400	$960,000
2000	GRAVITY LINE	SD- 21	- 36" TRUNK LINE & MANHOLES - RCP	$185	LF	600	$111,000
2001		SD- 22	- 24" TRUNK LINE & MANHOLES - RCP	$115	LF	600	$69,000
2001		SD- 23	- 30" TRUNK LINE & MANHOLES - RCP	$150	LF	1,500	$225,000
2001		SD- 24	- 24" TRUNK LINE & MANHOLES - RCP	$115	LF	500	$57,500
2003		SD- 25	- 3'X2' CHANNEL	$200	LF	1,200	$240,000
2002		SD- 26	- 24" COLLECTOR & MANHOLES - RCP	$115	LF	1,000	$115,000
2001		SD- 27	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2000		SD- 28	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000

Table 4-5
Storm Drainage Capital Improvements

PROJECT PHASING	BASIN	PRJ ID	IMPROVEMENT DESCRIPTION	UNIT COST		UNITS	TOTAL COST
	SYSTEM EXPANSION (CONT'D)						
1999	D CHANNEL	SD- 29	- CONSTRUCT 4'x3' CHANNEL	$300	LF	300	$90,000
1998	D	SD- 30	- 15" COLLECTOR & MANHOLES - RCP	$70	LF	100	$7,000
1999	GRAVITY LINE	SD- 31	- 24" COLLECTOR & MANHOLES - RCP	$115	LF	550	$63,000
20XX		SD- 32	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	150	$13,000
20XX		SD- 33	- 21" COLLECTOR & MANHOLES - RCP	$100	LF	150	$15,000
2004		SD- 34	- 30" TRUNK LINE & MANHOLES - RCP	$150	LF	1,350	$203,000
2005		SD- 35	- 27" COLLECTOR & MANHOLES - RCP	$135	LF	350	$47,000
2005		SD- 36	- 24" COLLECTOR & MANHOLES - RCP	$115	LF	750	$86,000
2005		SD- 37	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	600	$51,000
2006	E	SD- 38	- 15" COLLECTOR & MANHOLES - RCP	$70	LF	1,100	$77,000
	GRAVITY LINE		- 18" COLLECTOR & MANHOLES - RCP	$85	LF	600	$51,000
2005		SD- 39	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	$150	LF	500	$75,000
2006		SD- 40	- 12" COLLECTOR & MANHOLES - RCP	$55	LF	700	$39,000
2006		SD- 41	- 12" COLLECTOR & MANHOLES - RCP	$55	LF	700	$39,000
	F		- 18" COLLECTOR & MANHOLES - RCP	$85	LF	1,650	$140,000
2009	GRAVITY LINE	SD- 42	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	$150	LF	500	$75,000
20XX	G GRAVITY LINE	SD- 43	- 10" COLLECTOR & MANHOLES - RCP	$50	LF	50	$3,000
2007	H	SD- 44	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2007	GRAVITY LINE	SD- 45	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2001		SD- 46	- 36" COLLECTOR & MANHOLES - RCP	$185	LF	600	$111,000
2002		SD- 47	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	600	$51,000
2007	I	SD- 48	- 21" COLLECTOR & MANHOLES - RCP	$100	LF	1,000	$100,000
2006	GRAVITY LINE	SD- 49	- 33" COLLECTOR & MANHOLES - RCP	$170	LF	1,550	$264,000
2006		SD- 50	- 42" TRUNK LINE & MANHOLES - RCP	$205	LF	1,000	$205,000
2006		SD- 51	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	800	$68,000
			- 48" TRUNK LINE & MANHOLES - RCP	$225	LF	650	$146,000
2006		SD- 52	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	$150	LF	650	$97,500
2004		SD- 53	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	500	$43,000
			- 60" TRUNK LINE & MANHOLES - RCP	$275	LF	300	$83,000
2002		SD- 54	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	$150	LF	300	$45,000

Table 4-5
Storm Drainage Capital Improvements

PROJECT PHASING	BASIN	PRJ ID	IMPROVEMENT DESCRIPTION	UNIT COST		UNITS	TOTAL COST
	SYSTEM EXPANSION (CONT'D)						
	J		- 36" TRUNK LINE & MANHOLES - RCP	$185	LF	1,600	$296,000
2003	GRAVITY LINE	SD- 55	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	$150	LF	500	$75,000
2007	K	SD- 56	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2007	GRAVITY LINE	SD- 57	- 15" COLLECTOR & MANHOLES - RCP	$70	LF	300	$21,000
2007		SD- 58	- 21" COLLECTOR & MANHOLES - RCP	$100	LF	1,200	$120,000
2006		SD- 59	- 30" TRUNK LINE & MANHOLES - RCP	$150	LF	750	$113,000
2006		SD- 60	- 42" TRUNK LINE & MANHOLES - RCP	$205	LF	350	$72,000
2012	L	SD- 61	- 36" TRUNK LINE & MANHOLES - RCP	$185	LF	200	$37,000
2012	GRAVITY LINE	SD- 62	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2014	M	SD- 63	- 27" COLLECTOR & MANHOLES - RCP	$135	LF	400	$54,000
2014	GRAVITY LINE	SD- 64	- 33" COLLECTOR & MANHOLES - RCP	$170	LF	300	$51,000
2014		SD- 65	- 33" COLLECTOR & MANHOLES - RCP	$170	LF	300	$51,000
20XX	N,O,P	SD- 66	- CONSTRUCT 3'x4' CHANNEL	$350	LF	1,500	$525,000
20XX	CHANNEL	SD- 67	- CONSTRUCT 3'X2' CHANNEL	$200	LF	1,300	$260,000
20XX		SD- 68	- CONSTRUCT 5'x4' CHANNEL	$450	LF	400	$180,000
20XX		SD- 69	- CONSTRUCT 3'x4' CHANNEL	$350	LF	1,500	$525,000
	SUBTOTAL SYSTEM EXPANSION COSTS						$9,836,700
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 5% OF PIPELINES)						$120,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$13,740,000
	OUTFALL CONSOLIDATION PROJECTS						
2003	A (SDPS15)	SD- 5	- REMOVAL OF PUMP STATION	$10,000	LS		$10,000
2003	B (SDPS14)	SD- 6	- REMOVAL OF PUMP STATION	$8,000	LS		$8,000
	E		- PLUG MANHOLE OUTFALLS				
2000		SD- 70	@ GL002,3,4,11,12,13,15,17,18	$150	MH	8	$1,200
			- 18" INTERCEPTOR - RCP	$85	LF	500	$43,000
20XX		SD- 71	- REINFORCED CONCRETE EXCAVATION CST - NOTE#	$150	LF	500	$75,000
20XX		SD- 72	- PLUG MANHOLE OUTFALLS @GL010,16	$150	MH	2	$300
20XX	J,K,L	SD- 73	- 36" INTERCEPTOR - HDPE	$85	LF	1,100	$94,000
20XX		SD- 74	- MONITORING STATION	$6,500	EA	1	$7,000
	SUBTOTAL OUTFALL CONSOLIDATION COSTS						$239,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 5% OF PIPELINES)						$3,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$334,000

Table 4-5
Storm Drainage Capital Improvements

PROJECT PHASING	BASIN	PRJ ID	IMPROVEMENT DESCRIPTION	UNIT COST		UNITS	TOTAL COST
	LIFE CYCLE REPLACEMENT COSTS (UNTIL YEAR 2017)						
	GRAVITY LINES	*SD- 75*	- REPLACE 18" ACP LINE	$85	LF	100	$9,000
		SD- 76	- REPLACE 18" BOX LINE	$85	LF	400	$34,000
		SD- 77	- REPLACE 18" BRICK LINE	$85	LF	500	$43,000
		SD- 78	- REPLACE 18" CIP LINE	$85	LF	100	$9,000
		SD- 79	- REPLACE 18" CMP LINE	$85	LF	7,000	$595,000
		SD- 80	- REPLACE 18" RCP LINE	$85	LF	800	$68,000
		SD- 81	- REPLACE 18" TC LINE	$85	LF	300	$26,000
		SD- 82	- REPLACE 18" VCP LINE	$85	LF	700	$60,000
	PUMPS	*SD- 83*	- REPLACE 2 EX. PUMPS W/ HIGHER CAPACITY	$53,000	EA	2	$106,000
	SUBTOTAL LIFE CYCLE COSTS						$950,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 5% OF PIPELINES)						$13,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$1,329,000

	TOTAL STORM DRAINAGE SYSTEM UPGRADES	**$15,454,000**

NOTE #1: *Consolidation of basins A, B, & C into new drainage basin A-C.*

NOTE #2: *Cross section of channel increases approaching SD-8.*

NOTE #3: *Cost for underground construction; Above ground construction would preclude these costs.*

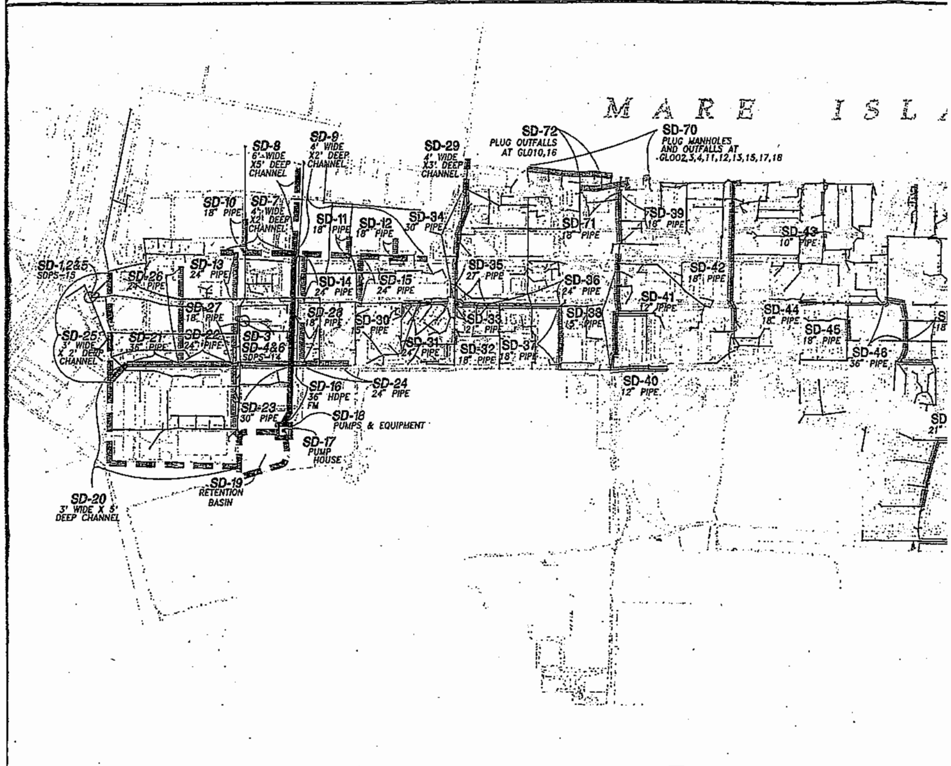
GENERAL A: *All line improvements include costs for manholes*

B: *Improvement construction assumes stable construction conditions due to concurrent roadway improvements.*

C: *Costs based on Reimer Associates experience and cross referenced with J.M. Montgomerey 1987 Report with allowance for inflation.*

D: *All cost estimates are in 1997 dollars and no inflation has been added to improvement costs proposed in future years.*

Figure 4-4 Recommended Storm Drain System Capital Improvements



MARE ISL
SD-72
PLUG OUTFALLS AT GL010,16
SD-70
PLUG MANHOLES AND OUTFALLS AT GL002,3,4,11,12,13,15,17,18
SD-8
6' WIDE X5' DEEP CHANNEL
SD-9
4' WIDE X2' DEEP CHANNEL
SD-29
4' WIDE X3' DEEP CHANNEL
SD-10
18" PIPE
SD-7
4' WIDE X2' DEEP CHANNEL
SD-11
18" PIPE
SD-12
18" PIPE
SD-34
30" PIPE
SD-71
18" PIPE
SD-39
18" PIPE
SD-43
SD-1,2&5
SDPS-15
SD-26
SD-13
24" PIPE
SD-14
24" PIPE
SD-15
24" PIPE
SD-35
27" PIPE
SD-36
24" PIPE
SD-42
18" PIPE
SD-41
SD-44
18" PIPE
SD-45
18" PIPE
SD-46
36" PIPE
SD-27
18" PIPE
SD-28
18" PIPE
SD-30
SD-33
SD-38
SD-25
3' WIDE X 2' DEEP CHANNEL
SD-21
36" PIPE
SD-22
24" PIPE
SD-3
SD-4&6
SDPS-14
SD-31
24" PIPE
SD-32
18" PIPE
SD-37
18" PIPE
SD-40
12" PIPE
SD-16
36" HDPE FM
SD-24
24" PIPE
SD-23
30" PIPE
SD-18
PUMPS & EQUIPMENT
SD-17
PUMP HOUSE
SD-19
RETENTION BASIN
SD-20
3' WIDE X 5' DEEP CHANNEL

SECTION 5

CAUSEWAY BRIDGE

SECTION 5
CAUSEWAY BRIDGE

5.1 BACKGROUND

The Mare Island Causeway Bridge provides the only vehicular, rail, and pedestrian access route to Mare Island from the east. This route, across the Mare Island Straits, provides two lanes of traffic inbound (westbound), one lane of traffic outbound (eastbound), a single railroad track, and a 7.5' wide sidewalk. The Bridge is approximately 2070' in length. A second access road, Route 37 connects with the north end of the island.

The Sacramento Street Overcrossing is located within the City of Vallejo. The structure carries four lanes of municipal vehicular traffic over the same railroad tracks that service Mare Island via the Causeway Bridge. The bridge is approximately 100' in length.

The MIRIS team performed a site visit and as-built plan review to determine the cost of bridge inspections required to meet regulatory requirements, and the feasibility of joint rail/vehicle use of the Causeway Bridge.

5.1.1 SUMMARY OF FINDINGS

The MIRIS Team has collected available and known documentation on the Causeway Bridge and Sacramento Street Overcrossing. Those data found include a copy of the 1978 alterations and repairs of the Causeway Bridge designed by Hardesty and Hanover, bridge Operation and Maintenance Manuals, the latest Underwater Description Report as well as the periodic inspection reports and engineering investigations of the Causeway Bridge.

Bridge As-Built Plans

The plan set consists of ninety-five sheets. Six of these sheets are copies from original 1933 bridge drawings and 9 sheets are from the 1960 bascule deck replacement. These fifteen sheets were submitted as reference drawings for the 1978 work.

These reference drawings detail alterations and repairs to the entire bridge, including complete details of the replacement of the original bascule bridge with a 189-foot center lift span. The approach spans, constructed in 1933 and extending approximately 900' on each side of the lift span, also underwent extensive repair in 1978.

Based on an initial field check, these plans are an accurate and useful description of the lift span and approaches. The main members, piling, and configuration appear to have been constructed as shown. The repairs and alterations detailed appear to have been accomplished. There were no obvious errors or inconsistencies found in the plans.

Previous Engineering Analyses of the Causeway Bridge

The MIRIS Team found five separate engineering analyses of the Causeway Bridge. These analyses are listed in Table 5-1. These studies were performed to demonstrate the bridge's ability to carry loads greater than its original design loads. Inspections were performed in conjunction with all of the studies.

The ability of the main trestle spans (the typical causeway section) to carry 2 lanes of HS20-44 (standard highway loading) OR E-72 (standard rail loading) at 10 mph was demonstrated in the 1972 report by Degenkolb. The west railroad approach trestle is rated for E-72, also at 10 mph. The 1978 lift span was designed for E-50 rail loads in conjunction with HS20-44 loads.

Table 5-1

Date and Firm	Title	Summary
6/1972 For: Commanding Officer, Western Division of NAVFAC By: H.J. Degenkolb	Engineering Study of Causeway Bridge and Trestle	Inspection and Load Rating. Inspection included below water inspection of the piles. "By imposing speed restrictions, the rail loading may be increased from E-50 to E-72." Speed limited to 10 mph on causeway trestles. "The decking and stringers of the west approach highway trestle are deficient in capacity even for present loadings and require reinforcement." This section was rebuilt around 1985. Mare Island requested that Degenkolb look at a special rail load also. The E-72 load controlled.
11/1974 For: Construction Officer, Mare Island By: H.J. Degenkolb	Engineering Analysis-Causeway Bridge and Trestle-Mare Island Naval Shipyard	"Analysis...to determine whether or not the structural quality of the structure is adequate to support traversal of a new type of special purpose railcar with a Mare Island locomotive. Also included are our recommendations for speed restrictions and concurrent limitations to other forms of Causeway traffic." Analyzed railcar and locomotive and one HS20-44 using AREA, AASHO, AISC, Navy Code. "A study of the tabulated results of analysis will indicate that all of the members involved in the support of railway loads in the Bascule Span Trusses, the typical Causeway spans, the timber railway approach trestle and piles are capable of supporting the maximum combination of loads with the new special purpose railcar and locomotive and standard HS20-44 highway loading including impact without exceeding the safe capacity as defined by any of the codes considered. Small theoretical overstresses were found in the Bascule Span only."

Table 5-1 (cont.)

10/1977 For: Mare Island Naval Shipyard By: H.J. Degenkolb	Inspection and Evaluation of the Mare Island Causeway	Purpose of report: to determine the structural integrity of the Causeway and to recommend repair method to enable the Causeway to safely carry the vehicular and train traffic as required by the shipyard. Performed field inspection of 20% of the piles, the Causeway, and the highway and railway trestles at the west end of the causeway. Concrete posts at the guardrails are cracking badly. Roadbed and walkway are sound. Recommends painting the superstructure, repairing the piles, replacing expansion joints, epoxy-grouting the rail posts and light standards
6/1989 For: Mare Island Naval Shipyard By: Putterman/Davis, Structural Engineers	Engineering Study-Causeway and Drydock 2 Trackage	"The purpose of this investigation is to determine whether various elements of the Causeway system... are structurally adequate to support a special purpose rail train. The train consists of a 525 kip eight-axle railcar and the shipyard's 132 kip four-axle diesel locomotive." The lift span, the typical causeway spans, and the railroad trestle were all found to be adequate for this load.
1/1993 For: Ocean Engineering and Construction Project Office-NAVFAC By: Blaylock Engineering Group, San Diego	Underwater Facilities Inspection and Assessment-Mare Island Naval Shipyard	Underwater inspection of the Causeway and various berths. "The causeway was found to be generally in good condition, but with some structural deficiencies...There is no structural damage which would significantly affect its load carrying capability." The report recommended replacement of anodes. This was performed in June 1993. Battered Pile at Bent 19H requires replacement ($8,100). Battered Pile at Bent 24H requires concrete encasement ($3,100). Recommends re-inspection in six years (1999). Piles at bents 0,1,2,52 are untreated timber and are "inaccessible". These were not inspected. Scour depths of greater than 3' were noted since 1978 repairs. Subcaps at bents 39 and 41 showing cracks with rust stains at longitudinal reinforcement. Cracks extend approx. 8-10 feet from end of bent. Level I inspection of entire bridge, including superstructure. Level II inspection at random locations and location showing irregularities. Level III inspection of 5% of the steel pipe piles.

5.1.2 EXISTING O&M REQUIREMENTS

Deficiencies and recommended actions are reported in Appendix C. The bridge is in generally good condition. Some adjustments, investigation of possible problems, repair of brake shoes, elimination of some minor safety items and establishment of a realistic inspection and preventive maintenance program are needed.

5.1.3 MAINTENANCE AND REPAIR COST PROJECTION

Items and actions from Appendix C, recommended for completion in 1997 are summarized below. These costs are for the lift bridge only and do not include road or signalization improvements; these are listed Section 5.1.7 under Transportation Capital Improvements.

Item	Description	Cost
1	Turn all brake drums and replace shoe pads in both towers:	$ 7,200
2	Disassemble, inspect, repair, reassemble and test brake assemblies, motor coupling, reduction gears	$16,200
3	Structural inspectors check for signs of rubbing and report.	$ 6,400
4	Adjust cables, cams and relays (yearly).	$ 4,400
5	Replace grease on open gears, inspect gear tooth faces, add grease to cables and cable guides.	$ 4,100
6	Review stored lubricants and mark appropriate use on containers.	$ 500
7	Install fire extinguishers.	$ 1,200
8	Install safety chain.	$ 600
9	Install missing lamps and replace switch.	$ 400
10	Electrical Panels and Space-heaters - no action.	$ 0
11	Prepare inspection and preventative maintenance plan.	$ 4,200
	Total	**$45,200**

5.1.4 CONTROLLING REGULATORY AGENCIES

Federal and State Regulations

Federal and state regulations govern all vehicular bridges in the various states. The regulations contained in the National Bridge Inspection Standards (NBIS) establish the requirements for inspection procedures, frequency of inspections, qualifications of personnel, inspection reports, and preparation of bridge records. These regulations apply to all bridges located on or over public roads.

The NBIS standards are described in the "Manual for Condition Evaluation of Bridges" and "Manual for the Maintenance Inspection of Bridges", published by the American Association of State Highway and Transportation Officials (AASHTO). These documents state an inspection frequency of 2 years. Underwater inspections, if applicable, are to be made every 5 years.

Caltrans has historically provided inspection and load rating services for both its own bridges on the State highway system and for those bridges owned by local agencies which are located off a State route. Various inter-agency agreements have been set up to cover the cost of this service. However, as Caltrans searches for ways to absorb budget and manpower cuts, the number of bridges they can inspect is reduced. As an alternative, some agencies contract with private firms to provide this service.

For more information on services provided by Caltrans to local agencies, the City may contact Caltrans at the following address:

Glenn Behm, Caltrans Deputy District Director
Caltrans District 4
111 Grand Avenue
PO Box 23660
Oakland, CA 94623-0660

Public Utilities Commission Regulations

Railway facilities are regulated by the Public Utilities Commission. City of Vallejo staff and the Public Utilities Commission staff have under discussion the improvements to the rail facilities which will bring them up to current standards. Therefore, this report will only discuss the possibility of joint/rail vehicle use, and not address regulations required to bring the rail facilities to current PUC standards.

5.1.5 BRIDGE INSPECTION AND LOAD RATING

Bridge Inspection

The regulations contained in the National Bridge Inspection Standards (NBIS) establish the requirements for inspection procedures, frequency of inspections, qualifications of personnel, inspection reports, and preparation of bridge records. The NBIS apply to all bridges located on or over public roads. The NBIS standards are described in the "Manual for Condition Evaluation of Bridges" and "Manual for the Maintenance Inspection of Bridges", published by the American Association of State Highway and Transportation Officials (AASHTO). These documents state that routine inspections be made every 2 years. Underwater inspections, if applicable, are to be made every 5 years. Also, an "Initial Inspection" is required upon the transfer of ownership of a bridge. The initial inspection is a fully documented investigation performed by qualified persons. A load rating investigation must be performed as part of the initial inspection.

The basic purpose of the inspections is to determine and maintain a record of the physical condition of the bridges. Items to be inspected include approaches, piers, abutments, bents, stringers, girders, bearings, expansion joints, deck, curbs, sidewalks, railing, as well as appurtenances at the Causeway center lift span such as cables, counterweights, wiring, and machinery. A record of the inspections is kept and a report of defects and deficiencies prepared. As necessary, recommendations for strengthening are made, if necessary.

The inspection should be performed on all load-carrying sections of the bridges, including the Causeway 1933 approach spans, center lift span, west highway trestle, and west railroad trestle. Specific items of interest will be inspection of the two outside steel box girders at the center lift span. Inspection of the insides of these important members will require a confined-space entry per OSHA guidelines. These "fracture-critical" members require a close look, including possible non-destructive testing.

Inspection of the Causeway lift span would require temporary closure of the bridge to boat traffic for approximately 6 hours. Closure would have to be coordinated and scheduled with the Coast Guard and bridge tender. This is not expected to be difficult as boat traffic is light at certain times (small boats can pass under the closed bridge).

Underwater Inspection

This inspection should occur every five years after the initial inspection. This inspection will include locating the channel bottom to determine scour. Divers would visually and manually check a representative portion of piling to determine their condition and possible deterioration.

Load Rating

After the inspection, the bridges would be load-rated. Load ratings provide a basis for determining the safe load capacity of a bridge. Once the safe load capacity is determined, the bridge is posted accordingly. Any deficiencies found from the inspection are used to lower the capacity of members. The condition and extent of deterioration of bridge components is considered in the load rating.

The end result will be an Inventory Rating and an Operational Rating. The inventory rating is used to determine what live load may use the bridge for an indefinite period of time. The operating rating will describe the maximum permissible live load to which the structure may be subjected.

Estimated Engineering Effort for the Inspections and Load Ratings

The table below summarizes the expected cost of the inspections and load rating of the Causeway Bridge and Sacramento Street Overhead. The cost of the initial inspection and the two-year routine inspection are similar.

Item	Interval	Cost
Causeway Bridge Inspection	2 years	$40,000
Causeway Bridge Load Rating	Once	$13,000
Causeway Bridge Underwater Inspection	5 years	$45,000
Sacramento Street OH Inspection	2 years	$8,000
Sacramento Street OH Load Rating	Once	$10,000

5.1.6 JOINT RAIL/VEHICULAR USE OF CAUSEWAY BRIDGE

Causeway Traffic Operations

The MIRIS Team determined that the lateral clearances at the bridge are insufficient to allow vehicle and rail traffic on the bridge concurrently. Therefore, the bridge will have to be cleared of vehicular traffic before trains are allowed onto the bridge. It is assumed that widening of the bridge approaches and center lift span, or even constructing a new vehicular bridge nearby is prohibitively expensive. These options were not investigated.

Currently, train movements are becoming more frequent, and for the Navy's purposes, joint rail/vehicle use is becoming a concern. Future industrial development on the Island will determine the amount of rail traffic generated, and joint use may be prevalent. Operationally, it may be possible for inbound cars to be spotted on a siding either in the Vallejo area or along AST on Mare Island, then picked up by a switch engine and moved throughout the island. Outbound cars would similarly be assembled on the island, then moved to a switching yard for assembly into a train. In this manner the number and timing of train movements across the causeway and lift bridge would be fairly discretionary by the industrial users and switch engine operator, and not be a function of operating schedules of the rail carrier. This is significant in that it suggests that train movements could be scheduled in off peak hours - early morning, mid-day, later in the evening - and timed to avoid conflicting with vehicle traffic moving into and out of the island, as well as traffic on Wilson Avenue.

5.1.7 TRANSPORTATION/RIGHT-OF-WAY IMPROVEMENTS

Transportation improvements were identified for the City of Vallejo by Fehr and Peers under a separate contract. Based on the reuse plan, they created trip generation factors and peak traffic projections to TAZ areas within the individual reuse areas. Applying these projections to existing arterial roads, a series of road cross-sections were developed for road and right-of-way improvements.

Reimer Associates took these profiles and, using construction estimates and information from the current 1997 Wilson Ave. improvement project, developed costs for each of these improvements as shown in Figure 5-1. These costs, listed in Table 5-2, reflect all aspects of road and right-of-way construction, including lighting, landscaping, rail crossing improvements, and joint trench costs; with the exception of environmental remediation and any gas, electrical and telephone utility relocation costs. An additional "Southern Crossing" (addressed by Fehr and Peers but not included in their improvements) is planned as a new bridge to connect with the roads in the southern end of the island. It was originally projected as an extension of Lemon Street, and has been roughly cited to have an estimated cost of $86 million[1]. This estimate needs to be verified and validated; however, at first inspection, it appears to be excessively high. (This cost is also in addition to the $60 million of transportation improvements listed in this report.)

The majority of transportation improvements will be accomplished in conjunction with redevelopment efforts; i.e. as a parcel is developed, roads serving it will be reconstructed. However, one notable exception to this is Walnut Ave. from G St. to Cedar Ave. This portion of Walnut Ave. runs through the center of the historic district and is unsuitable for expansion due to the proximity of historic facilities and appearance preservation requirements. It also serves the center of the "Downtown" portion of the island containing the Post Office, utility company offices, Alden Park and "Captain's Row", and represents the current façade of the island. At present it is in poor condition with numerous cracks, potholes, and evidence of base/subbase failures. This road should be resurfaced within the next year to prevent further decay and failures and improve the appearance of the island's central district. The total cost for this road resurfacing, including subgrade repairs but excluding reprofiling, will be $180,000. (Note: as of

[1] Previous reference to this bridge in the Final Reuse Plan estimated its cost at $106 million.

the date of this final report, the Navy had agreed to accomplish this road repair under the Caretaker Agreement; initial grinding and site preparation have been completed.)

A related transportation safety item is the need for railroad crossing warning signs. The Public Utilities Commission conducted a tour of the base in the summer of 1997 and identified a number of safety items that needed to be addressed. A series of these was the need for railroad crossing crossbucks and/or barricades at 51 intersections. The cost for these initial warning signs will be $34,300 for 49 of the intersections; two 2-lane barricades along G Street at the Causeway will be $86,000. As the base continues to be redeveloped, many of the initial warning signs will have to be upgraded to warning signals and, in a few select locations, barricades will be required. These upgraded rail crossing are included in Table 5-2, Transportation Capital Improvements, at the end of this section.

Table 5-2
Transportation System Capital Improvements

35,262.53

TYPE	TRANSPORTATION IMPROVEMENT	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COSTS	UNITS	TOTAL COSTS
ON-SITE SYSTEM EXPANSION (TO MEET PROJECTED FUTURE DEVELOPMENT)							
A	6 LANE ARTERIAL	T 1	RAILROAD AVENUE	ALL	$823 LF	3,500	$2,882,000
	NO PARKING		NORTH GATE TO G STREET				
	SUB-BASE FILL COSTS				$43 LF	3,500	$152,000
	CONSTRUCT 6/8 LANE INTERCHANGE	I 1			$798 LF	200	$160,000
	CONSTRUCT 2 LANE RAMP & ACCESS RDS				$542 LF	500	$271,000
	CONSTRUCT 1 LANE RD				$479 LF	900	$431,000
	INSTALL 4-WAY TRAFFIC SIGNAL				$95,000 EA	1	$95,000
	INSTALL 3-WAY TRAFFIC SIGNAL	I 2			$80,000 EA	1	$80,000
	INSTALL 3-WAY TRAFFIC SIGNAL	I 3			$80,000 EA	1	$80,000
	INSTALL 3-WAY TRAFFIC SIGNAL	I 4			$80,000 EA	1	$80,000
	RELOCATE EXISTING TRAFFIC SIGNAL	I 5			$12,500 EA	1	$12,500
G	INDUSTRIAL COLLECTOR	T 2	ACACIA STREET	ALL	$726 LF	1,100	$799,000
	4 LANES W/ PARKING		NORTH GATE TO CEDAR AVE				
	SUB-BASE FILL COSTS				$149 LF	1,100	$164,000
G	INDUSTRIAL COLLECTOR	T 3	P STREET	ALL	$726 LF	1,050	$763,000
	4 LANES W/ PARKING		CEDAR AVE TO RAILROAD AVE				
	SUB-BASE FILL COSTS				$131 LF	1,050	$137,000
F	INDUSTRIAL COLLECTOR	T 4	M STREET	ALL	$587 LF	1,100	$646,000
	4 LANES W/ PARKING		CEDAR AVE TO RAILROAD AVE				
	SUB-BASE FILL COSTS				$112 LF	1,100	$123,000
E	INDUSTRIAL LOCAL	T 5	CEDAR AVE	ALL	$797 LF	3,150	$2,512,000
	2 LANES - PARKING PERMITTED		P STREET TO G STREET				
	SUB-BASE FILL COSTS				$20 LF	2,600	$52,000
	INSTALL 3-WAY TRAFFIC SIGNAL	I 6			$83,500 EA	1	$83,500
	INSTALL 2 LANE R/R BARRICADE SIGNAL				$43,000 EA	4	$172,000
	INSTALL R/R CROSSING SIGN	I 26			$700 EA	2	$1,400
	INSTALL R/R CROSSING SIGN	I 27			$700 EA	2	$1,400
	INSTALL R/R CROSSING SIGN	I 28			$700 EA	2	$1,400

Table 5-2
Transportation System Capital Improvements

35,262.53

TYPE	TRANSPORTATION IMPROVEMENT	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COSTS	UNITS	TOTAL COSTS
	ON-SITE SYSTEM EXPANSION CONT'D						
F	INDUSTRIAL COLLECTOR	T 6	NEW STREET	ALL	$587 LF	1,050	$617,000
	4 LANES W/ PARKING		CEDAR AVE TO RAILROAD AVE				
	SUB-BASE FILL COSTS				$57 LF	400	$23,000
B	4 LANE ARTERIAL	T 7	G STREET	ALL	$710 LF	1,400	$993,000
	NO PARKING		CEDAR AVE TO CALIFORNIA AVE				
	SUB-BASE FILL COSTS				$7.78 LF	1,100	$8,600
	INSTALL 2 LANE R/R CROSSING BARRICADES	I 7			$43,000 EA	2	$86,000
	INSTALL 2 LANE R/R CROSSING BARRICADES	I 8			$43,000 EA	2	$86,000
	REPLACE 4-WAY TRAFFIC SIGNAL W/ 3-WAY				$4,000 EA	1	$4,000
G	INDUSTRIAL LOCAL	T 8	CEDAR AVE	ALL	$726 LF	1,100	$799,000
	2 LANES - PARKING PERMITTED		G STREET TO C STREET				
	SUB-BASE FILL COSTS				$7.56 LF	1,100	$8,300
K	SPECIAL TRANSITWAY	T 9	WALNUT STREET	ALL	$496 LF	5,500	$2,727,000
	SHARED VEHICLE/NON-MOTOR CORRIDOR		G STREET TO 10TH STREET				
	SUB-BASE FILL COSTS				$1.33 LF	5,500	$7,300
	INSTALL R/R CROSSING SIGNAL	I 12			$26,000 EA	3	$78,000
	INSTALL R/R CROSSING SIGNAL	I 21			$26,000 EA	2	$52,000
B	4 LANE ARTERIAL	T 10	RAILROAD AVENUE	ALL	$710 LF	4,400	$3,122,000
	NO PARKING		G STREET TO 8TH STREET				
	SUB-BASE FILL COSTS				$8.44 LF	4,400	$37,000
	INSTALL R/R CROSSING SIGNAL	I 10			$26,000 EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 18			$26,000 EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 19			$26,000 EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 20			$26,000 EA	2	$52,000
	INSTALL R/R CROSSING SIGNS	I 22			$700 EA	2	$1,400
	INSTALL R/R CROSSING SIGNAL	I 23			$26,000 EA	2	$52,000
H	INDUSTRIAL CORRIDOR	T 11	CALIFORNIA AVENUE	ALL	$560 LF	10,100	$5,652,000
	2 LANES - PARKING PERMITTED		CAUSEWAY TO BERTH 24				
	INSTALL R/R CROSSING SIGNAL	I 9			$26,000 EA	2	$52,000

Table 5-2
Transportation System Capital Improvements

35,262.53

TYPE	TRANSPORTATION IMPROVEMENT	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COSTS	UNITS	TOTAL COSTS
ON-SITE SYSTEM EXPANSION CONT'D							
I	RESIDENTIAL COLLECTOR	T 12	EXTENSION OF C STREET	ALL	$542 LF	750	$406,000
	2 LANES - PARKING PERMITTED		RAILROAD AVE TO WATERFRONT AVE				
F	INDUSTRIAL COLLECTOR	T 13	WATERFRONT AVENUE LOOP	ALL	$587 LF	5,000	$2,937,000
	4 LANES W/ PARKING		EXT. OF E TO CONC. WAYS 1				
G	INDUSTRIAL LOCAL	T 14	C STREET	ALL	$726 LF	1,050	$763,000
	2 LANES, PARKING PERMITTED		CEDAR AVE TO RAILROAD AVE				
	SUB-BASE FILL COSTS				$5.78 LF	1,050	$6,100
	INSTALL R/R CROSSING SIGNAL	I 11			$26,000 EA	2	$52,000
I	RESIDENTIAL COLLECTOR	T 15	CEDAR AVE	ALL	$542 LF	7,200	$3,900,000
	2 LANES - PARKING PERMITTED		C STREET TO CLUB CIRCLE DR				
	INSTALL R/R CROSSING SIGNAL	I 13			$26,000 EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 15			$26,000 EA	3	$78,000
I	RESIDENTIAL COLLECTOR	T 16	A STREET	ALL	$542 LF	2,500	$1,354,000
	2 LANES - PARKING PERMITTED		DUMP RD TO CALIFORNIA AVE				
	SUB-BASE FILL COSTS				$4.44 LF	1,800	$8,000
	INSTALL R/R CROSSING SIGNAL	I 14			$26,000 EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 16			$26,000 EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 17			$26,000 EA	2	$52,000
Aa	REDUCED RIGHT-OF-WAY (60')	T 17	RAILROAD AVE	ALL	$635 LF	650	$413,000
	CONSTRAINED 4 LANE ARTERIALS		8TH STREET TO 9TH STREET				
	SUB-BASE FILL COSTS				$4.44 LF	650	$2,900
	INSTALL R/R CROSSING SIGNAL	I 24			$26,000 EA	3	$78,000
Ab	REDUCED RIGHT-OF-WAY (53')	T 18	RAILROAD AVE	ALL	$531 LF	1,200	$637,000
	CONSTRAINED 4 LANE ARTERIALS		9TH STREET TO 12TH STREET				
	SUB-BASE FILL COSTS				$12 LF	1,200	$15,000
I	RESIDENTIAL COLLECTOR	T 19	WALNUT STREET	ALL	$542 LF	750	$406,000
	2 LANES - PARKING PERMITTED		10TH STREET TO CEDAR AVE				
	SUB-BASE FILL COSTS				$3.56 LF	750	$2,700

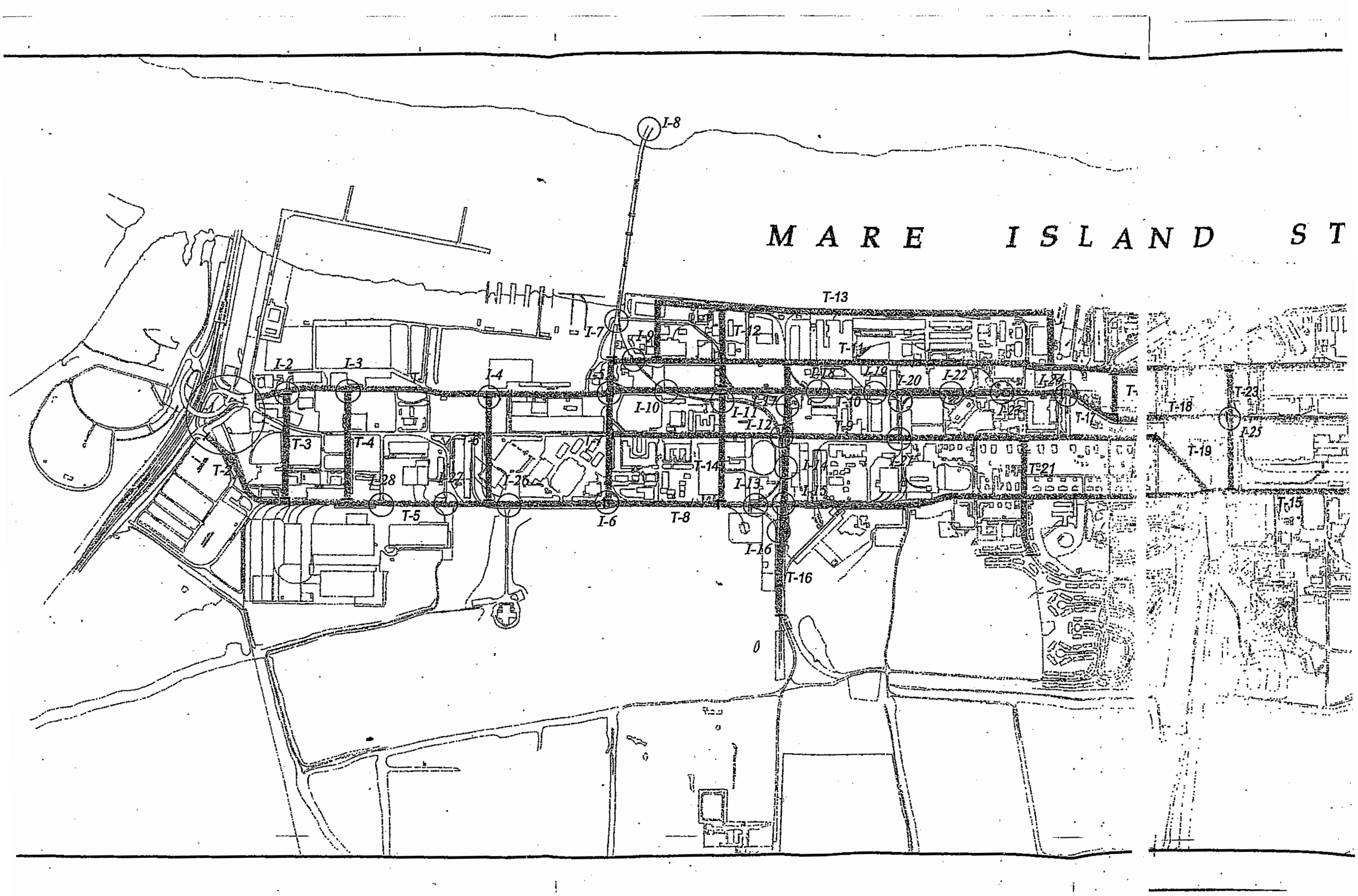
Table 5-2
Transportation System Capital Improvements

35,262.53

TYPE	TRANSPORTATION IMPROVEMENT	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COSTS	UNITS	TOTAL COSTS
	ON-SITE SYSTEM EXPANSION CONT'D						
H	INDUSTRIAL CORRIDOR	T 20	RAILROAD AVE	ALL	$560 LF	4,000	$2,239,000
	2 LANES - PARKING PERMITTED		12 STREET TO GARINO LANE				
	SUB-BASE FILL COSTS		Note 1		$3.11 LF	2,400	$7,000
	INSTALL R/R CROSSING SIGNAL	I 25			$26,000 EA	4	$104,000
I	RESIDENTIAL COLLECTOR	T 21	7TH STREET	ALL	$542 LF	1,150	$623,000
	2 LANES - PARKING PERMITTED		WALNUT AVE TO CRISP AVE				
	SUB-BASE FILL COSTS				$3.56 LF	1,150	$4,100
H	INDUSTRIAL CORRIDOR	T 22	9TH STREET	ALL	$560 LF	450	$252,000
	2 LANES - PARKING PERMITTED		RAILROAD AVE TO CALIFORNIA AVE				
I	INDUSTRIAL LOCAL	T 23	NEW ROAD	ALL	$542 LF	1,200	$650,000
	2 LANES - PARKING PERMITTED		RAILROAD AVE TO CALIFORNIA AVE				
	SUB-BASE FILL COSTS				$2.22 LF	700	$1,600
I	INDUSTRIAL LOCAL	T 24	14 STREET	ALL	$542 LF	1,300	$704,000
	2 LANES - PARKING PERMITTED		CALIFORNIA AVE TO CEDAR AVE				
	SUB-BASE FILL COSTS				$7.11 LF	750	$5,300
	SUBTOTAL ON-SITE UPGRADES						$40,170,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 30% OF ROADWAYS)						$3,615,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$60,420,000

TOTAL ROADWAY SYSTEM ESTIMATED COSTS (INC. ENG & CONT.)	**$60,420,000**

Note 1: No improvements have been extended to serve Reuse Area 10 since development is expected to occure in the far future, past the 20 year plannng horizon.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LIST OF APPENDICES

APPENDIX A

MIRIS
INFRASTRATEGY
ANALYSIS

APPENDIX A1

SET – 1

BASIS FOR DEMAND
FOR
CURRENT – 1997 UTILIZATION
LONG TERM BUILDOUT – 2007
ULTIMATE BUILDOUT – 20XX

MIRIS

InfraStrategy Analysis

CURRENT – 1997 UTILIZATION

Set 1 - Basis of Demand

- Land Use Distribution
- Land Use Factors
- Utility Demand Factors

July 15, 1997

Prepared by: Reimer Associates

1997 UTILIZATION

Land Use Distribution	1. North Light Industrial							2. Neighborhood Center						
Unless otherwise noted Allocation of Site SF from Mare Island Conversion Division listing of current leases - Existing facilities from EDC Appdx A.	Total Acreage 198.9; Developable Acreage 159.1				Site SF/AC from Lincoln Properties Plan 1/97 and allocation for Alco Site.			Total Acreage 89.4; Developable Acreage 71.5				Park Acreage from Final Base Reuse Plan. Education - see note 22.		
	SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES DU/BEDS	DAY POP PERSONS	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES DU/BEDS	DAY POP PERSONS
NON RESIDENTIAL														
HEAVY INDUSTRIAL	63,094	13.3	420,912	0.0	0.0		50				0.0	0.0		
LIGHT INDUSTRIAL	203,846	14.9	162,345	6.5	0.0		158	97,660	7.5	81,383	3.4	0.0		361
WAREHOUSE	0	0.0	0	0.0	0.0		0				0.0	0.0		
OFFICE	0	8.3	90,169	6.2	0.0		0	101,923	9.4	101,923	5.8	0.0		79
RETAIL				0.0	0.0						0.0	0.0		
EDUCATION				0.0	0.0			0	0.0	0	0.0	0.0		0
SUBTOTAL	266,940	36.4	673,427	12.7	0.0		208	199,583	16.8	183,306	9.2	0.0		440
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0			0	0.0	0	0.0	0.0	0	0
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0	0	0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK				0.0	0.0				25.0	108,900	22.5	0.0		0
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE	2,336,602	162.5	1,686,929	0.0	70.1			404,011	42.8	386,647	0.0	24.7		
CIVIC/REC SPACE				0.0	0.0			143,857	4.7	41,102	0.5	0.0		0
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	2,336,602	162.5	1,686,929	0.0	70.1		0	547,868	72.6	536,649	23.0	24.7		0
TOTALS	2,603,542	198.9	2,360,356	12.7	70.1	0	208	747,451	89.4	719,955	32.2	24.7	0	440

1997 UTILIZATION

Land Use Distribution

Unless otherwise noted Allocation of Site SF from Mare Island Conversion Division listing of current leases - Existing facilities from EDC Appdx A.

3. Mixed Use

Total Acreage 111.0

Developable Acreage 88.8

Park Acreage from Final Base Reuse Plan

Land Use	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0	0.0	0	0.0	0.0		0
LIGHT INDUSTRIAL	140,419	10.7	117,016	4.8	0.0		85
WAREHOUSE				0.0	0.0		
OFFICE	0	0.0	0	0.0	0.0		0
RETAIL				0.0	0.0		
EDUCATION	0	0.00	0	0.0	0.0		0
SUBTOTAL	140,419	10.7	117,016	4.8	0.0		85
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK		9.0	39,204	8.1	0.0		0
REGIONAL PARK				0.0	0.0		
OPEN SPACE	1,076,658	91.3	1,048,846	0.0	42.5		
CIVIC/REC SPACE				0.0	0.0		
MARINA				0.0	0.0		
SUBTOTAL	1,076,658	100.3	1,088,050	8.1	42.5		0
TOTALS	1,217,077	111.0	1,205,066	12.9	42.5	0	85

4. Historic District

Total Acreage 52.7

Developable Acreage 42.2

Park Acreage from Final Base Reuse Plan; 2-Story FAR used for LI and Office

Land Use	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0	0.0	0	0.0	0.0		0
LIGHT INDUSTRIAL	0	0.0	0	0.0	0.0		0
WAREHOUSE				0.0	0.0		
OFFICE	3,218	0.1	1,609	0.1	0.0		1
RETAIL				0.0	0.0		
EDUCATION				0.0	0.0		
SUBTOTAL	3,218	0.1	1,609	0.1	0.0		1
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY	0	0.0	0	0.0	0.0	0	0
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL	0	0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK		7.0	30,492	6.3	0.0		0
REGIONAL PARK				0.0	0.0		
OPEN SPACE	707,225	45.4	526,607	0.0	17.1		
CIVIC/REC SPACE	3,561	0.1	2,035	0.0	0.0		0
MARINA				0.0	0.0		
SUBTOTAL	710,786	52.6	559,134	6.3	17.1		0
TOTALS	714,004	52.7	560,743	6.4	17.1	0	1

1997 UTILIZATION

Land Use Distribution

Unless otherwise noted Allocation of Site SF from Mare Island Conversion Division listing of current leases - Existing facilities from EDC Appdx A.

5. Heavy Industry

Total Acreage 135.3
Developable Acreage 108.2

Waterfront FAR figure assigned to HI.

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL	89,000	5.2	166,297	0.0	0.0		120
LIGHT INDUSTRIAL	285,124	21.8	237,603	9.8	0.0		192
WAREHOUSE				0.0	0.0		
OFFICE	5,023	0.5	5,023	0.3	0.0		12
RETAIL	0	0.0	0	0.0	0.0		0
EDUCATION				0.0	0.0		
SUBTOTAL	379,147	27.5	408,924	10.1	0.0		324
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK				0.0	0.0		
REGIONAL PARK				0.0	0.0		
OPEN SPACE	1,110,826	107.8	2,059,130	0.0	35.0		
CIVIC/REC SPACE				0.0	0.0		
MARINA				0.0	0.0		
SUBTOTAL	1,110,826	107.8	2,059,130	0.0	35.0		0
TOTALS	1,489,973	135.3	2,468,054	10.1	35.0	0	324

6. Farragut Village

Total Acreage 105.2
Developable Acreage 84.2

Park Acreage from Final Base Reuse Plan; Ed. Population from VUSD.

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL				0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0		0
WAREHOUSE				0.0	0.0		
OFFICE				0.0	0.0		
RETAIL				0.0	0.0		
EDUCATION	13,629	1.04	11,358	0.5	0.0		15
SUBTOTAL	13,629	1.0	11,358	0.5	0.0		15
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES	0	0.0	0	0.0	0.0	0	0
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB	0	0.0	0	0.0	0.0	0	0
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL	0	0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK				0.0	0.0		
REGIONAL PARK				0.0	0.0		
OPEN SPACE	606,715	104.1	598,669	0.0	76.4		
CIVIC/REC SPACE	3,180	0.1	1,817	0.0	0.0		0
MARINA				0.0	0.0		
SUBTOTAL	609,895	104.2	600,487	0.0	76.4		0
TOTALS	623,524	105.2	611,844	0.5	76.4	0	15

1997 UTILIZATION

7. Developed Recreation
Total Acreage 46.2
Developable Acreage 37.0
Park acreage figure from Final Base Reuse Plan and Bldg. SF from City.

8. Coral Sea Village
Total Acreage 67.1
Developable Acreage 53.7
Park acreage figure from Final Base Reuse Plan.

Land Use Distribution	7. SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		8. SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
Unless otherwise noted Allocation of Site SF from Mare Island Conversion Division listing of current leases - Existing facilities from EDC Appdx A.	FACILITY *SF*	SITE *AC*	PRKING/RDS *SF*	PARK *AC*	OPEN *AC*	RES *DU/BEDS*	DAY POP *PERSONS*	FACILITY *SF*	SITE *AC*	PRKING/RDS *SF*	PARK *AC*	OPEN *AC*	RES *DU/BEDS*	DAY POP *PERSONS*
NON RESIDENTIAL														
HEAVY INDUSTRIAL				0.0	0.0						0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0			0	0.0	0	0.0	0.0		0
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE				0.0	0.0			0	0.0	0	0.0	0.0		0
RETAIL				0.0	0.0			0	0.0	0	0.0	0.0		0
EDUCATION				0.0	0.0						0.0	0.0		
SUBTOTAL				0.0	0.0			0	0.0	0	0.0	0.0		0
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0			0	0.0	0	0.0	0.0	0	0
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0			0	0.0	0	0.0	0.0	0	0
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0	0	0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK	0	0.0	0	0.0	0.0		0		4.0	17,424	3.6	0.0		0
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE	20,373	46.2	201,247	0.0	41.1			389,758	63.1	399,955	0.0	45.0		
CIVIC/REC SPACE				0.0	0.0						0.0	0.0		
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	20,373	46.2	201,247	0.0	41.1		0	389,758	67.1	417,379	3.6	45.0		0
TOTALS	20,373	46.2	201,247	0.0	41.1	0	0	389,758	67.1	417,379	3.6	45.0	0	0

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Land Use Distribution	9. Education/Office							10. Marina/Residential						
	Total Acreage 104.4			SF and population figures for USFS from City; Other Ed. from VUSD (note 23).				Total Acreage 82.6			Yacht Club or Boat House SF assigned (note 20).			
Unless otherwise noted Allocation of Site SF from Mare Island Conversion Division listing of current leases - Existing facilities from EDC Appdx A.	Developable Acreage 83.5							Developable Acreage 66.1						
	SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES DU/BEDS	DAY POP PERSONS	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES DU/BEDS	DAY POP PERSONS
NON RESIDENTIAL															
HEAVY INDUSTRIAL				0.0	0.0						0.0	0.0		
LIGHT INDUSTRIAL	0	0.0	0	0.0	0.0		0	72,000	5.5	60,000	2.5	0.0		15
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE	113,548	10.4	113,548	6.5	0.0		350	0	0.0	0	0.0	0.0		0
RETAIL	0	0.0	0	0.0	0.0		0	0	0.0	0	0.0	0.0		0
EDUCATION	0	0.0	0	0.0	0.0		0				0.0	0.0		
SUBTOTAL	113,548	10.4	113,548	6.5	0.0		350	72,000	5.5	60,000	2.5	0.0		15
RESIDENTIAL														
NEW CONDOS				0.0	0.0			0	0.0	0	0.0	0.0	0	0
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0						0.0	0.0		
DORMITORY BEDS	0	0.0	0	0.0	0.0	0					0.0	0.0		
SUBTOTAL	0	0.0	0	0.0	0.0	0	0	0	0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK		8.0	34,848	7.2	0.0		0				0.0	0.0		
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE	579,226	83.2	607,688	0.0	56.0			2,132,836	65.8	618,990	0.0	2.6		
CIVIC/REC SPACE	84,214	2.8	36,092	0.0	0.0		0				0.0	0.0		
MARINA				0.0	0.0			0	11.3	0	0.0	11.3		0
SUBTOTAL	663,440	94.0	678,628	7.2	56.0		0	2,132,836	77.1	618,990	0.0	13.9		0
TOTALS	776,988	104.4	792,176	13.7	56.0	0	350	2,204,836	82.6	678,990	2.5	13.9	0	15

1997 UTILIZATION

Land Use Distribution

Unless otherwise noted Allocation of Site SF from Mare Island Conversion Division listing of current leases - Existing facilities from EDC Appdx A.

11. Golf Course

Total Acreage 170.8

Developable Acreage 136.6

12. Regional Park

Total Acreage 216.0

Developable Acreage 172.8

Park acreage figure from Final Base Reuse Plan.

Land Use Distribution	11. Golf Course: SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		12. Regional Park: SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY	SITE	PRKING/RDS	PARK	OPEN	RES	DAY POP	FACILITY	SITE	PRKING/RDS	PARK	OPEN	RES	DAY POP
	SF	*AC*	*SF*	*AC*	*AC*	*DU/BEDS*	*PERSONS*	*SF*	*AC*	*SF*	*AC*	*AC*	*DU/BEDS*	*PERSONS*
NON RESIDENTIAL														
HEAVY INDUSTRIAL				0.0	0.0						0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0		0				0.0	0.0		
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE				0.0	0.0						0.0	0.0		
RETAIL				0.0	0.0						0.0	0.0		
EDUCATION				0.0	0.0						0.0	0.0		
SUBTOTAL	0	0.00	0	0.00	0.00		0	0	0.00	0	0.0	0.0		0
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0						0.0	0.0		
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	23,217	122.3	1,333	121.7	0.0		40				0.0	0.0		
DEVELOPED PARK				0.0	0.0						0.0	0.0		
REGIONAL PARK				0.0	0.0				163.0	710,028	0.0	146.7		0
OPEN SPACE	4,696	48.5	9,062	0.0	48.2				53.0		0.0	53.0		
CIVIC/REC SPACE				0.0	0.0				0.0	0	0.0	0.0		0
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	27,913	170.8	10,395	121.7	48.2		40	0	216.0	710,028	0.0	199.7		0
TOTALS	27,913	170.8	10,395	121.7	48.2	0	40	0	216.0	710,028	0.0	199.7	0	0

1997 UTILIZATION

Land Use Distribution

Unless otherwise noted Allocation of Site SF from Mare Island Conversion Division listing of current leases - Existing facilities from EDC Appdx A.

13. Open Space/ Recreation

Park acreage figure from Final Base Reuse Plan.

Total Acreage 99.1
Developable Acreage 79.3

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL				0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0		
WAREHOUSE				0.0	0.0		
OFFICE				0.0	0.0		
RETAIL				0.0	0.0		
EDUCATION				0.0	0.0		
SUBTOTAL				0.0	0.0		
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK				0.0	0.0		0
REGIONAL PARK				0.0	0.0		
OPEN SPACE		99.1	431,680	0.0	89.2		
CIVIC/REC SPACE				0.0	0.0		
MARINA				0.0	0.0		
SUBTOTAL	0	99.1	431,680	0.0	89.2		0
TOTALS	0	99.1	431,680	0.0	89.2	0	0

TOTAL

Total Acreage 1,479
Developable Acreage 1,183

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL	152,094	18.5	587,210	0.0	0.0		170
LIGHT INDUSTRIAL	799,049	60.5	658,348	27.0	0.0		810
WAREHOUSE	0	0.0	0	0.0	0.0		0
OFFICE	223,712	28.7	312,272	18.9	0.0		442
RETAIL	0	0.0	0	0.0	0.0		0
EDUCATION	13,629	1.0	11,358	0.5	0.0		15
SUBTOTAL	1,188,484	108.7	1,569,187	46.4	0.0		1,437
RESIDENTIAL							
NEW CONDOS	0	0.0	0	0.0	0.0	0	0
EXISTING DUPLEXES	0	0.0	0	0.0	0.0	0	0
EXISTING SINGLE FAMILY	0	0.0	0	0.0	0.0	0	0
MULTI-FAMILY - REHAB	0	0.0	0	0.0	0.0	0	0
LIVE/WORK	0	0.0	0	0.0	0.0	0	0
DORMITORY BEDS	0	0.0	0	0.0	0.0	0	0
SUBTOTAL	0	0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	23,217	122.3	1,333	121.7	0.0		40
DEVELOPED PARK	0	53.0	230,868	47.7	0.0		0
REGIONAL PARK	0.0	163.0	710,028	0.0	146.7		0
OPEN SPACE	9,368,926	1012.7	8,575,451	0.0	600.8		0
CIVIC/REC SPACE	234,812	7.7	81,046	0.4	0.0		0
MARINA	0	11.3	0	0.0	11.3		0
SUBTOTAL	9,626,955	1370.0	9,598,726	169.9	758.8		40
TOTALS	10,815,439	1,478.7	11,167,913	216.3	758.8	0	1,477

1997 UTILIZATION

Land Use Factors LAND USE DESIGNATION	LAND USE ID	FAR FACTOR *(A)*	PARKING AND ROADS PER GROSS AC *(B)*	PER per UNIT *(C)*	DU per AC	SPACE USE BY EMPLOYEE	TRANSIENT COUNT PER EMP OR USAGE PER ACRE	AVG DU or SPECIAL BLDG SF
NON RESIDENTIAL								
HEAVY INDUSTRIAL	HI	0.3	31,743 *7,13*			800 PER SF		
LIGHT INDUSTRIAL	LI	0.3	10,890 *,7,16,20*			600 PER SF		
WAREHOUSE	WH	0.3	10,890 *6,17*			1,200 PER SF		
OFFICE	OF	0.25	10,890 *6,20*			275 PER SF		
RETAIL	R	0.3	10,890 *6,18*			400 PER SF		
EDUCATION	ED	0.3	10,890 *6*			780 PER SF	3.85 *per emp-12*	
RESIDENTIAL								
NEW CONDOS	HR-N		8,712 *5*	2.5	12			2,000 SF
EXISTING DUPLEXES	MR		8,712 *5*	3.0	6			2,500 SF
EXISTING SINGLE FAMILY	LR		8,712 *5*	3.0	3			8,000 SF
MULTI-FAMILY - REHAB	MR-N		8,712 *5*	2.5	6			2,500 SF
LIVE/WORK	MIX		8,712 *5*	2.5	10			1,500 SF
DORMITORY BEDS	HR		300 *9*	1.0				60 SF - *15*
CIVIC/RECREATION/OPEN SPACE								
GOLF COURSE	GOLF	0.7	33.33 *10*			0.05 PER AC	2.5 per ac-*11*	
DEVELOPED PARK	C-PRK		4,356 *4*			0.2 PER AC		
REGIONAL PARK	R-PRK		4,356 *4*			0.1 PER AC	35 per day-*14*	
OPEN SPACE	HAB		none					
CIVIC/REC SPACE	CIV/REC	0.7	varies *5,6*			1500 PER SF		
MARINA	MAR		4356 *4*			0.16 PER AC	100 BERTHS	1,800 SF

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(A)	Source: EDC Application Appendix C	
(B)	Source: California Base Conversion Planning Factior	
(C)	Source: Final Base Reuse Plan - Table4-5	
4	Paving for Parking and Roads (Gross AC X 43560 X 0.10) = SF rec/os, marina	4,356
5	Paving for Parking and Roads (Gross AC X 43560 X 0.20) = SF	8,712
6	Paving for Parking and Roads (Gross AC X 43560 X 0.25) = SF	10,890
7	Paving for Parking, Roads and Ramps (Gross AC - Facility/43560 = 31743) hi	31,743
8	Paving for Parking and Roads (Gross AC X 43560 X 0.40) = SF	17,424
9	Assume 1 parking space per dormitory bed	300
10	Paving for Parking and Roads for Golf Course (emp+trans*300/9)	33.33
11	2.5 Transients Use per Acre (from El Toro)	2.5
12	3.85 Students/Emp from El Toro Study	3.85
13	Waterfront Heavy Industrial Assume FAR = .26	0.26
14	Daily Visitation for Regional Park from El Toro Study	35
15	Assume Dorm Footprint = (beds X 120 sf X .5) assumes 2 stories and includes fac.	60
16	Light Industrial Coverage Calculation for North Industrial Area	0.40
17	Warehouse Coverage Calculation for North Industrial Area	0.45
18	Office Coverage Calculation for North Industrial Area	0.35
19	Assume the Size of Boathouse	1,800
20	Assume 2 story buildings for these uses - FAR/2	
21	Cliff Solari from Vallejo Unified School District contacted for daily population - 900 students - 47 staff.	
22	Per VUSD - Bldg 533 was added to the education total - 4,000 SF and daily population of 65 - 60 students - 5 staff.	
23	Per VUSD - Bldg 1003 was added to the education total - daily population of 167 - 140 students - 27 staff.	

1997 UTILIZATION

Utility Demand Factors	LAND USE CLASSIFCATIONS																	
	NON-RESIDENTIAL						RESIDENTIAL						CIVIC/RECREATION/OPEN SPACE					
	HI	LI	WH	OF	RET	ED	HR-NEW	MR	LR	MR-NEW	LV/WK	DORM	GOLF	C-PARK	R-PARK	OPEN	CIV/REC	MAR
SANITARY SEWER																		
% WATER/SF	85%	85%	80%	90%	85%	90%							90%				90%	90%
AFY/AC	1.5	2.50	2.00	1.00	0.50	0.50	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.20			0.20	1.00
% WATER/EMP	85%	85%	85%	85%									80%	80%	85%			85%
GPD/DU							216	216	216	216	216	175						
WATER																		
AFY/SF	0.00011	0.00008	0.00006	0.00008	0.00022	0.00022											0.00022	
AFY/AC		0.11202	0.05601	0.22404	0.22404	0.22404	0.22404	0.22404	0.22404	0.22404	0.11202	0.11202		1.5			0.22404	
AFY/DU							0.25	0.3	0.35	0.3	0.25							
AFY/EMP&PERS	0.05601	0.05601	0.05601	0.05601										0.01680	0.01680			0.17924
AFY/BED												0.11						
AFY/COURSE													315					
AFY/CLUBHSE													5					3
STORM WATER																		
NEW C FACTOR[1]	0.90	0.68	0.85	0.65	0.73	0.65	0.35	0.40	0.35	0.45	0.35	0.35	0.20	0.20	0.20	0.27	0.20	0.45
EXIST. C FACTOR[2]	0.95	0.95	0.95	0.95	0.95									0.27		0.27	0.27	0.45

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.
[2] "C" Factor applicable to existing conditions and reuse of existing facilities; also includes local soil conditions for open areas.

MIRIS

InfraStrategy Analysis

LONG TERM BUILDOUT - 2007

Set 1 – Basis of Demand

- Land Use Distribution
- Land Use Factors
- Utility Demand Factors

July 15, 1997

Prepared by: Reimer Associates

LONG TERM BUILDOUT (2007)

Land Use Distribution	1. North Light Industrial							2. Neighborhood Center						
	Total Acreage 198.9			Site SF/AC from Lincoln Properties Plan 1/97 and allocation for Alco Site.				Total Acreage 89.4			Park Acreage from Final Base Reuse Plan.			
Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.	Developable Acreage 159.1							Developable Acreage 71.5						
	SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY	SITE	PRKING/RDS	PARK	OPEN	RES	DAY POP	FACILITY	SITE	PRKING/RDS	PARK	OPEN	RES	DAY POP
	SF	*AC*	*SF*	*AC*	*AC*	*DU/BEDS*	*PERSONS*	*SF*	*AC*	*SF*	*AC*	*AC*	*DU/BEDS*	*PERSONS*
NON RESIDENTIAL														
HEAVY INDUSTRIAL	133,294	13.3	420,912	0.0	0.0		167				0.0	0.0		
LIGHT INDUSTRIAL	863,231	63.1	687,487	27.5	0.0		1,439	68,281	5.2	56,901	2.4	0.0		114
WAREHOUSE	922,931	67.5	735,032	0.0	29.4		769				0.0	0.0		
OFFICE	83,269	8.3	90,169	5.3	0.0		303	274,477	25.2	274,477	15.8	0.0		998
RETAIL				0.0	0.0						0.0	0.0		
EDUCATION				0.0	0.0			0	0.0	0	0.0	0.0		0
SUBTOTAL	2,002,724	152.2	1,933,600	32.8	29.4		2,677	342,758	30.4	331,378	18.1	0.0		1,112
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0			28,800	1.9	16,727	0.9	0.0	19	48
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0	28,800	1.9	16,727	0.9	0.0	19	48
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK				0.0	0.0				25.0	108,900	22.5	0.0		5
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE	600,818	46.7	426,756	0.0	23.1			232,036	27.3	221,848	0.0	16.9		
CIVIC/REC SPACE				0.0	0.0			143,857	4.7	41,102	0.5	0.0		96
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	600,818	46.7	426,756	0.0	23.1		0	375,893	57.1	371,850	23.0	16.9		101
TOTALS	2,603,542	198.9	2,360,356	32.8	52.6	0	2,677	747,451	89.4	719,955	42.0	16.9	19	1,261

LONG TERM BUILDOUT (2007)

Land Use Distribution	3. Mixed Use							4. Historic District						
	Total Acreage 111.0			Park Acreage from Final Base Reuse Plan				Total Acreage 52.7			Park Acreage from Final Base Reuse Plan; 2-Story FAR used for LI and Office			
Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.	Developable Acreage 88.8							Developable Acreage 42.2						
	SITE RELATED		**PAVEMENT**	**GREEN SPACE**		**SOCIO RELATED**		**SITE RELATED**		**PAVEMENT**	**GREEN SPACE**		**SOCIO RELATED**	
	FACILITY *SF*	SITE *AC*	PRKING/RDS *SF*	PARK *AC*	OPEN *AC*	RES *DU/BEDS*	DAY POP *PERSONS*	FACILITY *SF*	SITE *AC*	PRKING/RDS *SF*	PARK *AC*	OPEN *AC*	RES *DU/BEDS*	DAY POP *PERSONS*
NON RESIDENTIAL														
HEAVY INDUSTRIAL	39,847	3.0	96,791	0.0	0.0		50	106,406	8.1	258,467	0.0	0.0		133
LIGHT INDUSTRIAL	283,632	21.7	236,360	9.8	0.0		473	339,871	13.0	141,613	2.0	0.0		566
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE	506,816	38.8	422,347	23.3	0.0		1,843	151,728	7.0	75,864	3.5	0.0		552
RETAIL				0.0	0.0						0.0	0.0		
EDUCATION	0	0.00	0	0.0	0.0		0				0.0	0.0		
SUBTOTAL	830,295	63.5	755,498	33.0	0.0		2,365	598,005	28.1	475,944	5.4	0.0		1,251
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0			112,438	6.0	52,272	2.2	0.0	18	54
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0						0.0	0.0		
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0	112,438	6.0	52,272	2.2	0.0	18	54
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK		9.0	39,204	8.1	0.0		2		7.0	30,492	6.3	0.0		1
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE	386,782	38.5	410,364	0.0	20.2			0	11.5	0	0.0	11.5		
CIVIC/REC SPACE				0.0	0.0			3,561	0.1	2,035	0.0	0.0		2
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	386,782	47.5	449,568	8.1	20.2		2	3,561	18.6	32,527	6.3	11.5		4
TOTALS	1,217,077	111.0	1,205,066	41.1	20.2	0	2,367	714,004	52.7	560,743	13.9	11.5	18	1,309

LONG TERM BUILDOUT (2007)

Land Use Distribution	5. Heavy Industry							6. Farragut Village						
Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.	Total Acreage 135.3; Developable Acreage 108.2				Waterfront FAR figure assigned to HI.			Total Acreage 105.2; Developable Acreage 84.2				Park Acreage from Final Base Reuse Plan; Ed. Population from VUSD.		
	SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES DU/BEDS	DAY POP PERSONS	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES. DU/BEDS	DAY POP PERSONS
NON RESIDENTIAL														
HEAVY INDUSTRIAL	962,966	56.7	1,799,312	0.0	0.0		1,204				0.0	0.0		
LIGHT INDUSTRIAL	140,950	10.8	117,458	4.9	0.0		235				0.0	0.0		
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE	12,600	1.2	12,600	0.7	0.0		46				0.0	0.0		
RETAIL	5,000	0.4	4,167	0.2	0.0		13				0.0	0.0		
EDUCATION				0.0	0.0			36,208	2.77	30,173	1.2	0.0		947
SUBTOTAL	1,121,516	69.0	1,933,537	5.7	0.0		1,497	36,208	2.8	30,173	1.2	0.0		947
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0			270,792	35.0	304,920	21.8	0.0	210	630
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0			109,559	8.2	71,148	4.0	0.0	49	123
LIVE/WORK				0.0	0.0						0.0	0.0		
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0	380,351	43.2	376,068	25.8	0.0	259	753
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK				0.0	0.0						0.0	0.0		
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE	368,457	66.3	534,517	0.0	45.6			203,785	59.2	203,786	0.0	49.8		
CIVIC/REC SPACE				0.0	0.0			3,180	0.1	1,817	0.0	0.0		2
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	368,457	66.3	534,517	0.0	45.6		0	206,965	59.3	205,603	0.0	49.8		2
TOTALS	1,489,973	135.3	2,468,054	5.7	45.6	0	1,497	623,524	105.2	611,844	27.0	49.8	259	1,702

LONG TERM BUILDOUT (2007)

Land Use Distribution	7. Developed Recreation							8. Coral Sea Village						
Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.	Total Acreage 46.2; Developable Acreage 37.0			*Park acreage figure from Final Base Reuse Plan.*				Total Acreage 67.1; Developable Acreage 53.7			*Park acreage figure from Final Base Reuse Plan.*			
	SITE RELATED		**PAVEMENT**	**GREEN SPACE**		**SOCIO RELATED**		**SITE RELATED**		**PAVEMENT**	**GREEN SPACE**		**SOCIO RELATED**	
	FACILITY *SF*	SITE *AC*	PRKING/RDS *SF*	PARK *AC*	OPEN *AC*	RES *DU/BEDS*	DAY POP *PERSONS*	FACILITY *SF*	SITE *AC*	PRKING/RDS *SF*	PARK *AC*	OPEN *AC*	RES *DU/BEDS*	DAY POP *PERSONS*
NON RESIDENTIAL														
HEAVY INDUSTRIAL				0.0	0.0						0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0			63	0.0	53	0.0	0.0		0
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE				0.0	0.0			0	0.0	0	0.0	0.0		0
RETAIL				0.0	0.0			73,150	5.6	60,958	2.5	0.0		183
EDUCATION				0.0	0.0						0.0	0.0		
SUBTOTAL				0.0	0.0			73,213	5.6	61,011	2.5	0.0		183
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0			245,753	33.7	293,304	21.3	0.0	202	606
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0			60,000	4.0	34,848	1.8	0.0	40	100
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0	305,753	37.7	328,152	23.1	0.0	242	706
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK	0	46.2	0	46.2	0.0		0		4.0	17,424	3.6	0.0		1
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE	20,373	0.0	0	0.0	-0.5			10,792	19.8	10,792	0.0	19.3		
CIVIC/REC SPACE				0.0	0.0						0.0	0.0		
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	20,373	46.2	0	46.2	-0.5		0	10,792	23.8	28,216	3.6	19.3		1
TOTALS	20,373	46.2	0	46.2	-0.5	0	0	389,758	67.1	417,379	29.2	19.3	242	890

LONG TERM BUILDOUT (2007)

Land Use Distribution — Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.	9. Education/Office — Total Acreage 104.4; Developable Acreage 83.5 — SF and population figures from USFS; Other Ed. from VUSD (note 23).							10. Marina/Residential — Total Acreage 82.6; Developable Acreage 66.1						
	SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES DU/BEDS	DAY POP PERSONS	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES DU/BEDS	DAY POP PERSONS
NON RESIDENTIAL														
HEAVY INDUSTRIAL				0.0	0.0						0.0	0.0		
LIGHT INDUSTRIAL	106,816	8.2	89,013	3.7	0.0		178	5,249	0.4	4,374	0.2	0.0		9
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE	113,548	10.4	113,548	6.5	0.0		350	0	0.0	0	0.0	0.0		0
RETAIL	54,370	4.2	45,308	1.9	0.0		136	0	0.0	0	0.0	0.0		0
EDUCATION	16,321	1.2	13,601	0.6	0.0		179				0.0	0.0		
SUBTOTAL	291,055	24.0	261,471	12.6	0.0		843	5,249	0.4	4,374	0.2	0.0		9
RESIDENTIAL														
NEW CONDOS				0.0	0.0			0	0.0	0	0.0	0.0	0	0
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0						0.0	0.0		
DORMITORY BEDS	0	0.0	0	0.0	0.0	0					0.0	0.0		
SUBTOTAL	0	0.0	0	0.0	0.0	0	0	0	0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK		8.0	34,848	7.2	0.0		1				0.0	0.0		
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE	401,719	69.6	459,766	0.0	49.9			2,199,587	82.2	674,616	0.0	16.2		
CIVIC/REC SPACE	84,214	2.8	36,092	0.0	0.0		56				0.0	0.0		
MARINA				0.0	0.0			0	0.0	0	0.0	0.0		0
SUBTOTAL	485,933	80.4	530,706	7.2	49.9		58	2,199,587	82.2	674,616	0.0	16.2		0
TOTALS	776,988	104.4	792,176	19.8	49.9	0	901	2,204,836	82.6	678,990	0.2	16.2	0	9

LONG TERM BUILDOUT (2007)

Land Use Distribution	11. Golf Course							12. Regional Park						
Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.	Total Acreage 170.8							Total Acreage 216.0				*Park acreage figure from Final Base Reuse Plan.*		
	Developable Acreage 136.6							Developable Acreage 172.8						
	SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY	SITE	PRKING/RDS	PARK	OPEN	RES	DAY POP	FACILITY	SITE	PRKING/RDS	PARK	OPEN	RES	DAY POP
	SF	*AC*	*SF*	*AC*	*AC*	*DU/BEDS*	*PERSONS*	*SF*	*AC*	*SF*	*AC*	*AC*	*DU/BEDS*	*PERSONS*
NON RESIDENTIAL														
HEAVY INDUSTRIAL				0.0	0.0						0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0		0				0.0	0.0		
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE				0.0	0.0						0.0	0.0		
RETAIL				0.0	0.0						0.0	0.0		
EDUCATION				0.0	0.0						0.0	0.0		
SUBTOTAL	0	0.00	0	0.00	0.00		0	0	0.00	0	0.0	0.0		0
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0						0.0	0.0		
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	27,913	122.3	10,395	121.4	0.0		312				0.0	0.0		
DEVELOPED PARK				0.0	0.0						0.0	0.0		
REGIONAL PARK				0.0	0.0				163.0	710,028	0.0	146.7		35
OPEN SPACE	0	48.5	0	0.0	48.5				53.0		0.0	53.0		
CIVIC/REC SPACE				0.0	0.0				0.0	0	0.0	0.0		0
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	27,913	170.8	10,395	121.4	48.5		312	0	216.0	710,028	0.0	199.7		35
TOTALS	27,913	170.8	10,395	121.4	48.5	0	312	0	216.0	710,028	0.0	199.7	0	35

LONG TERM BUILDOUT (2007)

13. Open Space/ Recreation
Total Acreage 99.1
Developable Acreage 79
Park acreage figure from Final Base Reuse Plan.

Land Use Distribution — *Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.*	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL				0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0		
WAREHOUSE				0.0	0.0		
OFFICE				0.0	0.0		
RETAIL				0.0	0.0		
EDUCATION				0.0	0.0		
SUBTOTAL				0.0	0.0		
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK				0.0	0.0		0
REGIONAL PARK				0.0	0.0		
OPEN SPACE		99.1	431,680	0.0	89.2		
CIVIC/REC SPACE				0.0	0.0		
MARINA				0.0	0.0		
SUBTOTAL	0	99.1	431,680	0.0	89.2		0
TOTALS	0	99.1	431,680	0.0	89.2	0	0

TOTAL
Total Acreage 1,479
Developable Acreage 1,183

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL	1,242,513	81.1	2,575,482	0.0	0.0		1,553
LIGHT INDUSTRIAL	1,808,093	122.4	1,333,259	50.3	0.0		3,013
WAREHOUSE	922,931	67.5	735,032	0.0	29.4		769
OFFICE	1,142,438	90.8	989,005	55.0	0.0		4,091
RETAIL	132,520	10.1	110,433	4.6	0.0		331
EDUCATION	52,529	4.0	43,774	1.8	0.0		1,126
SUBTOTAL	5,301,023	376.0	5,786,985	111.7	29.4		10,885
RESIDENTIAL							
NEW CONDOS	0	0.0	0	0.0	0.0	0	0
EXISTING DUPLEXES	516,545	68.7	598,224	43.1	0.0	412	1,236
EXISTING SINGLE FAMILY	112,438	6.0	52,272	2.2	0.0	18	54
MULTI-FAMILY - REHAB	109,559	8.2	71,148	4.0	0.0	49	123
LIVE/WORK	88,800	5.9	51,575	2.7	0.0	59	148
DORMITORY BEDS	0	0.0	0	0.0	0.0	0	0
SUBTOTAL	827,342	88.8	773,219	52.0	0.0	538	1,561
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	27,913	122.3	10,395	121.4	0.0		312
DEVELOPED PARK	0	99.2	230,868	93.9	0.0		10
REGIONAL PARK	0	163.0	710,028	0.0	146.7		35
OPEN SPACE	4,424,349	621.7	3,374,125	0.0	442.7		0
CIVIC/REC SPACE	234,812	7.7	81,046	0.4	0.0		157
MARINA	0	0.0	0	0.0	0.0		0
SUBTOTAL	4,687,074	1013.9	4,406,461	215.8	589.4		513
TOTALS	10,815,439	1,478.7	10,966,666	379.5	618.8	538	12,959

LONG TERM BUILDOUT (2007)

Land Use Factors LAND USE DESIGNATION	LAND USE ID	FAR FACTOR *(A)*	PARKING AND ROADS PER GROSS AC *(B)*		PER per UNIT *(C)*	DU per AC	SPACE USE BY EMPLOYEE		TRANSIENT COUNT PER EMP OR USAGE PER ACRE		AVG DU or SPECIAL BLDG SF	
NON RESIDENTIAL												
HEAVY INDUSTRIAL	HI	0.3	31,743	*7,13*			800	PER SF				
LIGHT INDUSTRIAL	LI	0.3	10,890	*,7,16,20*			600	PER SF				
WAREHOUSE	WH	0.3	10,890	*6,17*			1,200	PER SF				
OFFICE	OF	0.25	10,890	*6,20*			275	PER SF				
RETAIL	R	0.3	10,890	*6,18*			400	PER SF				
EDUCATION	ED	0.3	10,890	*6*			780	PER SF	3.85	*per emp-12*		
RESIDENTIAL												
NEW CONDOS	HR-N		8,712	*5*	2.5	12					2,000	SF
EXISTING DUPLEXES	MR		8,712	*5*	3.0	6					2,500	SF
EXISTING SINGLE FAMILY	LR		8,712	*5*	3.0	3					8,000	SF
MULTI-FAMILY - REHAB	MR-N		8,712	*5*	2.5	6					2,500	SF
LIVE/WORK	MIX		8,712	*5*	2.5	10					1,500	SF
DORMITORY BEDS	HR		300	*9*	1.0						60 SF - *15*	
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	GOLF	0.7	33.33	*10*			0.05	PER AC	2.5	per ac-*11*		
DEVELOPED PARK	C-PRK		4,356	*4*			0.2	PER AC				
REGIONAL PARK	R-PRK		4,356	*4*			0.1	PER AC	35	per day-*14*		
OPEN SPACE	HAB		none									
CIVIC/REC SPACE	CIV/REC	0.7	varies	*5,6*			1500	PER SF				
MARINA	MAR		4356	*4*			0.16	PER AC	100	BERTHS	1,800	SF

LONG TERM BUILDOUT (2007)

(A)	Source: EDC Application Appendix C		
(B)	Source: California Base Conversion Planning Factior		
(C)	Source: Final Base Reuse Plan - Table4-5		
4	Paving for Parking and Roads (Gross AC X 43560 X 0.10) = SF rec/os, marina		4,356
5	Paving for Parking and Roads (Gross AC X 43560 X 0.20) = SF		8,712
6	Paving for Parking and Roads (Gross AC X 43560 X 0.25) = SF		10,890
7	Paving for Parking, Roads and Ramps (Gross AC - Facility/43560 = 31743)	hl	31,743
8	Paving for Parking and Roads (Gross AC X 43560 X 0.40) = SF		17,424
9	Assume 1 parking space per dormitory bed		300
10	Paving for Parking and Roads for Golf Course (emp+trans*300/9)		33.33
11	2.5 Transients Use per Acre (from El Toro)		2.5
12	3.85 Students/Emp from El Toro Study		3.85
13	Waterfront Heavy Industrial Assume FAR = .26		0.26
14	Daily Visitation for Regional Park from El Toro Study		35
15	Assume Dorm Footprint = (beds X 120 sf X .5) assumes 2 stories and includes fac.		60
16	Light Industrial Coverage Calculation for North Industrial Area		0.40
17	Warehouse Coverage Calculation for North Industrial Area		0.45
18	Office/Retail Coverage Calculation for North Industrial Area		0.35
19	Assume the Size of Boathouse		1,800
20	Assume 2 story buildings for these uses - FAR/2		
21	Cliff Solari from Vallejo Unified School District contacted for daily population - 900 students - 47 staff.		
22	Per VUSD - Bldg 533 was added to the education total - 4,000 SF and daily population of 65 - 60 students - 5 staff.		
23	Per VUSD - Bldg 1003 was added to the education total - daily population of 167 - 140 students - 27 staff.		

LONG TERM BUILDOUT (2007)

Utility Demand Factors	LAND USE CLASSIFCATIONS																	
	NON-RESIDENTIAL						RESIDENTIAL						CIVIC/RECREATION/OPEN SPACE					
	HI	LI	WH	OF	RET	ED	HR-NEW	MR	LR	MR-NEW	LV/WK	DORM	GOLF	C-PARK	R-PARK	OPEN	CIV/REC	MAR
SANITARY SEWER																		
% WATER/SF	85%	85%	80%	90%	85%	90%							90%				90%	90%
AFY/AC	1.5	2.50	2.00	1.00	0.50	0.50	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.20			0.20	1.00
% WATER/EMP	85%	85%	85%	85%									80%	80%	85%			85%
GPD/DU							216	216	216	216	216	175						
WATER																		
AFY/SF	0.00011	0.00008	0.00006	0.00008	0.00022	0.00022											0.00022	
AFY/AC		0.11202	0.05601	0.22404	0.22404	0.22404	0.22404	0.22404	0.22404	0.22404	0.11202	0.11202		1.5			0.22404	
AFY/DU							0.25	0.3	0.35	0.3	0.25							
AFY/EMP&PERS	0.05601	0.05601	0.05601	0.05601										0.01680	0.01680			0.17924
AFY/BED												0.11						
AFY/COURSE													315					
AFY/CLUBHSE													5					3
STORM WATER																		
NEW C FACTOR [1]	0.90	0.68	0.85	0.65	0.73	0.65	0.35	0.40	0.35	0.45	0.35	0.35	0.20	0.20	0.20	0.27	0.20	0.45
EXIST. C FACTOR [2]	0.95	0.95	0.95	0.95	0.95									0.27		0.27	0.27	0.45

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities; also includes local soil conditions for open areas.

MIRIS

InfraStrategy Analysis

ULTIMATE BUILDOUT – 20XX

Set 1 – Basis of Demand

- **Land Use Distribution**
- **Land Use Factors**
- **Utility Demand Factors**

July 15, 1997

Prepared by: Reimer Associates

ULTIMATE BUILDOUT

Land Use Distribution

Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.

1. North Light Industrial

Total Acreage 198.9
Developable Acreage 159.1

Site SF/AC from Lincoln Properties Plan 1/97 and allocation for Alco Site.

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL	173,282	13.3	420,912	0.0	0.0		217
LIGHT INDUSTRIAL	1,122,200	82.1	893,733	35.8	0.0		1,870
WAREHOUSE	1,199,810	87.7	955,542	0.0	38.3		1,000
OFFICE	108,250	8.3	90,169	5.0	0.0		394
RETAIL				0.0	0.0		
EDUCATION				0.0	0.0		
SUBTOTAL	2,603,542	191.4	2,360,356	40.8	38.3		3,480
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK				0.0	0.0		
REGIONAL PARK				0.0	0.0		
OPEN SPACE		7.5		0.0	7.5		
CIVIC/REC SPACE				0.0	0.0		
MARINA				0.0	0.0		
SUBTOTAL	0	7.5	0	0.0	7.5		0
TOTALS	2,603,542	198.9	2,360,356	40.8	45.8	0	3,480

2. Neighborhood Center

Total Acreage 89.4
Developable Acreage 71.5

Park Acreage from Final Base Reuse Plan. Education - see note 22.

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL				0.0	0.0		
LIGHT INDUSTRIAL	118,147	9.0	98,456	4.1	0.0		197
WAREHOUSE				0.0	0.0		
OFFICE	445,386	40.9	445,386	25.6	0.0		1,620
RETAIL				0.0	0.0		
EDUCATION	11,261	0.9	9,384	0.4	0.0		110
SUBTOTAL	574,794	50.8	553,226	30.0	0.0		1,927
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK	28,800	1.9	16,727	0.9	0.0	19	48
DORMITORY BEDS				0.0	0.0		
SUBTOTAL	28,800	1.9	16,727	0.9	0.0	19	48
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK		25.0	108,900	22.5	0.0		5
REGIONAL PARK				0.0	0.0		
OPEN SPACE		7.0		0.0	7.0		
CIVIC/REC SPACE	143,857	4.7	41,102	0.5	0.0		96
MARINA				0.0	0.0		
SUBTOTAL	143,857	36.7	150,002	23.0	7.0		100
TOTALS	747,451	89.4	719,955	53.9	7.0	19	2,075

ULTIMATE BUILDOUT

Land Use Distribution	3. Mixed Use							4. Historic District						
Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.	Total Acreage 111.0; Developable Acreage 88.8					*Park Acreage from Final Base Reuse Plan*		Total Acreage 52.7; Developable Acreage 42.2					*Park Acreage from Final Base Reuse Plan; 2-Story FAR used for LI and Office*	
	SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY *SF*	SITE *AC*	PRKING/RDS *SF*	PARK *AC*	OPEN *AC*	RES *DU/BEDS*	DAY POP *PERSONS*	FACILITY *SF*	SITE *AC*	PRKING/RDS *SF*	PARK *AC*	OPEN *AC*	RES *DU/BEDS*	DAY POP *PERSONS*
NON RESIDENTIAL														
HEAVY INDUSTRIAL	95,023	7.3	230,817	0.0	0.0		119	106,406	8.1	258,467	0.0	0.0		133
LIGHT INDUSTRIAL	440,734	33.7	367,278	15.2	0.0		735	339,871	13.0	141,613	2.0	0.0		566
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE	679,640	52.0	566,367	31.2	0.0		2,471	151,728	7.0	75,864	3.5	0.0		552
RETAIL				0.0	0.0						0.0	0.0		
EDUCATION	1,680	0.13	1,400	0.1	0.0		2				0.0	0.0		
SUBTOTAL	1,217,077	93.1	1,165,862	46.4	0.0		3,327	598,005	28.1	475,944	5.4	0.0		1,251
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0			112,438	6.0	52,272	2.2	0.0	18	54
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0						0.0	0.0		
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0	112,438	6.0	52,272	2.2	0.0	18	54
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK		9.0	39,204	8.1	0.0		2		7.0	30,492	6.3	0.0		1
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE		8.9		0.0	8.9				11.5		0.0	11.5		
CIVIC/REC SPACE				0.0	0.0			3,561	0.1	2,035	0.0	0.0		2
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	0	17.9	39,204	8.1	8.9		2	3,561	18.6	32,527	6.3	11.5		4
TOTALS	1,217,077	111.0	1,205,066	54.5	8.9	0	3,329	714,004	52.7	560,743	13.9	11.5	18	1,309

ULTIMATE BUILDOUT

Land Use Distribution

Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.

5. Heavy Industry
Total Acreage 135.3
Developable Acreage 108.2
Waterfront FAR figure assigned to HI.

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL	1,170,313	68.9	2,186,742	0.0	0.0		1,463
LIGHT INDUSTRIAL	225,085	17.2	187,571	7.8	0.0		375
WAREHOUSE				0.0	0.0		
OFFICE	89,575	8.2	89,575	5.1	0.0		326
RETAIL	5,000	0.4	4,167	0.2	0.0		13
EDUCATION				0.0	0.0		
SUBTOTAL	1,489,973	94.7	2,468,054	13.1	0.0		2,176
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK				0.0	0.0		
REGIONAL PARK				0.0	0.0		
OPEN SPACE		40.6		0.0	40.6		
CIVIC/REC SPACE				0.0	0.0		
MARINA				0.0	0.0		
SUBTOTAL	0	40.6	0	0.0	40.6		0
TOTALS	1,489,973	135.3	2,468,054	13.1	40.6	0	2,176

6. Farragut Village
Total Acreage 105.2
Developable Acreage 84.2
Park Acreage from Final Base Reuse Plan; Ed. Population from VUSD.

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL				0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0		0
WAREHOUSE				0.0	0.0		
OFFICE				0.0	0.0		
RETAIL				0.0	0.0		
EDUCATION	36,208	2.77	30,173	1.2	0.0		947
SUBTOTAL	36,208	2.8	30,173	1.2	0.0		947
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES	270,792	35.0	304,920	21.8	0.0	210	630
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB	313,344	31.6	274,933	18.1	0.0	189	473
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL	584,136	66.6	579,853	39.8	0.0	399	1103
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK				0.0	0.0		
REGIONAL PARK				0.0	0.0		
OPEN SPACE		35.8		0.0	35.8		
CIVIC/REC SPACE	3,180	0.1	1,817	0.0	0.0		2
MARINA				0.0	0.0		
SUBTOTAL	3,180	35.9	1,817	0.0	35.8		2
TOTALS	623,524	105.2	611,844	41.1	35.8	399	2,052

ULTIMATE BUILDOUT

Land Use Distribution

Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.

7. Developed Recreation

Total Acreage 46.2
Developable Acreage 37.0

Park acreage figure from Final Base Reuse Plan and Bldg. SF from City.

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL				0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0		
WAREHOUSE				0.0	0.0		
OFFICE				0.0	0.0		
RETAIL				0.0	0.0		
EDUCATION				0.0	0.0		
SUBTOTAL				0.0	0.0		
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK	20,373	46.2	201,247	41.1	0.0		8
REGIONAL PARK				0.0	0.0		
OPEN SPACE		0.0		0.0	0.0		
CIVIC/REC SPACE				0.0	0.0		
MARINA				0.0	0.0		
SUBTOTAL	20,373	46.2	201,247	41.1	0.0		8
TOTALS	20,373	46.2	201,247	41.1	0.0	0	8

8. Coral Sea Village

Total Acreage 67.1
Developable Acreage 53.7

Park acreage figure from Final Base Reuse Plan.

Land Use Distribution	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL				0.0	0.0		
LIGHT INDUSTRIAL	63	0.005	53	0.0	0.0		0
WAREHOUSE				0.0	0.0		
OFFICE	10,792	1.0	10,792	0.6	0.0		39
RETAIL	73,150	5.6	60,958	2.5	0.0		183
EDUCATION				0.0	0.0		
SUBTOTAL	84,005	6.6	71,803	3.1	0.0		222
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES	245,753	33.7	293,304	21.3	0.0	202	606
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK	60,000	4.0	34,848	1.8	0.0	40	100
DORMITORY BEDS				0.0	0.0		
SUBTOTAL	305,753	37.7	328,152	23.1	0.0	242	706
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK		4.0	17,424	3.6	0.0		1
REGIONAL PARK				0.0	0.0		
OPEN SPACE		18.8		0.0	18.8		
CIVIC/REC SPACE				0.0	0.0		
MARINA				0.0	0.0		
SUBTOTAL	0	22.8	17,424	3.6	18.8		1
TOTALS	389,758	67.1	417,379	29.9	18.8	242	929

ULTIMATE BUILDOUT

Land Use Distribution	9. Education/Office							10. Marina/Residential						
Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.	Total Acreage 104.4; Developable Acreage 83.5			SF and population figures for USFS from City; Other Ed. from VUSD (note 23).				Total Acreage 82.6; Developable Acreage 66.1			Yacht Club or Boat House SF assigned (note 20).			
	SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES DU/BEDS	DAY POP PERSONS	FACILITY SF	SITE AC	PRKING/RDS SF	PARK AC	OPEN AC	RES DU/BEDS	DAY POP PERSONS
NON RESIDENTIAL														
HEAVY INDUSTRIAL				0.0	0.0						0.0	0.0		
LIGHT INDUSTRIAL	106,816	8.2	89,013	3.7	0.0		178	5,249	0.4	4,374	0.2	0.0		9
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE	113,548	10.4	113,548	6.5	0.0		350	9,040	0.8	9,040	0.5	0.0		33
RETAIL	54,370	4.2	45,308	1.9	0.0		136	42,663	3.3	35,553	1.5	0.0		107
EDUCATION	388,040	29.7	323,367	13.4	0.0		2,518				0.0	0.0		
SUBTOTAL	662,774	52.5	571,236	25.4	0.0		3,182	56,952	4.5	48,967	2.2	0.0		148
RESIDENTIAL														
NEW CONDOS				0.0	0.0			2,146,083	66.7	580,800	4.1	0.0	800	2,000
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0						0.0	0.0		
DORMITORY BEDS	30,000	5.0	150,000	0.9	0.0	500					0.0	0.0		
SUBTOTAL	30,000	5.0	150,000	0.9	0.0	500	0	2,146,083	66.7	580,800	4.1	0.0	800	2000
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE				0.0	0.0						0.0	0.0		
DEVELOPED PARK		8.0	34,848	7.2	0.0		1				0.0	0.0		
REGIONAL PARK				0.0	0.0						0.0	0.0		
OPEN SPACE		36.2		0.0	36.2				0.1		0.0	0.1		
CIVIC/REC SPACE	84,214	2.8	36,092	0.0	0.0		56				0.0	0.0		
MARINA				0.0	0.0			1,800	11.3	49,223	0.0	10.1		30
SUBTOTAL	84,214	46.9	70,940	7.2	36.2		58	1,800	11.4	49,223	0.0	10.3		30
TOTALS	776,988	104.4	792,176	33.5	36.2	500	3,239	2,204,836	82.6	678,990	6.2	10.3	800	2,178

ULTIMATE BUILDOUT

Land Use Distribution	11. Golf Course							12. Regional Park						
	Total Acreage		170.8					Total Acreage		216.0		Park acreage figure from Final Base Reuse Plan.		
	Developable Acreage		136.6					Developable Acreage		172.8				
Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.	SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED		SITE RELATED		PAVEMENT	GREEN SPACE		SOCIO RELATED	
	FACILITY	SITE	PRKING/RDS	PARK	OPEN	RES	DAY POP	FACILITY	SITE	PRKING/RDS	PARK	OPEN	RES	DAY POP
	SF	*AC*	*SF*	*AC*	*AC*	*DU/BEDS*	*PERSONS*	*SF*	*AC*	*SF*	*AC*	*AC*	*DU/BEDS*	*PERSONS*
NON RESIDENTIAL														
HEAVY INDUSTRIAL				0.0	0.0						0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0		0				0.0	0.0		
WAREHOUSE				0.0	0.0						0.0	0.0		
OFFICE				0.0	0.0						0.0	0.0		
RETAIL				0.0	0.0						0.0	0.0		
EDUCATION				0.0	0.0						0.0	0.0		
SUBTOTAL	0	0.00	0	0.00	0.00		0	0	0.00	0	0.0	0.0		0
RESIDENTIAL														
NEW CONDOS				0.0	0.0						0.0	0.0		
EXISTING DUPLEXES				0.0	0.0						0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0						0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0						0.0	0.0		
LIVE/WORK				0.0	0.0						0.0	0.0		
DORMITORY BEDS				0.0	0.0						0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	27,913	122.3	10,395	121.4	0.0		312				0.0	0.0		
DEVELOPED PARK				0.0	0.0						0.0	0.0		
REGIONAL PARK				0.0	0.0				163.0	710,028	0.0	146.7		35
OPEN SPACE		48.5		0.0	48.5				53.0		0.0	53.0		
CIVIC/REC SPACE				0.0	0.0				0.0	0	0.0	0.0		0
MARINA				0.0	0.0						0.0	0.0		
SUBTOTAL	27,913	170.8	10,395	121.4	48.5		312	0	216.0	710,028	0.0	199.7		35
TOTALS	27,913	170.8	10,395	121.4	48.5	0	312	0	216.0	710,028	0.0	199.7	0	35

ULTIMATE BUILDOUT

Land Use Distribution

Unless otherwise noted Allocation of Site SF from EDC Application - Existing from Appdx A and New from Appdx C.

13. Open Space/ Recreation

Total Acreage 99.1

Developable Acreage 79

Park acreage figure from Final Base Reuse Plan.

Land Use	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL				0.0	0.0		
LIGHT INDUSTRIAL				0.0	0.0		
WAREHOUSE				0.0	0.0		
OFFICE				0.0	0.0		
RETAIL				0.0	0.0		
EDUCATION				0.0	0.0		
SUBTOTAL				0.0	0.0		
RESIDENTIAL							
NEW CONDOS				0.0	0.0		
EXISTING DUPLEXES				0.0	0.0		
EXISTING SINGLE FAMILY				0.0	0.0		
MULTI-FAMILY - REHAB				0.0	0.0		
LIVE/WORK				0.0	0.0		
DORMITORY BEDS				0.0	0.0		
SUBTOTAL		0.0	0	0.0	0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE				0.0	0.0		
DEVELOPED PARK				0.0	0.0		0
REGIONAL PARK				0.0	0.0		
OPEN SPACE		99.1	431,680	0.0	89.2		
CIVIC/REC SPACE				0.0	0.0		
MARINA				0.0	0.0		
SUBTOTAL	0	99.1	431,680	0.0	89.2		0
TOTALS	0	99.1	431,680	0.0	89.2	0	0

TOTAL

Total Acreage 1,479

Developable Acreage 1,183

Land Use	SITE RELATED FACILITY SF	SITE RELATED SITE AC	PAVEMENT PRKING/RDS SF	GREEN SPACE PARK AC	GREEN SPACE OPEN AC	SOCIO RELATED RES DU/BEDS	SOCIO RELATED DAY POP PERSONS
NON RESIDENTIAL							
HEAVY INDUSTRIAL	1,545,024	97.6	3,096,938	0.0	0.0		1,931
LIGHT INDUSTRIAL	2,358,165	163.6	1,782,091	68.6	0.0		3,930
WAREHOUSE	1,199,810	87.7	955,542	0.0	38.3		1,000
OFFICE	1,607,959	128.6	1,400,741	78.0	0.0		5,784
RETAIL	175,183	13.4	145,986	6.0	0.0		438
EDUCATION	437,189	33.5	364,324	15.1	0.4		3,577
SUBTOTAL	7,323,330	524.4	7,745,621	167.7	38.7		16,660
RESIDENTIAL							
NEW CONDOS	2,146,083	66.7	580,800	4.1	0.0	800	2,000
EXISTING DUPLEXES	516,545	68.7	598,224	43.1	0.0	412	1,236
EXISTING SINGLE FAMILY	112,438	6.0	52,272	2.2	0.0	18	54
MULTI-FAMILY - REHAB	313,344	31.6	274,933	18.1	0.0	189	473
LIVE/WORK	88,800	5.9	51,575	2.7	0.0	59	148
DORMITORY BEDS	30,000	5.0	150,000	0.9	0.0	500	0
SUBTOTAL	3,207,211	183.8	1,707,804	71.0	0.0	1,479	3,911
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	27,913	122.3	10,395	121.4	0.0		312
DEVELOPED PARK	20,373	99.2	432,115	88.8	0.0		18
REGIONAL PARK	0.0	163.0	710,028	0.0	146.7		35
OPEN SPACE	0.0	366.9	431,680	0.0	357.0		0
CIVIC/REC SPACE	234,812	7.7	81,046	0.4	0.0		157
MARINA	1,800	11.3	49,223	0.0	10.1		30
SUBTOTAL	284,898	770.4	1,714,486	210.7	513.8		551
TOTALS	10,815,438	1,478.7	11,167,912	449.3	552.5	1,479	21,123

ULTIMATE BUILDOUT

Land Use Factors LAND USE DESIGNATION	LAND USE ID	FAR FACTOR *(A)*	PARKING AND ROADS PER GROSS AC *(B)*	PER per UNIT *(C)*	DU per AC	SPACE USE BY EMPLOYEE	TRANSIENT COUNT PER EMP OR USAGE PER ACRE	AVG DU or SPECIAL BLDG SF
NON RESIDENTIAL								
HEAVY INDUSTRIAL	HI	0.3	31,743 *7,13*			800 sf per emp		
LIGHT INDUSTRIAL	LI	0.3	10,890 *,7,16,20*			600 sf per emp		
WAREHOUSE	WH	0.3	10,890 *6,17*			1,200 sf per emp		
OFFICE	OF	0.25	10,890 *6,20*			275 sf per emp		
RETAIL	R	0.3	10,890 *6,18*			400 sf per emp		
EDUCATION	ED	0.3	10,890 *6*			780 sf per emp	3.85 *per emp-12*	
RESIDENTIAL								
NEW CONDOS	HR-N		8,712 *5*	2.5	12			2,000 SF
EXISTING DUPLEXES	MR		8,712 *5*	3.0	6			2,500 SF
EXISTING SINGLE FAMILY	LR		8,712 *5*	3.0	3			8,000 SF
MULTI-FAMILY - REHAB	MR-N		8,712 *5*	2.5	6			2,500 SF
LIVE/WORK	MIX		8,712 *5*	2.5	10			1,500 SF
DORMITORY BEDS	HR		300 *9*	1.0				60 SF - *15*
CIVIC/RECREATION/OPEN SPACE								
GOLF COURSE	GOLF	0.7	33.33 *10*			0.05 mp per ac	2.5 per ac-*11*	
DEVELOPED PARK	C-PRK		4,356 *4*			0.2 mp per ac		
REGIONAL PARK	R-PRK		4,356 *4*			0.1 mp per ac	35 per day-*14*	
OPEN SPACE	HAB		none					
CIVIC/REC SPACE	CIV/REC	0.7	varies *5,6*			1500 sf per emp		
MARINA	MAR		4356 *4*			0.16 mp per ac	100 BERTHS	1,800 SF

ULTIMATE BUILDOUT

(A)	Source: EDC Application Appendix C		
(B)	Source: California Base Conversion Planning Factior		
(C)	Source: Final Base Reuse Plan - Table4-5		
4	Paving for Parking and Roads (Gross AC X 43560 X 0.10) = SF rec/os, marina		4,356
5	Paving for Parking and Roads (Gross AC X 43560 X 0.20) = SF		8,712
6	Paving for Parking and Roads (Gross AC X 43560 X 0.25) = SF		10,890
7	Paving for Parking, Roads and Ramps (Gross AC - Facility/43560 = 31743)	hi	31,743
8	Paving for Parking and Roads (Gross AC X 43560 X 0.40) = SF		17,424
9	Assume 1 parking space per dormitory bed		300
10	Paving for Parking and Roads for Golf Course (emp+trans*300/9)		33.33
11	2.5 Transients Use per Acre (from El Toro)		2.5
12	3.85 Students/Emp from El Toro Study		3.85
13	Waterfront Heavy Industrial Assume FAR = .26		0.26
14	Daily Visitation for Regional Park from El Toro Study		35
15	Assume Dorm Footprint = (beds X 120 sf X .5) assumes 2 stories and includes fac.		60
16	Light Industrial Coverage Calculation for North Industrial Area		0.40
17	Warehouse Coverage Calculation for North Industrial Area		0.45
18	Office/Retail Coverage Calculation for North Industrial Area		0.35
19	Assume the Size of Boathouse		1,800
20	Assume 2 story buildings for these uses - FAR/2		
21	Cliff Solari from Vallejo Unified School District contacted for daily population - 900 students - 47 staff.		
22	Per VUSD - Bldg 533 was added to the education total - 4,000 SF and daily population of 65 - 60 students - 5 staff.		
23	Per VUSD - Bldg 1003 was added to the education total - daily population of 167 - 140 students - 27 staff.		

ULTIMATE BUILDOUT

Utility Demand Factors	LAND USE CLASSIFCATIONS																	
	NON-RESIDENTIAL						RESIDENTIAL						CIVIC/RECREATION/OPEN SPACE					
	HI	LI	WH	OF	RET	ED	HR-NEW	MR	LR	MR-NEW	LV/WK	DORM	GOLF	C-PARK	R-PARK	OPEN	CIV/REC	MAR
SANITARY SEWER																		
% WATER/SF	85%	85%	80%	90%	85%	90%							90%				90%	90%
AFY/AC	1.5	2.50	2.00	1.00	0.50	0.50	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.20			0.20	1.00
% WATER/EMP	85%	85%	85%	85%									80%	80%	85%			85%
GPD/DU							216	216	216	216	216	175						
WATER																		
AFY/SF	0.00011	0.00008	0.00006	0.00008	0.00022	0.00022											0.00022	
AFY/AC		0.11202	0.05601	0.22404	0.22404	0.22404	0.22404	0.22404	0.22404	0.22404	0.11202	0.11202		1.5			0.22404	
AFY/DU							0.25	0.3	0.35	0.3	0.25							
AFY/EMP&PERS	0.05601	0.05601	0.05601	0.05601										0.01680	0.01680			0.17924
AFY/BED												0.11						
AFY/COURSE													315					
AFY/CLUBHSE													5					3
STORM WATER																		
NEW C FACTOR [1]	0.90	0.68	0.85	0.65	0.73	0.65	0.35	0.40	0.35	0.45	0.35	0.35	0.20	0.20	0.20	0.27	0.20	0.45
EXIST. C FACTOR [2]	0.95	0.95	0.95	0.95	0.95									0.27		0.27	0.27	0.45

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities; also includes local soil conditions for open areas.

APPENDIX A2

SET – 2
DEMAND BY SYSTEM
FOR
CURRENT – 1997 UTILIZATION
LONG TERM BUILDOUT – 2007
ULTIMATE BUILDOUT – 20XX

MIRIS

InfraStrategy Analysis

CURRENT – 1997 UTILIZATION

Set 2 – Demand Generation

- Potable Water System
- Sanitary Sewer System
- Storm Water System

July 15, 1997

Prepared by: Reimer Associates

1997 UTILIZATION

Water System Analysis

	1. North Light Industrial							2. Neighborhood Center						
	Total Acreage 198.9							Total Acreage 89.4						
	Developable Acreage 159.1							Developable Acreage 71.5						
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	7.07	0.00		2.80	6	10	4,500	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	17.13	0.73		8.82	16	26	4,500	8.21	0.38		20.22	18	28	4,500
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	0.00	1.39		0.00	1	1		8.56	1.31		4.41	9	14	3,500
RETAIL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	24.19	2.12		11.62	23	38	4,500	16.77	1.69		24.63	27	43	4,500
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	33.75		0.00	21	33	
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		32.23	0.11		0.00	20	32	2,500
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	32.23	33.86		0.00	41	65	2,500
TOTAL	24.19	2.12	0.00	11.62	23	38	4,500	49.00	35.54	0.00	24.63	67	108	4,500

(1) Max ~~Day Flow~~ = Ave Flow X 1.6

1997 UTILIZATION

Water System Analysis

3. Mixed Use

Total Acreage 111.0
Developable Acreage 88.8

	DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	11.80	0.54		4.75	11	17	4,500
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0	
SUBTOTAL	11.80	0.54		4.75	11	17	4,500
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	12.15		0.00	8	12	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	12.15		0.00	8	12	0
TOTAL	11.80	12.69	0.00	4.75	18	29	4,500

4. Historic District

Total Acreage 52.7
Developable Acreage 42.2

	DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	0.27	0.02		0.06	0	0	3,500
RETAIL	0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0	
SUBTOTAL	0.27	0.02		0.06	0	0	3,500
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	9.45		0.00	6	9	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.80	0.00		0.00	0	1	2,500
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.80	9.45		0.00	6	10	2,500
TOTAL	1.07	9.46	0.00	0.06	7	10	3,500

(1) Max Day Flow = Ave Flow X 1.6

1997 UTILIZATION

Water System Analysis

5. Heavy Industry
Total Acreage 135.3
Developable Acreage 108.2

	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	9.97	0.00		6.72	10	17	4,500
LIGHT INDUSTRIAL	23.96	1.10		10.75	22	35	4,500
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	0.42	0.06		0.67	1	1	3,500
RETAIL	0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0	
SUBTOTAL	34.35	1.16		18.15	33	53	4,500
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0
TOTAL	34.35	1.16	0.00	18.15	33	53	4,500

6. Farragut Village
Total Acreage 105.2
Developable Acreage 84.2

	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00		0.00	0	0	
EDUCATION	3.05	0.11		0.00	2	3	3,000
SUBTOTAL	3.05	0.11		0.00	2	3	3,000
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.71	0.00		0.00	0	1	2,500
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.71	0.00		0.00	0	1	2,500
TOTAL	3.77	0.10	0.00	0.00	2	4	3,000

(1) Max Day Flow = Ave Flow X 1.6

1997 UTILIZATION

Water System Analysis

	7. Developed Recreation Total Acreage 46.2, Developable Acreage 37.0							***8. Coral Sea Village*** Total Acreage 67.1, Developable Acreage 53.7						
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00			0	0		0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00			0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	0.00	0.00		0.00	0	0	0
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	5.40		0.00	3	5	
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	0.00	5.40		0.00	3	5	0
TOTAL	0.00	0.00	0.00	0.00	0	0	0	0.00	5.40	0.00	0.00	3	5	0

(1) Max Day Flow = Ave Flow X 1.6

1997 UTILIZATION

Water System Analysis

9. Education/Office

Total Acreage 104.4
Developable Acreage 83.5

	DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	9.54	1.46		19.60	19	30	3,500
RETAIL	0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0	
SUBTOTAL	9.54	1.46		19.60	19	30	3,500
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	10.80		0.00	7	11	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	18.87	0.00		0.00	12	19	2,500
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	18.87	10.80		0.00	18	29	2,500
TOTAL	28.41	12.26	0.00	19.60	37	60	3,500

10. Marina/Residential

Total Acreage 82.6
Developable Acreage 66.1

	DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	6.05	0.28		0.84	4	7	4,500
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0	
SUBTOTAL	6.05	0.28		0.84	4	7	4,500
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0
TOTAL	6.05	0.28	0.00	0.84	4	7	4,500

(1) Max Day Flow = Ave Flow X 1.6

1997 UTILIZATION

Water System Analysis	11. Golf Course							12. Regional Park						
	Total Acreage	170.8						Total Acreage	216.0					
	Developable Acreage	136.6						Developable Acreage	172.8					
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	0.00	0.00		0.00	0	0	0
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	315.00		5.00	198	316	1,500	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	315.00		5.00	198	316	1,500	0.00	0.00		0.00	0	0	0
TOTAL	0.00	315.00	0.00	5.00	198	316	1,500	0.00	0.00	0.00	0.00	0	0	0

(1) Max Day Flow = Ave Flow X 1.6

1997 UTILIZATION

Water System Analysis

13. Open Space/ Recreation

Total Acreage 99.1
Developable Acreage 79.3

	DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0
TOTAL	0.00	0.00	0.00	0.00	0	0	0

TOTAL

Total Acreage 1478.7
Developable Acreage 1182.9

	DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	17.04	0.00		9.52	16	26	4,500
LIGHT INDUSTRIAL	67.13	3.02		45.38	71	114	4,500
WAREHOUSE	0.00	0.00		0.00	0	0	0
OFFICE	18.80	4.24		24.74	30	47	3,500
RETAIL	0.00	0.00		0.00	0	0	0
EDUCATION	3.05	0.11		0.00	2	3	3,000
SUBTOTAL	106.02	7.37		79.65	119	191	4,500
RESIDENTIAL							
NEW CONDOS	0.00	0.00	0.00		0	0	0
EXISTING DUPLEXES	0.00	0.00	0.00		0	0	0
EXISTING SINGLE FAMILY	0.00	0.00	0.00		0	0	0
MULTI-FAMILY - REHAB	0.00	0.00	0.00		0	0	0
LIVE/WORK	0.00	0.00	0.00		0	0	0
DORMITORY BEDS	0.00	0.00	0.00		0	0	0
SUBTOTAL	0.00	0.00	0.00		0.0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	315.00		5.00	198	320	1,500
DEVELOPED PARK	0.00	71.55		0.00	44	71	0
REGIONAL PARK	0.00	0.00		0.00	0	0	0
OPEN SPACE	0.00	0.00		0.00	0	0	0
CIVIC/REC SPACE	52.61	0.10		0.00	33	52	2,500
MARINA	0.00	0.00		0.00	0	0	0
SUBTOTAL	52.61	386.65		5.00	275	443	2,500
TOTAL	158.63	394.02	0.00	84.65	394	634	4,500

(1) Max Day Flow = ~~Ave~~ Flow X 1.6 TOTAL REGIONAL FIRE DEMAND BASED ON NFPA EQUATION: Q=1020 x SQRT (P) x (1 - 0.01 x SQRT ~~(P)); T = Q/1000~~

Fire Flow Allocation by Reimer Associates

	FLOW RATE	DURATION
NON RESIDENTIAL		
HEAVY INDUSTRIAL	4,500	4
LIGHT INDUSTRIAL	4,500	4
WAREHOUSE	4,500	4
OFFICE	3,500	3
RETAIL	3,500	3
EDUCATION	3,000	3
RESIDENTIAL		
NEW CONDOS	3,500	3
EXISTING DUPLEXES	2,500	2
EXISTING SINGLE FAMILY	3,500	3
MULTI-FAMILY - REHAB	2,500	2
LIVE/WORK	2,500	2
DORMITORY BEDS	3,500	3
CIVIC/RECREATION/OPEN SPACE		
GOLF COURSE	1,500	2
DEVELOPED PARK	1,500	2
REGIONAL PARK	none	none
OPENSPACE	none	none
CIVIC/REC SPACE	3,000	3
MARINA	3,500	3

TABLE 3-3 VALLEJO FIRE DEPARTEMENT FIRE FLOW REQUIREMENTS
Souce: City of Vallejo

ZONE DESIGNATION	FLOW RATE	DURATION
Resource Conservation	none	none
Rural Residential	1,500	2
Low Density Residential	1,500	2
Medium Density Residential	2,500	2
Residential View District	2,500	2
Neighborhood Shopping	2,500	2
Schools	3,000	3
High Density Residential	3,500	3
Arch Heritage District	3,500	3
Linear Commercial	3,500	3
Waterfront Shopping	3,500	3
Freeway Shopping	3,500	3
Planned Development RES	3,500	3
Intensive Use	3,500	3
Limited Office	3,500	4
Pedestrian Shopping	4,500	4
Planned Development COM	4,500	4
Planned Development IND	4,500	4
Medical	4,500	4

Water Storage Requirements by Reimer Associates

Max. Day Storage	Fire Flow Storage	Equalization Storage	Total Storage
634 gpm	4,500 gpm	0 gal./ft.	
x 1440 min/day	x 240 duration	x 5.50 ft.	
0.9 M.Gal.	1.1 M.Gal.	- M.Gal.	**2.0 Million Gal.**

1997 UTILIZATION

Sanitary Sewer System Analysis	1. North Light Industrial					2. Neighborhood Center				
	Total Acreage		198.9			Total Acreage		89.4		
	Developable Acreage		159.1			Developable Acreage		71.5		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0053	0.0177		0.0021	0.0252	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0130	0.0332		0.0067	0.0528	0.0062	0.0166		0.0153	0.0381
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0	0.0074		0.0000	0.0074	0.0069	0.0083		0.0033	0.0185
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0	0.0			0.0000
SUBTOTAL	0.0183	0.0582		0.0088	0.0853	0.0131	0.0250		0.0186	0.0567
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0	0.0		0.0
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0040		0.0	0.0040
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE		0.2651			0.2651		0.0191			0.0191
CIVIC/REC SPACE	0.0	0.0			0.0	0.0258	0.0008			0.0267
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.2651		0.0	0.2651	0.0258	0.0239		0.0	0.0497
TOTAL	0.0183	0.3233	0.0000	0.0088	0.3504	0.0389	0.0489	0.0	0.0186	0.1064

1997 UTILIZATION

Sanitary Sewer System Analysis	3. Mixed Use					4. Historic District				
	Total Acreage 111.0					Total Acreage 52.7				
	Developable Acreage 88.8					Developable Acreage 42.2				
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0089	0.0239		0.0036	0.0364	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0	0.0		0.0	0.0	0.0002	0.0001		0.0	0.0004
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0	0.0			0.0
SUBTOTAL	0.0089	0.0239		0.0036	0.0364	0.0002	0.0001		0.0	0.0004
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0	0.0		0.0
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0014		0.0	0.0014		0.0011		0.0	0.0011
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE		0.1018			0.1018		0.0473			0.0473
CIVIC/REC SPACE	0.0	0.0			0.0	0.0006	0.0			0.0007
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.1032		0.0	0.1032	0.0006	0.0484		0.0	0.0491
TOTAL	0.0089	0.1272	0.0	0.0036	0.1397	0.0009	0.0486	0.0	0.0	0.0495

1997 UTILIZATION

Sanitary Sewer System Analysis	5. Heavy Industry					6. Farragut Village				
	Total Acreage		135.3			Total Acreage		105.2		
	Developable Acreage		108.2			Developable Acreage		84.2		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0075	0.0070		0.0051	0.0196	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0181	0.0485		0.0081	0.0748	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0003	0.0004		0.0005	0.0013	0.0	0.0		0.0	0.0
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0024	0.0			0.0024
SUBTOTAL	0.0260	0.0560		0.0137	0.0957	0.0024	0.0		0.0	0.0024
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0	0.0		0.0
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0		0.0	0.0
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE		0.0972			0.0972		0.0057			0.0057
CIVIC/REC SPACE	0.0	0.0			0.0	0.0006	0.0			0.0006
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0972		0.0	0.1	0.0006	0.0057		0.0	0.0063
TOTAL	0.0260	0.1531	0.0	0.0137	0.1928	0.0030	0.0057	0.0	0.0	0.0087

1997 UTILIZATION

Sanitary Sewer System Analysis	7. Developed Recreation					8. Coral Sea Village				
	Total Acreage		46.2			Total Acreage		67.1		
	Developable Acreage		37.0			Developable Acreage		53.7		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0	0.0			0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0	0.0		0.0
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0006		0.0	0.0006
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE		0.0			0.0		0.0056			0.0056
CIVIC/REC SPACE	0.0	0.0			0.0	0.0	0.0			0.0
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0	0.0063		0.0	0.0063
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0063	0.0	0.0	0.0063

1997 UTILIZATION

Sanitary Sewer System Analysis	9. Education/Office					10. Marina/Residential				
	Total Acreage		104.4			Total Acreage		82.6		
	Developable Acreage		83.5			Developable Acreage		66.1		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.0046	0.0123		0.0006	0.0175
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0076	0.0093		0.0148	0.0318	0.0	0.0		0.0	0.0
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0	0.0			0.0
SUBTOTAL	0.0076	0.0093		0.0148	0.0318	0.0046	0.0123		0.0006	0.0175
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0	0.0		0.0
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0013		0.0	0.0013		0.0		0.0	0.0
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE		0.0192			0.0192		0.1171			0.1171
CIVIC/REC SPACE	0.0151	0.0005			0.0156	0.0	0.0			0.0
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0151	0.0210		0.0	0.0361	0.0	0.1272		0.0	0.1272
TOTAL	0.0228	0.0303	0.0	0.0148	0.0679	0.0046	0.1394	0.0	0.0006	0.1446

1997 UTILIZATION

Sanitary Sewer System Analysis	11. Golf Course					12. Regional Park				
	Total Acreage		170.8			Total Acreage		216.0		
	Developable Acreage		136.6			Developable Acreage		172.8		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0	0.0			0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0	0.0		0.0
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0036	0.0036		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0		0.0	0.0
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE					0.0					0.0
CIVIC/REC SPACE	0.0	0.0			0.0	0.0	0.0			0.0
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0		0.0036	0.0036	0.0	0.0		0.0	0.0
TOTAL	0.0	0.0	0.0	0.0036	0.0036	0.0	0.0	0.0	0.0	0.0

1997 UTILIZATION

Sanitary Sewer System Analysis

13. Open Space/ Recreation — Total Acreage 99.1; Developable Acreage 79.3

TOTAL — Total Acreage 1478.7; Developable Acreage 1182.9

	13. Open Space/Recreation: GENERATION BY LAND USE (MGD) by SF	by AC	by DU/BED	by DAY POP	AVE, FLOW (MGD)	TOTAL: GENERATION BY LAND USE (MGD) by SF	by AC	by DU/BED	by DAY POP	AVE, FLOW (MGD)
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.013	0.025		0.007	0.045
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.051	0.135		0.034	0.220
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0	0.0		0.0	0.0	0.015	0.026		0.019	0.059
RETAIL	0.0	0.0			0.0	0.0	0.0		0.0	0.0
EDUCATION	0.0	0.0			0.0	0.002	0.0		0.0	0.002
SUBTOTAL	0.0	0.0		0.0	0.0	0.08	0.18		0.06	0.33
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0	0.0		0.0
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.004	0.004
DEVELOPED PARK		0.0		0.0	0.0		0.008		0.0	0.008
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE					0.0		0.678			0.678
CIVIC/REC SPACE	0.0	0.0			0.0	0.042	0.001			0.044
MARINA	0.0	0.0		0.0	0.0	0.0	0.010		0.0	0.010
SUBTOTAL	0.0	0.0		0.0	0.0	0.042	0.698	0.0	0.004	0.744
TOTAL	0.0	0.0	0.0	0.0	0.0	0.123	0.883	0.0	0.064	1.070

1997 UTILIZATION

Storm Water System Analysis

	1. North Light Industrial							2. Neighborhood Center						
	Total Acreage		198.9					Total Acreage		89.4				
	Developable Acreage		159.1					Developable Acreage		71.5				
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	13.3	0.0	13.3	0.95	0.90	11.9	14.4	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	14.9	6.5	8.4	0.95	0.68	7.5	9.0	7.5	3.4	4.1	0.95	0.68	3.7	12.4
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	8.3	6.2	2.1	0.95	0.65	3.0	3.6	9.4	5.8	3.5	0.95	0.65	3.9	12.9
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	36.4	12.7	23.7			22.4	27.0	16.8	9.2	7.6			7.6	25.3
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0	25.0	22.5	2.5	0.27	0.20	6.6	22.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPENSPACE	162.5	70.1	92.4	0.27	0.27	60.5	73.0	42.8	24.7	18.2	0.27	0.27	14.8	49.5
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	4.7	0.5	4.2	0.27	0.20	1.0	3.3
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	162.5	70.1	92.4			60.5	73.0	72.6	47.7	24.9			22.4	74.7
TOTAL	198.9	82.8	116.1	**Ave. C**	0.42	82.9	100.0	89.4	56.9	32.5	**Ave. C**	0.34	30.0	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

1997 UTILIZATION

Storm Water System Analysis

	3. Mixed Use							4. Historic District						
	Total Acreage	111.0						Total Acreage	52.7					
	Developable Acreage	88.8						Developable Acreage	42.2					
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	10.7	4.8	5.9	0.95	0.68	6.9	13.9	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0	0.1	0.1	0.1	0.95	0.65	0.1	0.5
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	10.7	4.8	5.9			6.9	13.9	0.1	0.1	0.1			0.1	0.5
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	9.0	0.0	9.0	0.27	0.20	1.8	3.6	7.0	6.3	0.7	0.27	0.20	1.4	7.4
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPENSPACE	91.3	0.0	91.3	0.27	0.27	41.1	82.5	45.4	17.1	28.3	0.27	0.27	17.4	92.0
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.1	0.0	0.1	0.27	0.20	0.0	0.1
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	100.3	0.0	100.3			42.9	86.1	52.6	23.4	29.2			18.8	99.5
TOTAL	111.0	4.8	106.2	Ave. C	0.45	49.8	100.0	52.7	23.5	29.2	Ave. C	0.36	18.9	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

1997 UTILIZATION

Storm Water System Analysis

5. Heavy Industry
Total Acreage 135.3
Developable Acreage 108.2

	REPORTED ACREAGE SITE AC	PARK/OPE AC	PAVED AC	C VALUES EX [2]	NEW [1]	HYDROLOGY CA	% OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	5.2	0.0	5.2	0.95	0.90	5.0	8.1
LIGHT INDUSTRIAL	21.8	9.8	12.0	0.95	0.68	14.1	22.9
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.5	0.3	0.2	0.95	0.65	0.2	0.4
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	27.5	10.1	17.4			19.3	31.3
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPENSPACE	107.8	35.0	72.8	0.27	0.27	42.2	68.7
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	107.8	35.0	72.8			42.2	68.7
TOTAL	135.3	45.1	90.2	Ave. C	0.45	61.5	100.0

6. Farragut Village
Total Acreage 105.2
Developable Acreage 84.2

	REPORTED ACREAGE SITE AC	PARK/OPE AC	PAVED AC	C VALUES EX [2]	NEW [1]	HYDROLOGY CA	% OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	1.0	0.5	0.6		0.65	0.5	1.5
SUBTOTAL	1.0	0.5	0.6			0.5	1.5
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPENSPACE	104.1	76.4	27.7	0.27	0.27	33.1	98.5
CIVIC/REC SPACE	0.1	0.0	0.1	0.27	0.20	0.0	0.1
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	104.2	76.4	27.8			33.1	98.5
TOTAL	105.2	76.8	28.4	Ave. C	0.32	33.6	100.0

1 "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.
2 "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

1997 UTILIZATION

Storm Water System Analysis	*7. Developed Recreation*							*8. Coral Sea Village*						
	Total Acreage		46.2					Total Acreage		67.1				
	Developable Acreage		37.0					Developable Acreage		53.7				
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE *AC*	PARK/OPE *AC*	PAVED *AC*	EX [2]	NEW [1]	CA	% OF CA	SITE *AC*	PARK/OPE *AC*	PAVED *AC*	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0			0.0	0.0
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0	4.0	3.6	0.4	0.27	0.20	0.8	3.8
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPENSPACE	46.2	41.1	5.1	0.27	0.27	13.4	100.0	63.1	45.0	18.1	0.27	0.27	20.3	96.2
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	46.2	41.1	5.1			13.4	100.0	67.1	48.6	18.5			21.1	100.0
TOTAL	46.2	41.1	5.1	**Ave. C**	0.29	13.4	100.0	67.1	48.6	18.5	**Ave. C**	0.31	21.1	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.
[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

1997 UTILIZATION

Storm Water System Analysis

9. Education/Office
Total Acreage 104.4
Developable Acreage 83.5

Storm Water System Analysis	REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	10.4	6.5	3.9	0.95	0.65	4.3	12.7
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	10.4	6.5	3.9			4.3	12.7
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	8.0	7.2	0.8	0.27	0.20	1.6	4.7
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPENSPACE	83.2	56.0	27.2	0.27	0.27	27.4	80.9
CIVIC/REC SPACE	2.8	0.0	2.8	0.27	0.20	0.6	1.6
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	94.0	63.2	30.8			29.5	87.3
TOTAL	104.4	69.7	34.7	**Ave. C**	0.32	33.8	100.0

10. Marina/Residential
Total Acreage 82.6
Developable Acreage 66.1

Storm Water System Analysis	REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	5.5	2.5	3.0	0.95	0.68	2.7	7.4
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	5.5	2.5	3.0			2.7	7.4
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPENSPACE	65.8	2.6	63.2	0.27	0.27	29.1	78.8
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	11.3	11.3	0.0	0.45	0.45	5.1	13.8
SUBTOTAL	77.1	13.9	63.2			34.2	92.6
TOTAL	82.6	16.4	66.2	**Ave. C**	0.45	36.9	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.
[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

1997 UTILIZATION

Storm Water System Analysis

11. Golf Course
Total Acreage 170.8
Developable Acreage 136.6

	REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	122.3	121.7	0.6		0.20	24.5	65.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPENSPACE	48.5	48.2	0.3	0.27	0.27	13.2	35.0
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	170.8	169.9	0.9			37.6	100.0
TOTAL	170.8	169.9	0.9	Ave. C	0.22	37.6	100.0

12. Regional Park
Total Acreage 216.0
Developable Acreage 172.8

	REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	163.0	146.7	16.3		0.20	32.6	69.5
OPENSPACE	53.0	53.0	0.0	0.27	0.27	14.3	30.5
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	216.0	199.7	16.3			46.9	100.0
TOTAL	216.0	199.7	16.3	Ave. C	0.22	46.9	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.
[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

1997 UTILIZATION

Storm Water System Analysis

13. Open Space/ Recreation

Total Acreage 99.1
Developable Acreage 79.3

	REPORTED ACREAGE SITE AC	PARK/OPE AC	PAVED AC	C VALUES EX [2]	NEW [1]	HYDROLOGY CA	% OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPENSPACE	99.1	89.2	9.9	0.27	0.27	28.5	100.0
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	99.1	89.2	9.9			28.5	100.0
TOTAL	99.1	89.2	9.9	Ave. C	0.29	28.5	100.0

TOTAL

Total Acreage 1478.7
Developable Acreage 1182.9

	REPORTED ACREAGE SITE AC	PARK/OPE AC	PAVED AC	C VALUES EX [2]	NEW [1]	HYDROLOGY CA	% OF TOTAL
NON RESIDENTIAL							
HEAVY INDUSTRIAL	18.5	0.0	18.5	0.95	0.90	16.9	3.4
LIGHT INDUSTRIAL	60.5	27.0	33.5	0.95	0.68	34.9	7.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	28.7	18.9	9.7	0.95	0.65	11.5	2.3
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	1.0	0.5	0.6		0.65	0.5	0.1
SUBTOTAL	108.7	46.4	62.3			63.8	12.9
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	122.3	121.7	0.6		0.20	24.5	4.9
DEVELOPED PARK	53.0	39.6	13.4	0.27	0.20	12.2	2.5
REGIONAL PARK	163.0	146.7	16.3		0.20	32.6	6.6
OPENSPACE	1012.7	558.3	454.4	0.27	0.27	355.2	71.8
CIVIC/REC SPACE	7.7	0.4	7.3	0.27	0.20	1.6	0.3
MARINA	11.3	11.3	0.0	0.45	0.45	5.1	1.0
SUBTOTAL	1370.0	878.1	491.9			431.1	87.1
TOTAL	1478.7	924.5	554.2	Ave. C	0.33	494.9	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.
[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

1997 UTILIZATION

Storm Water Discharge Analysis		1. North Light Industrial				2. Neighborhood Center		
		Total Acreage		198.9		Total Acreage	89.4	
		Average C Value		0.42		Average C Value	0.34	
		SUBBASIN AREAS[1]				SUBBASIN AREAS[1]		
		1 - A	1 - B	1 - C	1 - D	2 - D	2 - E	2 - F
		63.1	92.3	35.5	8.2	41.1	22.4	6.0
DRAINAGE BASINS								
#	Intensity							
A	1.05	27.8						
B	0.73		28.3					
C	0.88			13.1				
D	1.46				5.0	20.3		
E	0.49						3.7	
F	0.92							1.9
G	0.84							
H	1.13							
I	1.11							
J	1.06							
K	1.11							
L	0.72							
M	1.36							
N	1.28							
O	1.54							
P	1.31							
TOTAL DISCHARGE		27.8	28.3	13.1	5.0	20.3	3.7	1.9

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

1997 UTILIZATION

Storm Water Discharge Analysis		3. Mixed Use					4. Historic District			
		Total Acreage				111.0	Total Acreage			89.4
		Average C Value				0.45	Average C Value			0.36
		SUBBASIN AREAS[1]					SUBBASIN AREAS[1]			
		3 - D	3 - E	3 - F	3 - G	3 - H	4 - F	4 - G	4 - H	4 - I
		23.0	31.7	26.1	25.5	4.8	1.6	1.3	30.2	7.3
DRAINAGE BASINS										
#	Intensity									
A	1.05									
B	0.73									
C	0.88									
D	1.46	15.2								
E	0.49		7.0							
F	0.92			10.8			0.5			
G	0.84				9.7			0.4		
H	1.13					2.4			12.3	
I	1.11									2.9
J	1.06									
K	1.11									
L	0.72									
M	1.36									
N	1.28									
O	1.54									
P	1.31									
TOTAL DISCHARGE		15.2	7.0	10.8	9.7	2.4	0.5	0.4	12.3	2.9

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

1997 UTILIZATION

Storm Water Discharge Analysis		5. *Heavy Industry*						6. *Farragut Village*		
		Total Acreage					135.3	Total Acreage	105.2	
		Average C Value					0.45	Average C Value	0.32	
		SUBBASIN AREAS[1]						SUBBASIN AREAS[1]		
		5 - H	5 - I	5 - J	5 - K	5 - L	5 - M	6 - F	6 - H	6 - I
		2.0	49.7	35.1	8.7	22.8	6.1	5.4	30.4	54.5
DRAINAGE BASINS #	Intensity									
A	1.05									
B	0.73									
C	0.88									
D	1.46									
E	0.49									
F	0.92							1.6		
G	0.84									
H	1.13	1.0							11.1	
I	1.11		25.2							19.5
J	1.06			17.0						
K	1.11				4.4					
L	0.72					7.5				
M	1.36						3.8			
N	1.28									
O	1.54									
P	1.31									
TOTAL DISCHARGE		1.0	25.2	17.0	4.4	7.5	3.8	1.6	11.1	19.5

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

1997 UTILIZATION

Storm Water Discharge Analysis		7. Developed Recreation			8. Coral Sea Village			9. Education/Office		
		Total Acreage 46.2			Total Acreage 67.1			Total Acreage 104.4		
		Average C Value 0.29			Average C Value 0.31			Average C Value 0.32		
		SUBBASIN AREAS[1]			SUBBASIN AREAS[1]			SUBBASIN AREAS[1]		
		7 - I	7 - L	7 - OL	8 - I	8 - L	8 - OL	9 - I	9 - L	9 - M
		36.7	0.9	8.6	7.8	49.1	10.2	8.4	32.4	48.4
DRAINAGE BASINS										
#	Intensity									
A	1.05									
B	0.73									
C	0.88									
D	1.46									
E	0.49									
F	0.92									
G	0.84									
H	1.13									
I	1.11	11.9			2.7			3.0		
J	1.06									
K	1.11									
L	0.72		0.2			11.2			7.6	
M	1.36									21.5
N	1.28									
O	1.54									
P	1.31									
TOTAL DISCHARGE		11.9	0.2	0.0	2.7	11.2	0.0	3.0	7.6	21.5

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

1997 UTILIZATION

Storm Water Discharge Analysis		10. Marina/Residential				11. Golf Course		
		Total Acreage			82.6	Total Acreage	170.8	
		Average C Value			0.45	Average C Value	0.22	
		SUBBASIN AREAS[1]				SUBBASIN AREAS[1]		
		10 - M	10 - N	10 - O	10 - P	11 - M	11 - N	11 - O
		15.4	21.1	26.8	19.3	3.4	37.2	26.3
DRAINAGE BASINS #	Intensity							
A	1.05							
B	0.73							
C	0.88							
D	1.46							
E	0.49							
F	0.92							
G	0.84							
H	1.13							
I	1.11							
J	1.06							
K	1.11							
L	0.72							
M	1.36	9.4				1.0		
N	1.28		12.2				10.6	
O	1.54			18.6				9.0
P	1.31				11.4			
TOTAL DISCHARGE		9.4	12.2	18.6	11.4	1.0	10.6	9.0

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

1997 UTILIZATION

Storm Water Discharge Analysis		12. Regional Park				TOTAL
		Total Acreage 216.0				Total Acreage 1478.7
		Average C Value 0.22				Average C Value 0.33
		SUBBASIN AREAS[1]				DRAINAGE BASIN TOTAL DISCHARGE[2] (cfs)
		12 - M	12 - N	12 - O	12 - P	
		3.6	6.8	9.7	17.2	
DRAINAGE BASINS						
#	Intensity					
A	1.05					27.8
B	0.73					28.3
C	0.88					13.1
D	1.46					40.5
E	0.49					10.7
F	0.92					14.8
G	0.84					10.1
H	1.13					26.9
I	1.11					65.3
J	1.06					17.0
K	1.11					4.4
L	0.72					26.5
M	1.36	1.1				36.8
N	1.28		1.9			24.7
O	1.54			3.3		30.9
P	1.31				4.9	16.3
TOTAL DISCHARGE		1.1	1.9	3.3	4.9	394.3

[1] Areas of sub-basins may not add to total due to reductions for overland flow.
[2] Reuse Area 13 drains into surrounding dredge ponds and was excluded.

MIRIS

InfraStrategy Analysis

LONG TERM BUILDOUT - 2007

Set 2 – Demand Generation

- Potable Water System
- Sanitary Sewer System
- Storm Water System

July 15, 1997

Prepared by: Reimer Associates

LONG TERM BUILDOUT (2007)

Water System Analysis

	1. North Light Industrial							2. Neighborhood Center						
	Total Acreage 198.9							Total Acreage 89.4						
	Developable Acreage 159.1							Developable Acreage 71.5						
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	14.93	0.00		9.33	15	24	4,500	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	72.53	3.08		80.58	97	154	4,500	5.74	0.26		6.37	8	12	4,500
WAREHOUSE	51.69	0.00		43.08	59	94	4,500	0.00	0.00		0.00	0	0	
OFFICE	7.00	1.18		16.96	16	25	3,500	23.06	3.53		55.90	51	82	3,500
RETAIL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	146.15	4.26		149.95	186	297	4,500	28.80	3.79		62.28	59	94	4,500
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.10	4.80		3	5	2,500
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.10	4.80		3	5	2,500
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	33.75		0.08	21	33	1,500
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		32.23	0.11		0.00	20	32	2,500
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	32.23	33.86		0.08	41	65	2,500
TOTAL	146.15	4.26	0.00	149.95	186	297	4,500	61.03	37.75	4.80	62.36	103	164	4,500

(1) Max Day Flow = Ave Flow X 1.6

.ONG TERM BUILDOUT (2007

Water System Analysis

	3. Mixed Use							**4. Historic District**						
	Total Acreage	111.0						Total Acreage	52.7					
	Developable Acreage	88.8						Developable Acreage	42.2					
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
ION RESIDENTIAL														
HEAVY INDUSTRIAL	4.46	0.00		2.79	4	7	4,500	11.92	0.00		7.45	12	19	4,500
LIGHT INDUSTRIAL	23.83	1.09		26.48	32	51	4,500	28.55	0.22		31.73	37	60	4,500
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	42.58	5.21		103.23	93	149	3,500	12.75	0.78		30.90	27	44	3,500
RETAIL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	70.87	6.31		132.49	130	207	4,500	53.22	1.00		70.08	77	123	4,500
ESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.50	6.30		4	7	3,500
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.50	6.30		4	7	3,500
IVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	12.15		0.03	8	12	1,500	0.00	9.45		0.02	6	9	1,500
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		0.80	0.00		0.00	0	1	2,500
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	12.15		0.03	8	12	1,500	0.80	9.45		0.02	6	10	2,500
OTAL	70.87	18.46	0.00	132.52	137	219	4,500	54.02	10.94	6.30	70.10	87	140	4,500

(1) Max Day Flow = Ave Flow X 1.6

LONG TERM BUILDOUT (2007

Water System Analysis	5. Heavy Industry							6. Farragut Village						
	Total Acreage		135.3					Total Acreage		105.2				
	Developable Acreage		108.2					Developable Acreage		84.2				
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	107.87	0.00		67.42	108	173	4,500	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	11.84	0.54		13.16	16	25	4,500	0.00	o		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	1.06	0.16		2.57	2	4	3,500	0.00	0.00		0.00	0	0	
RETAIL	1.12	0.04		0.00	1	1	3,500	0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0		8.11	0.28		0.00	5	8	3,000
SUBTOTAL	121.89	0.74		83.15	127	203	4,500	8.11	0.28		0.00	5	8	3,000
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			4.88	63.00		42	67	2,500
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.90	14.70		10	15	2,500
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		5.78	77.70		52	83	2,500
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		0.71	0.00		0.00	0	1	2,500
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	0.71	0.00		0.00	0	1	2,500
TOTAL	121.89	0.74	0.00	83.15	127	203	4,500	8.82	6.06	77.70	0.00	57	92	3,000

(1) Max Day Flow = Ave Flow X 1.6

LONG TERM BUILDOUT (2007

Water System Analysis

7. Developed Recreation
Total Acreage 46.2
Developable Acreage 37.0

	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00			0	0	
EDUCATION	0.00	0.00			0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	69.30		0.00	43	69	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	69.30		0.00	43	69	0
TOTAL	0.00	69.30	0.00	0.00	43	69	0

8. Coral Sea Village
Total Acreage 67.1
Developable Acreage 53.7

	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.01	0.00		0.01	0	0	4,500
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0	
RETAIL	16.39	0.56		0.00	10	17	3,500
EDUCATION	0.00	0.00		0.00	0	0	
SUBTOTAL	16.39	0.56		0.01	10	17	4,500
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		4.77	60.60		40	65	2,500
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.20	10.00		6	10	2,500
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		4.97	70.60		47	75	2,500
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	5.40		0.01	3	5	1,500
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	5.40		0.01	3	5	1,500
TOTAL	16.39	10.94	70.60	0.02	61	97	4,500

(1) Max Day Flow = Ave Flow X 1.6

.ONG TERM BUILDOUT (2007

Water System Analysis	9. Education/Office							10. Marina/Residential						
	Total Acreage		104.4					Total Acreage		82.6				
	Developable Acreage		83.5					Developable Acreage		66.1				
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	8.97	0.41		9.97	12	19	4,500	0.44	0.02		0.49	1	1	4,500
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	9.54	1.46		19.60	19	30	3,500	0.00	0.00		0.00	0	0	
RETAIL	12.18	0.42		0.00	8	12	3,500	0.00	0.00		0.00	0	0	
EDUCATION	3.66	0.13		0.00	2	4	3,000	0.00	0.00		0.00	0	0	
SUBTOTAL	34.35	2.42		29.58	41	66	4,500	0.44	0.02		0.49	1	1	4,500
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	10.80		0.02	7	11	1,500	0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	18.87	0.00		0.00	12	19	2,500	0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	18.87	10.80		0.02	18	29	2,500	0.00	0.00		0.00	0	0	0
TOTAL	53.22	13.22	0.00	29.60	59	95	4,500	0.44	0.02	0.00	0.49	1	1	4,500

(1) Max Day Flow = Ave Flow X 1.6

LONG TERM BUILDOUT (2007

Water System Analysis	11. Golf Course							12. Regional Park						
	Total Acreage	170.8						Total Acreage	216.0					
	Developable Acreage	136.6						Developable Acreage	172.8					
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	0.00	0.00		0.00	0	0	0
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	315.00		5.00	198	316	1,500	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.59	0	1	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	315.00		5.00	198	316	1,500	0.00	0.00		0.59	0	1	0
TOTAL	0.00	315.00	0.00	5.00	198	316	1,500	0.00	0.00	0.00	0.59	0	1	0

(1) Max Day Flow = Ave Flow X 1.6

LONG TERM BUILDOUT (2007

Water System Analysis

	13. Open Space/ Recreation							***TOTAL***						
	Total Acreage		99.1					Total Acreage		1478.7				
	Developable Acreage		79.3					Developable Acreage		1182.9				
	DEMAND BY FACTOR (AFY)				**TTL DEMAND (GPM)**			**DEMAND BY FACTOR (AFY)**				**TTL DEMAND (GPM)**		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX *DAY (1)*	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0		139.19	0.00		86.99	140	224	4,500
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0		151.91	5.64		168.79	202	323	4,500
WAREHOUSE	0.00	0.00		0.00	0	0		51.69	0.00		43.08	59	94	4,500
OFFICE	0.00	0.00		0.00	0	0		95.98	12.32		229.16	209	334	3,500
RETAIL	0.00	0.00		0.00	0	0		29.69	1.02		0.00	19	30	3,500
EDUCATION	0.00	0.00		0.00	0	0		11.77	0.41		0.00	8	12	3,000
SUBTOTAL	0.00	0.00		0.00	0	0	0	480.24	19.39		528.02	635	1016	4,500
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0		0.00	0.00	0.00		0	0	0
EXISTING DUPLEXES		0.00	0.00		0	0		0.00	9.65	123.60		82	132	2,500
EXISTING SINGLE FAMILY		0.00	0.00		0	0		0.00	0.50	6.30		4	7	3,500
MULTI-FAMILY - REHAB		0.00	0.00		0	0		0.00	0.90	14.70		10	15	2,500
LIVE/WORK		0.00	0.00		0	0		0.00	0.30	14.80		9	15	2,500
DORMITORY BEDS		0.00	0.00		0	0		0.00	0.00	0.00		0	0	0
SUBTOTAL		0.00	0.00		0	0	0	0.00	11.35	159.40		105.5	169	3,500
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	315.00		5.00	198	320	1,500
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	140.85		0.17	87	139	1,500
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.59	0	1	0
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	0
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		52.61	0.10		0.00	33	52	2,500
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	0
SUBTOTAL	0.00	0.00		0.00	0	0	0	52.61	455.95		5.76	318	512	2,500
TOTAL	0.00	0.00	0.00	0.00	0	0	0	532.84	486.69	159.40	533.78	1,059	1,697	3,678

(1) Max Day Flow = Ave Flow X 1.6 TOTAL REGIONAL FIRE DEMAND BASED ON NFPA EQUATION: Q=1020 x SQRT (P) x (1 - 0.01 x SQRT (P)); T = Q/1000

LONG TERM BUILDOUT (2007)

Fire Flow Allocation by Reimer Associates	FLOW RATE	DURATION
NON RESIDENTIAL		
HEAVY INDUSTRIAL	4,500	4
LIGHT INDUSTRIAL	4,500	4
WAREHOUSE	4,500	4
OFFICE	3,500	3
RETAIL	3,500	3
EDUCATION	3,000	3
RESIDENTIAL		
NEW CONDOS	3,500	3
EXISTING DUPLEXES	2,500	2
EXISTING SINGLE FAMILY	3,500	3
MULTI-FAMILY - REHAB	2,500	2
LIVE/WORK	2,500	2
DORMITORY BEDS	3,500	3
CIVIC/RECREATION/OPEN SPACE		
GOLF COURSE	1,500	2
DEVELOPED PARK	1,500	2
REGIONAL PARK	none	none
OPEN SPACE	none	none
CIVIC/REC SPACE	3,000	3
MARINA	3,500	3

TABLE 3-3 VALLEJO FIRE DEPARTEMENT FIRE FLOW REQUIREMENTS
Souce: City of Vallejo

ZONE DESIGNATION	FLOW RATE	DURATION
Resource Conservation	none	none
Rural Residential	1,500	2
Low Density Residential	1,500	2
Medium Density Residential	2,500	2
Residential View District	2,500	2
Neighborhood Shopping	2,500	2
Schools	3,000	3
High Density Residential	3,500	3
Arch Heritage District	3,500	3
Linear Commercial	3,500	3
Waterfront Shopping	3,500	3
Freeway Shopping	3,500	3
Planned Development RES	3,500	3
Intensive Use	3,500	3
Limited Office	3,500	4
Pedestrian Shopping	4,500	4
Planned Development COM	4,500	4
Planned Development IND	4,500	4
Medical	4,500	4

Water Storage Requirements by Reimer Associates	Max. Day Storage	Fire Flow Storage	Equalization Storage	Total Storage
	1,697 gpm	3,678 gpm	162,857 gal./ft.	
	x 1440 min/day	x 221 duration	x 5.50 ft.	
	2.4 M.Gal.	0.8 M.Gal.	0.9 M.Gal.	**4.1 Million Gal.**

LONG TERM BUILDOUT (2007)

Sanitary Sewer System Analysis	1. North Light Industrial					2. Neighborhood Center				
	Total Acreage		198.9			Total Acreage		89.4		
	Developable Acreage		159.1			Developable Acreage		71.5		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0113	0.0177		0.0071	0.0361	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0549	0.1405		0.0610	0.2563	0.0043	0.0116		0.0048	0.0208
WAREHOUSE	0.0368	0.1201		0.0326	0.1895	0.0	0.0		0.0	0.0
OFFICE	0.0056	0.0074		0.0128	0.0258	0.0185	0.0224		0.0423	0.0832
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0000	0.0000			0.0000
SUBTOTAL	0.1086	0.2857		0.1134	0.5077	0.0228	0.0341		0.0471	0.1040
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0002	0.0041		0.0043
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0002	0.0041		0.0043
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0040		0.0001	0.0041
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.1201			0.1	0.0258	0.0008			0.0267
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.1		0.0	0.1	0.0258	0.0048		0.0001	0.0307
TOTAL	0.1086	0.4058	0.0000	0.1134	0.6278	0.0486	0.0391	0.0041	0.0472	0.1390

LONG TERM BUILDOUT (2007)

Sanitary Sewer System Analysis	3. Mixed Use					4. Historic District				
	Total Acreage		111.0			Total Acreage		52.7		
	Developable Acreage		88.8			Developable Acreage		42.2		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0034	0.0041		0.0021	0.0096	0.0090	0.0109		0.0056	0.0255
LIGHT INDUSTRIAL	0.0180	0.0483		0.0200	0.0863	0.0216	0.0289		0.0240	0.0745
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0341	0.0345		0.0781	0.1467	0.0102	0.0062		0.0234	0.0398
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0000	0.0000			0.0000	0.0	0.0			0.0
SUBTOTAL	0.0555	0.0869		0.1002	0.2426	0.0408	0.0460		0.0530	0.1399
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0005	0.0039		0.0044
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0005	0.0039		0.0044
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0014		0.0	0.0015		0.0011		0.0000	0.0011
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.0			0.0	0.0006	0.0000			0.0007
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0014		0.0	0.0015	0.0006	0.0011		0.0	0.0018
TOTAL	0.0555	0.0883	0.0000	0.1003	0.2441	0.0415	0.0477	0.0039	0.0530	0.1461

LONG TERM BUILDOUT (2007)

Sanitary Sewer System Analysis	5. Heavy Industry					6. Farragut Village				
	Total Acreage		135.3			Total Acreage		105.2		
	Developable Acreage		108.2			Developable Acreage		84.2		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0816	0.0757		0.0510	0.2083	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0090	0.0240		0.0100	0.0429	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0008	0.0010		0.0019	0.0038	0.0	0.0		0.0	0.0
RETAIL	0.0008	0.0002			0.0010	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0065	0.0			0.0065
SUBTOTAL	0.0923	0.1009		0.0629	0.2560	0.0065	0.0		0.0	0.0065
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0031	0.0454		0.0485
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0007	0.0106		0.0113
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0038	0.0559		0.0598
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0		0.0	0.0
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.0			0.0	0.0006	0.0			0.0006
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0006	0.0		0.0	0.0006
TOTAL	0.0923	0.1009	0.0000	0.0629	0.2560	0.0071	0.0039	0.0559	0.0000	0.0669

LONG TERM BUILDOUT (2007)

Sanitary Sewer System Analysis	7. Developed Recreation					8. Coral Sea Village				
	Total Acreage		46.2			Total Acreage		67.1		
	Developable Acreage		37.0			Developable Acreage		53.7		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0	0.0		0.0	0.0	0.0000	0.0000		0.0000	0.0000
RETAIL	0.0	0.0			0.0	0.0124	0.0025			0.0149
EDUCATION	0.0	0.0			0.0	0.0	0.0			0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0124	0.0025		0.0000	0.0149
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0030	0.0436		0.0466
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0004	0.0086		0.0090
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0034	0.0523		0.0556
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0082		0.0000	0.0082		0.0006		0.0000	0.0006
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.0			0.0	0.0	0.0			0.0
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0082		0.0000	0.0082	0.0	0.0006		0.0	0.0006
TOTAL	0.0	0.0082	0.0	0.0000	0.0082	0.0124	0.0065	0.0523	0.0000	0.0712

LONG TERM BUILDOUT (2007)

Sanitary Sewer System Analysis	9. Education/Office					10. Marina/Residential				
	Total Acreage		104.4			Total Acreage		82.6		
	Developable Acreage		83.5			Developable Acreage		66.1		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0068	0.0182		0.0075	0.0325	0.0003	0.0009		0.0004	0.0016
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0076	0.0093		0.0148	0.0318	0.0000	0.0000		0.0000	0.0000
RETAIL	0.0092	0.0019			0.0111	0.0000	0.0000			0.0000
EDUCATION	0.0029	0.0000			0.0029	0.0	0.0			0.0
SUBTOTAL	0.0266	0.0293		0.0224	0.0783	0.0003	0.0009		0.0004	0.0016
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0000	0.0000		0.0000
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0000	0.0000		0.0000		0.0	0.0		0.0
SUBTOTAL		0.0000	0.0000		0.0000		0.0000	0.0000		0.0000
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0013		0.0	0.0013		0.0		0.0	0.0
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0151	0.0005			0.0156	0.0	0.0			0.0
MARINA	0.0	0.0		0.0	0.0	0.0	0.0000		0.0000	0.0000
SUBTOTAL	0.0151	0.0018		0.0	0.0169	0.0	0.0000		0.0000	0.0000
TOTAL	0.0417	0.0311	0.0000	0.0224	0.0952	0.0003	0.0009	0.0000	0.0004	0.0016

LONG TERM BUILDOUT (2007)

Sanitary Sewer System Analysis

	11. Golf Course					12. Regional Park				
	Total Acreage		170.8			Total Acreage		216.0		
	Developable Acreage		136.6			Developable Acreage		172.8		
	GENERATION BY LAND USE (MGD)					GENERATION BY LAND USE (MGD)				
	by SF	by AC	by DU/BED	by DAY POP	AVE, FLOW (MGD)	by SF	by AC	by DU/BED	by DAY POP	AVE, FLOW (MGD)
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0	0.0			0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0	0.0		0.0
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0000		0.0036	0.0036		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0		0.0	0.0
REGIONAL PARK				0.0	0.0				0.0004	0.0004
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.0			0.0	0.0	0.0			0.0
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0000		0.0036	0.0036	0.0	0.0		0.0004	0.0004
TOTAL	0.0	0.0	0.0	0.0036	0.0036	0.0	0.0	0.0	0.0004	0.0004

LONG TERM BUILDOUT (2007)

Sanitary Sewer System Analysis	13. Open Space/ Recreation					TOTAL				
	Total Acreage		99.1			Total Acreage		1478.7		
	Developable Acreage		79.3			Developable Acreage		1182.9		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.105	0.108		0.066	0.279
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.115	0.272		0.128	0.515
WAREHOUSE	0.0	0.0		0.0	0.0	0.037	0.120		0.033	0.190
OFFICE	0.0	0.0		0.0	0.0	0.077	0.081		0.173	0.331
RETAIL	0.0	0.0			0.0	0.022	0.005		0.0	0.027
EDUCATION	0.0	0.0			0.0	0.009	0.0000		0.0	0.009
SUBTOTAL	0.0	0.0		0.0	0.0	0.37	0.59		0.40	1.35
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.000	0.000		0.000
EXISTING DUPLEXES		0.0	0.0		0.0		0.006	0.089		0.095
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.001	0.004		0.004
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.001	0.011		0.011
LIVE/WORK		0.0	0.0		0.0		0.001	0.013		0.013
DORMITORY BEDS		0.0	0.0		0.0		0.000	0.000		0.000
SUBTOTAL		0.0	0.0		0.0		0.01	0.12		0.12
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.000		0.004	0.004
DEVELOPED PARK		0.0		0.0	0.0		0.017		0	0.017
REGIONAL PARK				0.0	0.0				0.0004	0.0004
OPEN SPACE										0
CIVIC/REC SPACE	0.0	0.0			0.0	0.042	0.122			0.164
MARINA	0.0	0.0		0.0	0.0	0	0.000		0.000	0.000
SUBTOTAL	0.0	0.0		0.0	0.0	0.04	0.14	0	0.00	0.18
TOTAL	0.0	0.0	0.0	0.0	0.0	0.408	0.732	0.116	0.404	1.660

LONG TERM BUILDOUT (2007)

Storm Water System Analysis	1. North Light Industrial							2. Neighborhood Center						
	Total Acreage		198.9					Total Acreage		89.4				
	Developable Acreage		159.1					Developable Acreage		71.5				
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	13.3	0.0	13.3	0.95	0.90	11.9	11.9	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	63.1	27.5	35.6	0.95	0.68	31.6	31.7	5.2	2.4	2.9	0.95	0.68	2.6	9.1
WAREHOUSE	67.5	29.4	38.1	0.95	0.85	40.3	40.3	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	8.3	5.3	3.0	0.95	0.65	3.4	3.4	25.2	15.8	9.5	0.95	0.65	10.4	36.5
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	152.2	62.2	89.9			87.3	87.4	30.4	18.1	12.3			13.0	45.5
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	1.9	0.9	1.0		0.35	0.6	2.1
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	1.9	0.9	1.0			0.6	2.1
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0	25.0	22.5	2.5	0.27	0.20	6.6	23.1
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	46.7	23.1	23.6	0.27	0.27	12.6	12.6	27.3	16.9	10.4	0.27	0.27	7.4	25.9
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	4.7	0.5	4.2	0.27	0.20	1.0	3.4
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	46.7	23.1	23.6			12.6	12.6	57.1	39.9	17.2			14.9	52.4
TOTAL	198.9	85.4	113.5	Ave. C	0.50	99.9	100.0	89.4	58.9	30.5	Ave. C	0.32	28.5	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

LONG TERM BUILDOUT (2007)

Storm Water System Analysis

	3. Mixed Use							4. Historic District						
	Total Acreage 111.0							Total Acreage 52.7						
	Developable Acreage 88.8							Developable Acreage 42.2						
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	3.0	0.0	3.0	0.95	0.90	2.9	5.8	8.1	0.0	8.1	0.95	0.90	7.7	26.3
LIGHT INDUSTRIAL	21.7	9.8	11.9	0.95	0.68	14.0	27.9	13.0	2.0	11.1	0.95	0.68	11.0	37.4
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	38.8	23.3	15.5	0.95	0.65	21.0	42.0	7.0	3.5	3.5	0.95	0.65	4.2	14.4
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	63.5	33.0	30.5			37.9	75.7	28.1	5.4	22.7			23.0	78.1
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	6.0	2.2	3.8		0.35	1.9	6.5
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	6.0	2.2	3.8			1.9	6.5
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	9.0	1.6	7.4	0.27	0.20	1.8	3.6	7.0	6.3	0.7	0.27	0.20	1.4	4.8
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	38.5	0.0	38.5	0.27	0.27	10.4	20.7	11.5	11.5	0.0	0.27	0.27	3.1	10.5
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.1	0.0	0.1	0.27	0.20	0.0	0.1
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	47.5	1.6	45.8			12.2	24.3	18.6	17.8	0.8			4.5	15.3
TOTAL	111.0	34.7	76.3	**Ave. C**	0.45	50.1	100.0	52.7	25.4	27.3	**Ave. C**	0.56	29.5	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

LONG TERM BUILDOUT (2007)

Storm Water System Analysis	5. Heavy Industry							6. Farragut Village						
	Total Acreage		135.3					Total Acreage		105.2				
	Developable Acreage		108.2					Developable Acreage		84.2				
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	56.7	0.0	56.7	0.95	0.90	53.8	67.7	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	10.8	4.9	5.9	0.95	0.68	6.9	8.7	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	1.2	0.7	0.4	0.95	0.65	0.6	0.8	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.4	0.2	0.2	0.95	0.73	0.2	0.3	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	2.8	1.2	1.5		0.65	1.3	4.2
SUBTOTAL	69.0	5.7	63.3			61.6	77.5	2.8	1.2	1.5			1.3	4.2
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	35.0	21.8	13.2		0.40	11.2	35.5
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	8.2	4.0	4.1		0.45	3.0	9.4
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	43.2	25.8	17.4			14.1	44.9
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	66.3	45.6	20.7	0.27	0.27	17.9	22.5	59.2	49.8	9.4	0.27	0.27	16.0	50.8
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.1	0.0	0.1	0.27	0.20	0.0	0.1
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	66.3	45.6	20.7			17.9	22.5	59.3	49.8	9.5			16.0	50.9
TOTAL	135.3	51.3	84.0	Ave. C	0.59	79.5	100.0	105.2	76.8	28.4	Ave. C	0.30	31.4	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

LONG TERM BUILDOUT (2007)

Storm Water System Analysis

	7. Developed Recreation							8. Coral Sea Village						
	Total Acreage 46.2							Total Acreage 67.1						
	Developable Acreage 37.0							Developable Acreage 53.7						
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	5.6	2.5	3.1	0.95	0.73	2.9	13.9
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	5.6	2.5	3.1			2.9	13.9
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	33.7	21.3	12.4		0.40	10.7	50.9
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	4.0	1.8	2.2		0.35	1.3	6.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	37.7	23.1	14.6			12.0	56.8
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	46.2	46.2	0.0	0.27	0.20	12.5	100.0	4.0	3.6	0.4	0.27	0.20	0.8	3.8
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	0.0	-0.5	0.5	0.27	0.27	0.0	0.0	19.8	19.3	0.5	0.27	0.27	5.4	25.5
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	46.2	45.7	0.5			12.5	100.0	23.8	22.9	0.9			6.2	29.3
TOTAL	46.2	45.7	0.5	Ave. C	0.27	12.5	100.0	67.1	48.6	18.5	Ave. C	0.31	21.0	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

LONG TERM BUILDOUT (2007)

Storm Water System Analysis

	9. Education/Office							**10. Marina/Residential**						
	Total Acreage		104.4					Total Acreage		82.6				
	Developable Acreage		83.5					Developable Acreage		66.1				
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE. AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	8.2	3.7	4.5	0.95	0.68	4.1	12.6	0.4	0.2	0.2	0.95	0.68	0.2	0.9
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	10.4	6.5	3.9	0.95	0.65	4.3	13.4	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	4.2	1.9	2.3	0.95	0.73	2.2	6.8	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	1.2	0.6	0.7		0.65	0.6	1.9	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	24.0	12.6	11.4			11.1	34.7	0.4	0.2	0.2			0.2	0.9
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	8.0	7.2	0.8	0.27	0.20	1.6	5.0	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	69.6	49.9	19.8	0.27	0.27	18.8	58.6	82.2	16.2	66.0	0.27	0.27	22.2	99.1
CIVIC/REC SPACE	2.8	0.0	2.8	0.27	0.20	0.6	1.7	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	80.4	57.1	23.3			21.0	65.3	82.2	16.2	66.0			22.2	99.1
TOTAL	104.4	69.7	34.7	**Ave. C**	0.31	32.1	100.0	82.6	16.4	66.2	**Ave. C**	0.27	22.4	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

LONG TERM BUILDOUT (2007)

Storm Water System Analysis	11. Golf Course							12. Regional Park						
	Total Acreage	170.8						Total Acreage	216.0					
	Developable Acreage	136.6						Developable Acreage	172.8					
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0			0.0	0.0
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	122.3	121.4	0.9		0.20	24.5	65.1	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	163.0	146.7	16.3		0.20	32.6	69.5
OPEN SPACE	48.5	48.5	0.0	0.27	0.27	13.1	34.9	53.0	53.0	0.0	0.27	0.27	14.3	30.5
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	170.8	169.9	0.9			37.6	100.0	216.0	199.7	16.3			46.9	100.0
TOTAL	170.8	169.9	0.9	Ave. C	0.22	37.6	100.0	216.0	199.7	16.3	Ave. C	0.22	46.9	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

LONG TERM BUILDOUT (2007)

Storm Water System Analysis

13. Open Space/ Recreation
Total Acreage 99.1
Developable Acreage 79.3

TOTAL
Total Acreage 1478.7
Developable Acreage 1182.9

	13. REPORTED ACREAGE			13. C VALUES		13. HYDROLOGY		TOTAL REPORTED ACREAGE			TOTAL C VALUES		TOTAL HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF TOTAL
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	81.1	0.0	81.1	0.95	0.90	76.4	14.7
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0	122.4	50.3	72.1	0.95	0.68	70.4	13.6
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	67.5	29.4	38.1	0.95	0.85	40.3	7.8
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0	90.8	55.0	35.8	0.95	0.65	44.0	8.5
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	10.1	4.6	5.6	0.95	0.73	5.3	1.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	4.0	1.8	2.2		0.65	1.9	0.4
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	376.0	141.1	234.9			238.4	46.0
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	68.7	43.1	25.6		0.40	21.9	4.2
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	6.0	2.2	3.8		0.35	1.9	0.4
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	8.2	4.0	4.1		0.45	3.0	0.6
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	5.9	2.7	3.2		0.35	1.9	0.4
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	88.8	52.0	36.7			28.6	5.5
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	122.3	121.4	0.9		0.20	24.5	4.7
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0	99.2	87.4	11.8	0.27	0.20	24.6	4.8
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	163.0	146.7	16.3		0.20	32.6	6.3
OPEN SPACE	99.1	89.2	9.9	0.27	0.27	26.8	100.0	621.7	422.5	199.2	0.27	0.27	167.9	32.4
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	7.7	0.4	7.3	0.27	0.20	1.6	0.3
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	99.1	89.2	9.9			26.8	100.0	1013.9	778.5	235.4			251.1	48.5
TOTAL	99.1	89.2	9.9	Ave. C	0.27	26.8	100.0	1478.7	971.6	507.1	Ave. C	0.35	518.1	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.
[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

LONG TERM BUILDOUT (2007)

Storm Water Discharge Analysis		1. North Light Industrial				2. Neighborhood Center		
		Total Acreage		198.9		Total Acreage	89.4	
		Average C Value		0.50		Average C Value	0.32	
		SUBBASIN AREAS[1]				SUBBASIN AREAS[1]		
		1 - A	1 - B	1 - C	1 - D	2 - D	2 - E	2 - F
		63.1	92.3	35.5	8.2	41.1	22.4	6.0
DRAINAGE BASINS								
#	Intensity							
A	1.05	33.5						
B	0.73		34.1					
C	0.88			15.8				
D	1.46				6.1	19.3		
E	0.49						3.5	
F	0.92							1.8
G	0.84							
H	1.13							
I	1.11							
J	1.06							
K	1.11							
L	0.72							
M	1.36							
N	1.28							
O	1.54							
P	1.31							
TOTAL DISCHARGE		33.5	34.1	15.8	6.1	19.3	3.5	1.8

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

LONG TERM BUILDOUT (2007)

Storm Water Discharge Analysis		*3. Mixed Use*					*4. Historic District*			
		Total Acreage			111.0		Total Acreage		89.4	
		Average C Value			0.45		Average C Value		0.56	
		SUBBASIN AREAS[1]					SUBBASIN AREAS[1]			
		3 - D	3 - E	3 - F	3 - G	3 - H	4 - F	4 - G	4 - H	4 - I
		23.0	31.7	26.1	25.5	4.8	1.6	1.3	30.2	7.3
DRAINAGE BASINS										
#	Intensity									
A	1.05									
B	0.73									
C	0.88									
D	1.46	15.3								
E	0.49		7.1							
F	0.92			10.9			0.8			
G	0.84				9.7			0.6		
H	1.13					2.5			19.2	
I	1.11									4.6
J	1.06									
K	1.11									
L	0.72									
M	1.36									
N	1.28									
O	1.54									
P	1.31									
TOTAL DISCHARGE		15.3	7.1	10.9	9.7	2.5	0.8	0.6	19.2	4.6

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

LONG TERM BUILDOUT (2007)

Storm Water Discharge Analysis		5. *Heavy Industry* Total Acreage 135.3, Average C Value 0.59						6. *Farragut Village* Total Acreage 105.2, Average C Value 0.30		
		SUBBASIN AREAS[1]						SUBBASIN AREAS[1]		
		5 - H	5 - I	5 - J	5 - K	5 - L	5 - M	6 - F	6 - H	6 - I
		2.0	49.7	35.1	8.7	22.8	6.1	5.4	30.4	54.5
DRAINAGE BASINS										
#	Intensity									
A	1.05									
B	0.73									
C	0.88									
D	1.46									
E	0.49									
F	0.92							1.5		
G	0.84									
H	1.13	1.3							10.3	
I	1.11		32.7							18.2
J	1.06			22.1						
K	1.11				5.7					
L	0.72					9.7				
M	1.36						4.9			
N	1.28									
O	1.54									
P	1.31									
TOTAL DISCHARGE		1.3	32.7	22.1	5.7	9.7	4.9	1.5	10.3	18.2

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

LONG TERM BUILDOUT (2007)

Storm Water Discharge Analysis		*7. Developed Recreation* Total Acreage 46.2, Average C Value 0.27			*8. Coral Sea Village* Total Acreage 67.1, Average C Value 0.31			*9. Education/Office* Total Acreage 104.4, Average C Value 0.31		
		SUBBASIN AREAS[1]			SUBBASIN AREAS[1]			SUBBASIN AREAS[1]		
		7 - I	7 - L	7 - OL	8 - I	8 - L	8 - OL	9 - I	9 - L	9 - M
		36.7	0.9	8.6	7.8	49.1	10.2	8.4	32.4	48.4
DRAINAGE BASINS										
#	Intensity									
A	1.05									
B	0.73									
C	0.88									
D	1.46									
E	0.49									
F	0.92									
G	0.84									
H	1.13									
I	1.11	11.1			2.7			2.9		
J	1.06									
K	1.11									
L	0.72		0.2			11.2			7.2	
M	1.36									20.4
N	1.28									
O	1.54									
P	1.31									
TOTAL DISCHARGE		11.1	0.2	0.0	2.7	11.2	0.0	2.9	7.2	20.4

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

LONG TERM BUILDOUT (2007)

Storm Water Discharge Analysis		**10. Marina/Residential**				**11. Golf Course**		
		Total Acreage		82.6		Total Acreage	170.8	
		Average C Value		0.27		Average C Value	0.22	
		SUBBASIN AREAS[1]				SUBBASIN AREAS[1]		
		10 - M	10 - N	10 - O	10 - P	11 - M	11 - N	11 - O
		15.4	21.1	26.8	19.3	3.4	37.2	26.3
DRAINAGE BASINS								
#	Intensity							
A	1.05							
B	0.73							
C	0.88							
D	1.46							
E	0.49							
F	0.92							
G	0.84							
H	1.13							
I	1.11							
J	1.06							
K	1.11							
L	0.72							
M	1.36	5.7				1.0		
N	1.28		7.4				10.6	
O	1.54			11.3				9.0
P	1.31				6.9			
TOTAL DISCHARGE		5.7	7.4	11.3	6.9	1.0	10.6	9.0

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

LONG TERM BUILDOUT (2007)

Storm Water Discharge Analysis		12. Regional Park				TOTAL
		Total Acreage 216.0				Total Acreage 1478.7
		Average C Value 0.22				Average C Value 0.35
		SUBBASIN AREAS[1]				DRAINAGE BASIN TOTAL DISCHARGE[2] (cfs)
		12 - M	12 - N	12 - O	12 - P	
		3.6	6.8	9.7	17.2	
DRAINAGE BASINS						
#	Intensity					
A	1.05					33.5
B	0.73					34.1
C	0.88					15.8
D	1.46					40.6
E	0.49					10.6
F	0.92					15.0
G	0.84					10.4
H	1.13					33.4
I	1.11					72.2
J	1.06					22.1
K	1.11					5.7
L	0.72					28.3
M	1.36	1.1				33.1
N	1.28		1.9			19.8
O	1.54			3.3		23.5
P	1.31				4.9	11.8
TOTAL DISCHARGE		1.1	1.9	3.3	4.9	409.9

[1] Areas of sub-basins may not add to total due to reductions for overland flow.
[2] Reuse Area 13 drains into surrounding dredge ponds and was excluded.

MIRIS

InfraStrategy Analysis

ULTIMATE BUILDOUT – 20XX

Set 2 – Demand Generation

- **Potable Water System**
- **Sanitary Sewer System**
- **Storm Water System**

July 15, 1997

Prepared by: Reimer Associates

ULTIMATE BUILDOUT

Water System Analysis	1. North Light Industrial							2. Neighborhood Center						
	Total Acreage 198.9							Total Acreage 89.4						
	Developable Acreage 159.1							Developable Acreage 71.5						
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	19.41	0.00		12.13	19	31	4,500	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	94.28	4.01		104.76	125	201	4,500	9.93	0.00		11.03	13	21	4,500
WAREHOUSE	67.20	0.00		56.00	76	122	4,500	0.00	0.00		0.00	0	0	
OFFICE	9.09	1.11		22.05	20	32	3,500	37.42	5.73		90.71	83	132	3,500
RETAIL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0		2.52	0.09		0.00	2	3	3,000
SUBTOTAL	189.99	5.12		194.94	241	386	4,500	49.87	5.81		101.74	97	156	4,500
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.10	4.80		3	5	2,500
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.10	4.80		3	5	2,500
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	33.75		0.08	21	33	1,500
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		32.23	0.11		0.00	20	32	2,500
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	32.23	33.86		0.08	41	65	2,500
TOTAL	189.99	5.12	0.00	194.94	241	386	4,500	82.10	39.77	4.80	101.82	141	226	4,500

(1) Max Day Flow = Ave Flow X 1.6

ULTIMATE BUILDOUT

Water System Analysis	3. Mixed Use							4. Historic District						
	Total Acreage		111.0					Total Acreage		52.7				
	Developable Acreage		88.8					Developable Acreage		42.2				
	DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)			DEMAND BY FACTOR (AFY)				TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	10.64	0.00		6.65	11	17	4,500	11.92	0.00		7.45	12	19	4,500
LIGHT INDUSTRIAL	37.03	1.70		41.14	49	79	4,500	28.55	0.22		31.73	37	60	4,500
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	57.10	6.99		138.43	125	200	3,500	12.75	0.78		30.90	27	44	3,500
RETAIL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
EDUCATION	0.38	0.01		0.00	0	0	3,000	0.00	0.00		0.00	0	0	
SUBTOTAL	105.15	8.70		186.22	185	297	4,500	53.22	1.00		70.08	77	123	4,500
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.50	6.30		4	7	3,500
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.50	6.30		4	7	3,500
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	12.15		0.03	8	12	1,500	0.00	9.45		0.02	6	9	1,500
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		0.80	0.00		0.00	0	1	2,500
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	12.15		0.03	8	12	1,500	0.80	9.45		0.02	6	10	2,500
TOTAL	105.15	20.85	0.00	186.25	193	309	4,500	54.02	10.94	6.30	70.10	87	140	4,500

(1) Max Day Flow = Ave Flow X 1.6

ULTIMATE BUILDOUT

Water System Analysis

5. Heavy Industry

Total Acreage 135.3

Developable Acreage 108.2

	DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	131.10	0.00		81.94	132	211	4,500
LIGHT INDUSTRIAL	18.91	0.87		21.01	25	40	4,500
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	7.53	1.15		18.24	17	27	3,500
RETAIL	1.12	0.04		0.00	1	1	3,500
EDUCATION	0.00	0.00		0.00	0	0	
SUBTOTAL	158.66	2.06		121.19	174	279	4,500
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0
TOTAL	158.66	2.06	0.00	121.19	174	279	4,500

6. Farragut Village

Total Acreage 105.2

Developable Acreage 84.2

	DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00		0.00	0	0	
EDUCATION	8.11	0.28		0.00	5	8	3,000
SUBTOTAL	8.11	0.28		0.00	5	8	3,000
RESIDENTIAL							
NEW CONDOS		0.00	0.00		0	0	
EXISTING DUPLEXES		4.88	63.00		42	67	2,500
EXISTING SINGLE FAMILY		0.00	0.00		0	0	
MULTI-FAMILY - REHAB		4.04	56.80		38	60	2,500
LIVE/WORK		0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0	
SUBTOTAL		8.93	119.80		80	127	2,500
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.71	0.00		0.00	0	1	2,500
MARINA	0.00	0.00		0.00	0	0	
SUBTOTAL	0.71	0.00		0.00	0	1	2,500
TOTAL	8.82	9.20	119.80	0.00	85	136	3,000

(1) Max Day Flow = Ave Flow X 1.6

ULTIMATE BUILDOUT

Water System Analysis

7. ***Developed Recreation*** — Total Acreage 46.2; Developable Acreage 37.0

8. ***Coral Sea Village*** — Total Acreage 67.1; Developable Acreage 53.7

	7. DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	7. TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE	8. DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	8. TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0		0.01	0.00		0.01	0	0	4,500
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0		0.91	0.14		2.20	2	3	3,500
RETAIL	0.00	0.00			0	0		16.39	0.56		0.00	10	17	3,500
EDUCATION	0.00	0.00			0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	17.30	0.70		2.20	12	20	4,500
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			4.77	60.60		40	65	2,500
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.20	10.00		6	10	2,500
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		4.97	70.60		47	75	2,500
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	61.67		0.14	38	61	1,500	0.00	5.40		0.01	3	5	1,500
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	61.67		0.14	38	61	1,500	0.00	5.40		0.01	3	5	1,500
TOTAL	0.00	61.67	0.00	0.14	38	61	1,500	17.30	11.08	70.60	2.22	63	100	4,500

(1) Max Day Flow = Ave Flow X 1.6

ULTIMATE BUILDOUT

Water System Analysis

9. Education/Office — Total Acreage 104.4; Developable Acreage 83.5

10. Marina/Residential — Total Acreage 82.6; Developable Acreage 66.1

	9. DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	9. TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE	10. DEMAND BY FACTOR (AFY) per SF	per GREEN AC	per DU/BED	per DAY POP	10. TTL DEMAND (GPM) AVE.	MAX DAY (1)	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	8.97	0.41		9.97	12	19	4,500	0.44	0.02		0.49	1	1	4,500
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	9.54	1.46		19.60	19	30	3,500	0.76	0.12		1.84	2	3	3,500
RETAIL	12.18	0.42		0.00	8	12	3,500	9.56	0.33		0.00	6	10	3,500
EDUCATION	86.94	2.99		0.00	56	89	3,000	0.00	0.00		0.00	0	0	
SUBTOTAL	117.63	5.29		29.58	94	151	4,500	10.76	0.47		2.33	8	13	4,500
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.91	200.00		124	199	3,500
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.10	55.00		34	54	3,500		0.00	0.00		0	0	
SUBTOTAL		0.10	55.00		34	54	3,500		0.91	200.00		124	199	3,500
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	10.80		0.02	7	11	1,500	0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	18.87	0.00		0.00	12	19	2,500	0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0		3.00	0.00		5.39	5	8	3,500
SUBTOTAL	18.87	10.80		0.02	18	29	2,500	3.00	0.00		5.39	5	8	3,500
TOTAL	136.50	16.18	55.00	29.60	147	235	4,500	13.76	1.38	200.00	7.72	138	220	4,500

(1) Max Day Flow = Ave Flow X 1.6

ULTIMATE BUILDOUT

Water System Analysis	**11. Golf Course**							**12. Regional Park**						
	Total Acreage		170.8					Total Acreage		216.0				
	Developable Acreage		136.6					Developable Acreage		172.8				
	DEMAND BY FACTOR (AFY)				**TTL DEMAND (GPM)**			**DEMAND BY FACTOR (AFY)**				**TTL DEMAND (GPM)**		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
WAREHOUSE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
OFFICE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
RETAIL	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
EDUCATION	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	0.00		0.00	0	0	0	0.00	0.00		0.00	0	0	0
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING DUPLEXES		0.00	0.00		0	0			0.00	0.00		0	0	
EXISTING SINGLE FAMILY		0.00	0.00		0	0			0.00	0.00		0	0	
MULTI-FAMILY - REHAB		0.00	0.00		0	0			0.00	0.00		0	0	
LIVE/WORK		0.00	0.00		0	0			0.00	0.00		0	0	
DORMITORY BEDS		0.00	0.00		0	0			0.00	0.00		0	0	
SUBTOTAL		0.00	0.00		0	0	0		0.00	0.00		0	0	0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	315.00		5.00	198	316	1,500	0.00	0.00		0.00	0	0	
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.59	0	1	
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
MARINA	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	
SUBTOTAL	0.00	315.00		5.00	198	316	1,500	0.00	0.00		0.59	0	1	0
TOTAL	0.00	315.00	0.00	5.00	198	316	1,500	0.00	0.00	0.00	0.59	0	1	0

(1) Max Day Flow = Ave Flow X 1.6

ULTIMATE BUILDOUT

Water System Analysis

13. Open Space/ Recreation — Total Acreage 99.1; Developable Acreage 79.3

TOTAL — Total Acreage 1478.7; Developable Acreage 1182.9

	13. DEMAND BY FACTOR (AFY)				13. TTL DEMAND (GPM)			TOTAL DEMAND BY FACTOR (AFY)				TOTAL TTL DEMAND (GPM)		
	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE	per SF	per GREEN AC	per DU/BED	per DAY POP	AVE.	MAX DAY *(1)*	FIRE
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.00	0.00		0.00	0	0		173.08	0.00		108.17	174	278	4,500
LIGHT INDUSTRIAL	0.00	0.00		0.00	0	0		198.12	7.23		220.14	263	421	4,500
WAREHOUSE	0.00	0.00		0.00	0	0		67.20	0.00		56.00	76	122	4,500
OFFICE	0.00	0.00		0.00	0	0		135.10	17.48		323.98	295	471	3,500
RETAIL	0.00	0.00		0.00	0	0		39.25	1.35		0.00	25	40	3,500
EDUCATION	0.00	0.00		0.00	0	0		97.95	3.37		0.00	63	100	3,000
SUBTOTAL	0.00	0.00		0.00	0	0	0	710.70	29.43		708.29	895	1432	4,500
RESIDENTIAL														
NEW CONDOS		0.00	0.00		0	0		0.00	0.91	200.00		124	199	3,500
EXISTING DUPLEXES		0.00	0.00		0	0		0.00	9.65	123.60		82	132	2,500
EXISTING SINGLE FAMILY		0.00	0.00		0	0		0.00	0.50	6.30		4	7	3,500
MULTI-FAMILY - REHAB		0.00	0.00		0	0		0.00	4.04	56.80		38	60	2,500
LIVE/WORK		0.00	0.00		0	0		0.00	0.30	14.80		9	15	2,500
DORMITORY BEDS		0.00	0.00		0	0		0.00	0.10	55.00		34	54	3,500
SUBTOTAL		0.00	0.00		0	0	0	0.00	15.50	456.50		291.7	412	3,500
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.00	0.00		0.00	0	0		0.00	315.00		5.00	198	320	1,500
DEVELOPED PARK	0.00	0.00		0.00	0	0		0.00	133.22		0.30	83	132	1,500
REGIONAL PARK	0.00	0.00		0.00	0	0		0.00	0.00		0.59	0	1	0
OPEN SPACE	0.00	0.00		0.00	0	0		0.00	0.00		0.00	0	0	0
CIVIC/REC SPACE	0.00	0.00		0.00	0	0		52.61	0.10		0.00	33	52	2,500
MARINA	0.00	0.00		0.00	0	0		3.00	0.00		5.39	5	8	3,500
SUBTOTAL	0.00	0.00		0.00	0	0	0	55.61	448.32		11.27	318	513	3,500
TOTAL	0.00	0.00	0.00	0.00	0	0	0	766.31	493.25	456.50	719.57	1,505	2,358	4,760

(1) Max Day Flow = Ave Flow X 1.6 TOTAL REGIONAL FIRE DEMAND BASED ON NFPA EQUATION: Q=1020 x SQRT (P) x (1 - 0.01 x SQRT (P)); T = Q/1000

ULTIMATE BUILDOUT

Fire Flow Allocation by Reimer Associates	FLOW RATE	DURATION
NON RESIDENTIAL		
HEAVY INDUSTRIAL	4,500	4
LIGHT INDUSTRIAL	4,500	4
WAREHOUSE	4,500	4
OFFICE	3,500	3
RETAIL	3,500	3
EDUCATION	3,000	3
RESIDENTIAL		
NEW CONDOS	3,500	3
EXISTING DUPLEXES	2,500	2
EXISTING SINGLE FAMILY	3,500	3
MULTI-FAMILY - REHAB	2,500	2
LIVE/WORK	2,500	2
DORMITORY BEDS	3,500	3
CIVIC/RECREATION/OPEN SPACE		
GOLF COURSE	1,500	2
DEVELOPED PARK	1,500	2
REGIONAL PARK	none	none
OPEN SPACE	none	none
CIVIC/REC SPACE	3,000	3
MARINA	3,500	3

TABLE 3-3 VALLEJO FIRE DEPARTEMENT FIRE FLOW REQUIREMENTS
Souce: City of Vallejo

ZONE DESIGNATION	FLOW RATE	DURATION
Resource Conservation	none	none
Rural Residential	1,500	2
Low Density Residential	1,500	2
Medium Density Residential	2,500	2
Residential View District	2,500	2
Neighborhood Shopping	2,500	2
Schools	3,000	3
High Density Residential	3,500	3
Arch Heritage District	3,500	3
Linear Commercial	3,500	3
Waterfront Shopping	3,500	3
Freeway Shopping	3,500	3
Planned Development RES	3,500	3
Intensive Use	3,500	3
Limited Office	3,500	4
Pedestrian Shopping	4,500	4
Planned Development COM	4,500	4
Planned Development IND	4,500	4
Medical	4,500	4

Water Storage Requirements by Reimer Associates	Max. Day Storage	Fire Flow Storage	Equalization Storage	Total Storage
	2,358 gpm	4,760 gpm	162,857 gal./ft.	
	x 1440 min/day	x 286 duration	x 5.50 ft.	
	3.4 M.Gal.	1.4 M.Gal.	0.9 M.Gal.	**5.7 Million Gal.**

ULTIMATE BUILDOUT

Sanitary Sewer System Analysis	1. North Light Industrial					2. Neighborhood Center				
	Total Acreage		198.9			Total Acreage		89.4		
	Developable Acreage		159.1			Developable Acreage		71.5		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0147	0.0177		0.0092	0.0416	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0713	0.1826		0.0793	0.3332	0.0075	0.0201		0.0083	0.0360
WAREHOUSE	0.0478	0.1562		0.0424	0.2464	0.0	0.0		0.0	0.0
OFFICE	0.0073	0.0074		0.0167	0.0313	0.0300	0.0364		0.0686	0.1350
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0020	0.0002			0.0022
SUBTOTAL	0.1411	0.3639		0.1475	0.6525	0.0395	0.0567		0.0770	0.1732
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0002	0.0041		0.0043
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0002	0.0041		0.0043
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0040		0.0001	0.0041
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.0			0.0	0.0258	0.0008			0.0267
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0258	0.0048		0.0001	0.0307
TOTAL	0.1411	0.3639	0.0000	0.1475	0.6525	0.0653	0.0617	0.0041	0.0770	0.2082

ULTIMATE BUILDOUT

Sanitary Sewer System Analysis	3. Mixed Use					4. Historic District				
	Total Acreage		111.0			Total Acreage		52.7		
	Developable Acreage		88.8			Developable Acreage		42.2		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0081	0.0097		0.0050	0.0228	0.0090	0.0109		0.0056	0.0255
LIGHT INDUSTRIAL	0.0280	0.0750		0.0311	0.1342	0.0216	0.0289		0.0240	0.0745
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0457	0.0463		0.1047	0.1967	0.0102	0.0062		0.0234	0.0398
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0003	0.0000			0.0003	0.0	0.0			0.0
SUBTOTAL	0.0821	0.1310		0.1409	0.3540	0.0408	0.0460		0.0530	0.1399
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0005	0.0039		0.0044
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0005	0.0039		0.0044
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0014		0.0	0.0015		0.0011		0.0000	0.0011
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.0			0.0	0.0006	0.0000			0.0007
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0014		0.0	0.0015	0.0006	0.0011		0.0	0.0018
TOTAL	0.0821	0.1325	0.0000	0.1409	0.3555	0.0415	0.0477	0.0039	0.0530	0.1461

ULTIMATE BUILDOUT

Sanitary Sewer System Analysis	5. Heavy Industry Total Acreage 135.3 Developable Acreage 108.2					6. Farragut Village Total Acreage 105.2 Developable Acreage 84.2				
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0992	0.0920		0.0620	0.2531	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0143	0.0383		0.0159	0.0685	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0060	0.0073		0.0138	0.0272	0.0	0.0		0.0	0.0
RETAIL	0.0008	0.0002			0.0010	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0065	0.0			0.0065
SUBTOTAL	0.1204	0.1378		0.0917	0.3498	0.0065	0.0		0.0	0.0065
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0031	0.0454		0.0485
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0028	0.0409		0.0437
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0059	0.0863		0.0922
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0		0.0	0.0
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.0			0.0	0.0006	0.0			0.0006
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0006	0.0		0.0	0.0006
TOTAL	0.1204	0.1378	0.0000	0.0917	0.3498	0.0071	0.0059	0.0863	0.0000	0.0993

ULTIMATE BUILDOUT

Sanitary Sewer System Analysis	7. Developed Recreation					8. Coral Sea Village				
	Total Acreage 46.2					Total Acreage 67.1				
	Developable Acreage 37.0					Developable Acreage 53.7				
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0	0.0		0.0	0.0	0.0007	0.0009		0.0017	0.0033
RETAIL	0.0	0.0			0.0	0.0124	0.0025			0.0149
EDUCATION	0.0	0.0			0.0	0.0	0.0			0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0131	0.0034		0.0017	0.0182
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0030	0.0436		0.0466
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0004	0.0086		0.0090
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0034	0.0523		0.0556
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0073		0.0001	0.0074		0.0006		0.0000	0.0006
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.0			0.0	0.0	0.0			0.0
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0073		0.0001	0.0074	0.0	0.0006		0.0	0.0006
TOTAL	0.0	0.0073	0.0	0.0001	0.0074	0.0131	0.0074	0.0523	0.0017	0.0745

ULTIMATE BUILDOUT

Sanitary Sewer System Analysis	9. Education/Office					10. Marina/Residential				
	Total Acreage		104.4			Total Acreage		82.6		
	Developable Acreage		83.5			Developable Acreage		66.1		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0068	0.0182		0.0075	0.0325	0.0003	0.0009		0.0004	0.0016
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0076	0.0093		0.0148	0.0318	0.0006	0.0007		0.0014	0.0027
RETAIL	0.0092	0.0019			0.0111	0.0072	0.0015			0.0087
EDUCATION	0.0696	0.0000			0.0696	0.0	0.0			0.0
SUBTOTAL	0.0933	0.0293		0.0224	0.1450	0.0082	0.0031		0.0018	0.0130
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0059	0.1728		0.1787
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0004	0.0875		0.0879		0.0	0.0		0.0
SUBTOTAL		0.0004	0.0875		0.0879		0.0059	0.1728		0.1787
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.0		0.0	0.0
DEVELOPED PARK		0.0013		0.0	0.0013		0.0		0.0	0.0
REGIONAL PARK				0.0	0.0				0.0	0.0
OPEN SPACE										
CIVIC/REC SPACE	0.0151	0.0005			0.0156	0.0	0.0			0.0
MARINA	0.0	0.0		0.0	0.0	0.0	0.0101		0.0041	0.0165
SUBTOTAL	0.0151	0.0018		0.0	0.0169	0.0	0.0101		0.0041	0.0165
TOTAL	0.1084	0.0315	0.0875	0.0224	0.2498	0.0106	0.0191	0.1728	0.0058	0.2083

ULTIMATE BUILDOUT

Sanitary Sewer System Analysis	11. Golf Course					12. Regional Park				
	Total Acreage		170.8			Total Acreage		216.0		
	Developable Acreage		136.6			Developable Acreage		172.8		
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
WAREHOUSE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
OFFICE	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
RETAIL	0.0	0.0			0.0	0.0	0.0			0.0
EDUCATION	0.0	0.0			0.0	0.0	0.0			0.0
SUBTOTAL	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING DUPLEXES		0.0	0.0		0.0		0.0	0.0		0.0
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.0	0.0		0.0
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.0	0.0		0.0
LIVE/WORK		0.0	0.0		0.0		0.0	0.0		0.0
DORMITORY BEDS		0.0	0.0		0.0		0.0	0.0		0.0
SUBTOTAL		0.0	0.0		0.0		0.0	0.0		0.0
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0000		0.0036	0.0036		0.0		0.0	0.0
DEVELOPED PARK		0.0		0.0	0.0		0.0		0.0	0.0
REGIONAL PARK				0.0	0.0				0.0004	0.0004
OPEN SPACE										
CIVIC/REC SPACE	0.0	0.0			0.0	0.0	0.0			0.0
MARINA	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0
SUBTOTAL	0.0	0.0000		0.0036	0.0036	0.0	0.0		0.0004	0.0004
TOTAL	0.0	0.0	0.0	0.0036	0.0036	0.0	0.0	0.0	0.0004	0.0004

ULTIMATE BUILDOUT

Sanitary Sewer System Analysis	13. Open Space/ Recreation					TOTAL				
	Total Acreage 99.1					Total Acreage 1478.7				
	Developable Acreage 79.3					Developable Acreage 1182.9				
	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)	GENERATION BY LAND USE (MGD)				AVE, FLOW (MGD)
	by SF	by AC	by DU/BED	by DAY POP		by SF	by AC	by DU/BED	by DAY POP	
NON RESIDENTIAL										
HEAVY INDUSTRIAL	0.0	0.0		0.0	0.0	0.131	0.130		0.082	0.343
LIGHT INDUSTRIAL	0.0	0.0		0.0	0.0	0.150	0.364		0.167	0.681
WAREHOUSE	0.0	0.0		0.0	0.0	0.048	0.156		0.042	0.246
OFFICE	0.0	0.0		0.0	0.0	0.108	0.114		0.245	0.468
RETAIL	0.0	0.0			0.0	0.030	0.006		0.0	0.036
EDUCATION	0.0	0.0			0.0	0.078	0.0002		0.0	0.079
SUBTOTAL	0.0	0.0		0.0	0.0	0.55	0.77		0.54	1.85
RESIDENTIAL										
NEW CONDOS		0.0	0.0		0.0		0.006	0.173		0.179
EXISTING DUPLEXES		0.0	0.0		0.0		0.006	0.089		0.095
EXISTING SINGLE FAMILY		0.0	0.0		0.0		0.001	0.004		0.004
MULTI-FAMILY - REHAB		0.0	0.0		0.0		0.003	0.041		0.044
LIVE/WORK		0.0	0.0		0.0		0.001	0.013		0.013
DORMITORY BEDS		0.0	0.0		0.0		0.000	0.088		0.088
SUBTOTAL		0.0	0.0		0.0		0.02	0.41		0.42
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE		0.0		0.0	0.0		0.000		0.004	0.004
DEVELOPED PARK		0.0		0.0	0.0		0.016		0	0.016
REGIONAL PARK				0.0	0.0				0.0004	0.0004
OPEN SPACE										0
CIVIC/REC SPACE	0.0	0.0			0.0	0.042	0.001			0.044
MARINA	0.0	0.0		0.0	0.0	0	0.010		0.004	0.017
SUBTOTAL	0.0	0.0		0.0	0.0	0.04	0.03	0	0.01	0.08
TOTAL	0.0	0.0	0.0	0.0	0.0	0.590	0.815	0.407	0.544	2.355

ULTIMATE BUILDOUT

Storm Water System Analysis

1. North Light Industrial — Total Acreage 198.9; Developable Acreage 159.1

2. Neighborhood Center — Total Acreage 89.4; Developable Acreage 71.5

	1. REPORTED ACREAGE SITE AC	1. REPORTED ACREAGE PARK/OPE AC	1. REPORTED ACREAGE PAVED AC	1. C VALUES EX [2]	1. C VALUES NEW [1]	1. HYDROLOGY CA	1. HYDROLOGY % OF CA	2. REPORTED ACREAGE SITE AC	2. REPORTED ACREAGE PARK/OPE AC	2. REPORTED ACREAGE PAVED AC	2. C VALUES EX [2]	2. C VALUES NEW [1]	2. HYDROLOGY CA	2. HYDROLOGY % OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	13.3	0.0	13.3	0.95	0.90	11.9	10.8	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	82.1	35.8	46.3	0.95	0.68	41.1	37.1	9.0	4.1	5.0	0.95	0.68	4.5	14.1
WAREHOUSE	87.7	38.3	49.5	0.95	0.85	52.4	47.2	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	8.3	5.0	3.3	0.95	0.65	3.5	3.1	40.9	25.6	15.3	0.95	0.65	16.9	53.1
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.9	0.4	0.5		0.65	0.4	1.3
SUBTOTAL	191.4	79.0	112.3			109.0	98.2	50.8	30.0	20.8			21.8	68.4
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY,- REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	1.9	0.9	1.0		0.35	0.6	1.9
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	1.9	0.9	1.0			0.6	1.9
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0	25.0	22.5	2.5	0.27	0.20	6.6	20.7
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	7.5	7.5	0.0	0.27	0.27	2.0	1.8	7.0	7.0	0.0	0.27	0.27	1.9	5.9
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	4.7	0.5	4.2	0.27	0.20	1.0	3.1
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	7.5	7.5	0.0			2.0	1.8	36.7	29.9	6.7			9.4	29.7
TOTAL	198.9	86.6	112.3	**Ave. C**	0.56	111.0	100.0	89.4	60.8	28.6	**Ave. C**	0.36	31.8	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

ULTIMATE BUILDOUT

Storm Water System Analysis

3. Mixed Use

Total Acreage 111.0

Developable Acreage 88.8

	REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	7.3	0.0	7.3	0.95	0.90	6.5	13.2
LIGHT INDUSTRIAL	33.7	15.2	18.5	0.95	0.68	16.7	33.7
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	52.0	31.2	20.8	0.95	0.65	21.9	44.3
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.1	0.1	0.1		0.65	0.1	0.1
SUBTOTAL	93.1	46.4	46.7			45.3	91.3
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	9.0	1.6	7.4	0.27	0.20	1.9	3.9
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	8.9	0.0	8.9	0.27	0.27	2.4	4.8
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	17.9	1.6	16.2			4.3	8.7
TOTAL	111.0	48.1	62.9	**Ave. C**	0.45	49.6	100.0

4. Historic District

Total Acreage 52.7

Developable Acreage 42.2

	REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	8.1	0.0	8.1	0.95	0.90	7.3	28.8
LIGHT INDUSTRIAL	13.0	2.0	11.1	0.95	0.68	8.0	31.6
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	7.0	3.5	3.5	0.95	0.65	3.2	12.6
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	28.1	5.4	22.7			18.6	73.0
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	6.0	2.2	3.8		0.35	1.9	7.6
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	6.0	2.2	3.8			1.9	7.6
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	7.0	6.3	0.7	0.27	0.20	1.8	7.2
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	11.5	11.5	0.0	0.27	0.27	3.1	12.2
CIVIC/REC SPACE	0.1	0.0	0.1	0.27	0.20	0.0	0.1
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	18.6	17.8	0.8			5.0	19.5
TOTAL	52.7	25.4	27.3	**Ave. C**	0.48	25.5	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

ULTIMATE BUILDOUT

Storm Water System Analysis

5. Heavy Industry

Total Acreage 135.3

Developable Acreage 108.2

	REPORTED ACREAGE SITE AC	REPORTED ACREAGE PARK/OPE AC	REPORTED ACREAGE PAVED AC	C VALUES EX [2]	C VALUES NEW [1]	HYDROLOGY CA	HYDROLOGY % OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	68.9	0.0	68.9	0.95	0.90	62.0	72.9
LIGHT INDUSTRIAL	17.2	7.8	9.5	0.95	0.68	8.5	10.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	8.2	5.1	3.1	0.95	0.65	3.4	4.0
RETAIL	0.4	0.2	0.2	0.95	0.73	0.2	0.2
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	94.7	13.1	81.7			74.1	87.1
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	40.6	40.6	0.0	0.27	0.27	11.0	12.9
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	40.6	40.6	0.0			11.0	12.9
TOTAL	135.3	53.6	81.7	Ave. C	0.63	85.1	100.0

6. Farragut Village

Total Acreage 105.2

Developable Acreage 84.2

	REPORTED ACREAGE SITE AC	REPORTED ACREAGE PARK/OPE AC	REPORTED ACREAGE PAVED AC	C VALUES EX [2]	C VALUES NEW [1]	HYDROLOGY CA	HYDROLOGY % OF CA
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	2.8	1.2	1.5		0.65	1.3	4.0
SUBTOTAL	2.8	1.2	1.5			1.3	4.0
RESIDENTIAL							
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	35.0	21.8	13.2		0.40	11.2	33.7
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	31.6	18.1	13.5		0.45	11.0	33.1
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	66.6	39.8	26.7			22.1	66.8
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	35.8	35.8	0.0	0.27	0.27	9.7	29.2
CIVIC/REC SPACE	0.1	0.0	0.1	0.27	0.20	0.0	0.1
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	35.9	35.8	0.1			9.7	29.2
TOTAL	105.2	76.8	28.4	Ave. C	0.31	33.1	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

ULTIMATE BUILDOUT

Storm Water System Analysis

	7. Developed Recreation							8. Coral Sea Village						
	Total Acreage 46.2							Total Acreage 67.1						
	Developable Acreage 37.0							Developable Acreage 53.7						
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0	1.0	0.6	0.4	0.95	0.65	0.4	1.9
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	5.6	2.5	3.1	0.95	0.73	2.9	13.7
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	6.6	3.1	3.5			3.3	15.6
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	33.7	21.3	12.4		0.40	10.7	49.9
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	4.0	1.8	2.2		0.35	1.3	5.9
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	37.7	23.1	14.6			12.0	55.8
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	46.2	41.1	5.1	0.27	0.20	12.1	100.0	4.0	3.6	0.4	0.27	0.20	1.1	4.9
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0
OPEN SPACE	0.0	0.0	0.0	0.27	0.27	0.0	0.0	18.8	18.8	0.0	0.27	0.27	5.1	23.7
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	46.2	41.1	5.1			12.1	100.0	22.8	22.4	0.4			6.1	28.6
TOTAL	46.2	41.1	5.1	**Ave. C**	0.26	12.1	100.0	67.1	48.7	18.4	**Ave. C**	0.32	21.4	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

ULTIMATE BUILDOUT

Storm Water System Analysis	9. Education/Office							10. Marina/Residential							
	Total Acreage		104.4					Total Acreage		82.6					
	Developable Acreage		83.5					Developable Acreage		66.1					
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY		
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	
NON RESIDENTIAL															
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	0.0	0.0	0.0	0.95	0.90	0.0	0.0	
LIGHT INDUSTRIAL	8.2	3.7	4.5	0.95	0.68	4.1	10.4	0.4	0.2	0.2	0.95	0.68	0.2	0.7	
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0	
OFFICE	10.4	6.5	3.9	0.95	0.65	4.3	11.1	0.8	0.5	0.3	0.95	0.65	0.3	1.1	
RETAIL	4.2	1.9	2.3	0.95	0.73	2.2	5.6	3.3	1.5	1.8	0.95	0.73	1.7	5.6	
EDUCATION	29.7	13.4	16.3		0.65	14.2	36.6	0.0	0.0	0.0		0.65	0.0	0.0	
SUBTOTAL	52.5	25.4	27.0			24.8	63.7	4.5	2.2	2.3			2.2	7.4	
RESIDENTIAL															
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	66.7	4.1	62.6		0.35	23.0	75.7	
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0	
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0	
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0	
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0	
DORMITORY BEDS	5.0	0.9	4.1		0.35	1.7	4.3	0.0	0.0	0.0		0.35	0.0	0.0	
SUBTOTAL	5.0	0.9	4.1			1.7	4.3	66.7	4.1	62.6			23.0	75.7	
CIVIC/RECREATION/OPEN SPACE															
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0	
DEVELOPED PARK	8.0	7.2	0.8	0.27	0.20	2.1	5.4	0.0	0.0	0.0	0.27	0.20	0.0	0.0	
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	0.0	0.0	0.0		0.20	0.0	0.0	
OPEN SPACE	36.2	36.2	0.0	0.27	0.27	9.8	25.1	0.1	0.1	0.0	0.27	0.27	0.0	0.1	
CIVIC/REC SPACE	2.8	0.0	2.8	0.27	0.20	0.6	1.4	0.0	0.0	0.0	0.27	0.20	0.0	0.0	
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	11.3	10.1	1.2	0.45	0.45	5.1	16.7	
SUBTOTAL	46.9	43.4	3.6			12.4	32.0	11.4	10.3	1.2			5.1	16.9	
TOTAL	104.4	69.7	34.7	**Ave. C**	0.37	38.9	100.0	82.6	16.5	66.1	**Ave. C**	0.37	30.4	100.0	

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

ULTIMATE BUILDOUT

Storm Water System Analysis	11. Golf Course							12. Regional Park						
	Total Acreage 170.8							Total Acreage 216.0						
	Developable Acreage 136.6							Developable Acreage 172.8						
	REPORTED ACREAGE			C VALUES		HYDROLOGY		REPORTED ACREAGE			C VALUES		HYDROLOGY	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	0.0	0.0	0.0	0.95	0.90	0.0	0.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0	0.0	0.0	0.0	0.95	0.68	0.0	0.0
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	0.0	0.0	0.0	0.95	0.85	0.0	0.0
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0	0.0	0.0	0.0	0.95	0.65	0.0	0.0
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	0.0	0.0	0.0	0.95	0.73	0.0	0.0
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	0.0	0.0	0.0		0.65	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0			0.0	0.0
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	0.0	0.0	0.0		0.40	0.0	0.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	0.0	0.0	0.0		0.45	0.0	0.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	0.0	0.0	0.0		0.35	0.0	0.0
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0			0.0	0.0
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	122.3	121.4	0.9		0.20	24.5	65.1	0.0	0.0	0.0		0.20	0.0	0.0
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.0	0.0	0.0	0.27	0.20	0.0	0.0
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	163.0	146.7	16.3		0.20	32.6	69.5
OPEN SPACE	48.5	48.5	0.0	0.27	0.27	13.1	34.9	53.0	53.0	0.0	0.27	0.27	14.3	30.5
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	0.0	0.0	0.0	0.27	0.20	0.0	0.0
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	0.0	0.0	0.0	0.45	0.45	0.0	0.0
SUBTOTAL	170.8	169.9	0.9			37.6	100.0	216.0	199.7	16.3			46.9	100.0
TOTAL	170.8	169.9	0.9	**Ave. C**	0.22	37.6	100.0	216.0	199.7	16.3	**Ave. C**	0.22	46.9	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.

[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

ULTIMATE BUILDOUT

Storm Water System Analysis

13. Open Space/ Recreation
Total Acreage 99.1
Developable Acreage 79.3

TOTAL
Total Acreage 1478.7
Developable Acreage 1182.9

	REPORTED ACREAGE (13)			C VALUES (13)		HYDROLOGY (13)		REPORTED ACREAGE (TOTAL)			C VALUES (TOTAL)		HYDROLOGY (TOTAL)	
	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF CA	SITE AC	PARK/OPE AC	PAVED AC	EX [2]	NEW [1]	CA	% OF TOTAL
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.0	0.0	0.95	0.90	0.0	0.0	97.6	0.0	97.6	0.95	0.90	87.8	16.0
LIGHT INDUSTRIAL	0.0	0.0	0.0	0.95	0.68	0.0	0.0	163.6	68.6	95.0	0.95	0.68	83.2	15.1
WAREHOUSE	0.0	0.0	0.0	0.95	0.85	0.0	0.0	87.7	38.3	49.5	0.95	0.85	52.4	9.5
OFFICE	0.0	0.0	0.0	0.95	0.65	0.0	0.0	128.6	78.0	50.6	0.95	0.65	54.0	9.8
RETAIL	0.0	0.0	0.0	0.95	0.73	0.0	0.0	13.4	6.0	7.4	0.95	0.73	7.0	1.3
EDUCATION	0.0	0.0	0.0		0.65	0.0	0.0	33.5	15.1	18.4		0.65	16.0	2.9
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	524.4	206.0	318.5			300.3	54.6
RESIDENTIAL														
NEW CONDOS	0.0	0.0	0.0		0.35	0.0	0.0	66.7	4.1	62.6		0.35	23.0	4.2
EXISTING DUPLEXES	0.0	0.0	0.0		0.40	0.0	0.0	68.7	43.1	25.6		0.40	21.9	4.0
EXISTING SINGLE FAMILY	0.0	0.0	0.0		0.35	0.0	0.0	6.0	2.2	3.8		0.35	1.9	0.3
MULTI-FAMILY - REHAB	0.0	0.0	0.0		0.45	0.0	0.0	31.6	18.1	13.5		0.45	11.0	2.0
LIVE/WORK	0.0	0.0	0.0		0.35	0.0	0.0	5.9	2.7	3.2		0.35	1.9	0.3
DORMITORY BEDS	0.0	0.0	0.0		0.35	0.0	0.0	5.0	0.9	4.1		0.35	1.7	0.3
SUBTOTAL	0.0	0.0	0.0			0.0	0.0	183.8	71.0	112.8			61.3	11.1
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.0	0.0		0.20	0.0	0.0	122.3	121.4	0.9		0.20	24.5	4.4
DEVELOPED PARK	0.0	0.0	0.0	0.27	0.20	0.0	0.0	99.2	82.3	16.9	0.27	0.20	25.6	4.7
REGIONAL PARK	0.0	0.0	0.0		0.20	0.0	0.0	163.0	146.7	16.3		0.20	32.6	5.9
OPEN SPACE	99.1	89.2	9.9	0.27	0.27	26.8	100.0	366.9	348.2	18.8	0.27	0.27	99.1	18.0
CIVIC/REC SPACE	0.0	0.0	0.0	0.27	0.20	0.0	0.0	7.7	0.4	7.3	0.27	0.20	1.6	0.3
MARINA	0.0	0.0	0.0	0.45	0.45	0.0	0.0	11.3	10.1	1.2	0.45	0.45	5.1	0.9
SUBTOTAL	99.1	89.2	9.9			26.8	100.0	770.4	709.2	61.2			188.4	34.3
TOTAL	99.1	89.2	9.9	Ave. C	0.27	26.8	100.0	1478.7	986.1	492.6	Ave. C	0.37	550.0	100.0

[1] "C" Factor applicable to new development or redevelopment areas to City of Vallejo Standards.
[2] "C" Factor applicable to existing conditions and reuse of existing facilities (including local soil conditions).

ULTIMATE BUILDOUT

Storm Water Discharge Analysis		1. North Light Industrial				2. Neighborhood Center		
		Total Acreage			198.9	Total Acreage	89.4	
		Average C Value			0.56	Average C Value	0.36	
		SUBBASIN AREAS[1]				SUBBASIN AREAS[1]		
		1 - A	1 - B	1 - C	1 - D	2 - D	2 - E	2 - F
		63.1	92.3	35.5	8.2	41.1	22.4	6.0
DRAINAGE BASINS								
#	Intensity							
A	1.05	37.2						
B	0.73		37.9					
C	0.88			17.6				
D	1.46				6.7	21.5		
E	0.49						3.9	
F	0.92							2.0
G	0.84							
H	1.13							
I	1.11							
J	1.06							
K	1.11							
L	0.72							
M	1.36							
N	1.28							
O	1.54							
P	1.31							
TOTAL DISCHARGE		37.2	37.9	17.6	6.7	21.5	3.9	2.0

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

ULTIMATE BUILDOUT

Storm Water Discharge Analysis		3. Mixed Use					4. Historic District			
		Total Acreage				111.0	Total Acreage			89.4
		Average C Value				0.45	Average C Value			0.48
		SUBBASIN AREAS[1]					SUBBASIN AREAS[1]			
		3 - D	3 - E	3 - F	3 - G	3 - H	4 - F	4 - G	4 - H	4 - I
		23.0	31.7	26.1	25.5	4.8	1.6	1.3	30.2	7.3
DRAINAGE BASINS #	Intensity									
A	1.05									
B	0.73									
C	0.88									
D	1.46	15.1								
E	0.49		7.0							
F	0.92			10.8			0.7			
G	0.84				9.6			0.5		
H	1.13					2.4			16.6	
I	1.11									3.9
J	1.06									
K	1.11									
L	0.72									
M	1.36									
N	1.28									
O	1.54									
P	1.31									
TOTAL DISCHARGE		15.1	7.0	10.8	9.6	2.4	0.7	0.5	16.6	3.9

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

ULTIMATE BUILDOUT

Storm Water Discharge Analysis		5. Heavy Industry						6. Farragut Village		
		Total Acreage					135.3	Total Acreage	105.2	
		Average C Value					0.63	Average C Value	0.31	
		SUBBASIN AREAS[1]						SUBBASIN AREAS[1]		
		5 - H	5 - I	5 - J	5 - K	5 - L	5 - M	6 - F	6 - H	6 - I
		2.0	49.7	35.1	8.7	22.8	6.1	5.4	30.4	54.5
DRAINAGE BASINS #	Intensity									
A	1.05									
B	0.73									
C	0.88									
D	1.46									
E	0.49									
F	0.92							1.6		
G	0.84									
H	1.13	1.4							10.9	
I	1.11		34.9							19.2
J	1.06			23.6						
K	1.11				6.1					
L	0.72					10.4				
M	1.36						5.3			
N	1.28									
O	1.54									
P	1.31									
TOTAL DISCHARGE		1.4	34.9	23.6	6.1	10.4	5.3	1.6	10.9	19.2

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

ULTIMATE BUILDOUT

Storm Water Discharge Analysis		*7. Developed Recreation*			*8. Coral Sea Village*			*9. Education/Office*		
		Total Acreage 46.2			Total Acreage 67.1			Total Acreage 104.4		
		Average C Value 0.26			Average C Value 0.32			Average C Value 0.37		
		SUBBASIN AREAS[1]			SUBBASIN AREAS[1]			SUBBASIN AREAS[1]		
		7 - I	7 - L	7 - OL	8 - I	8 - L	8 - OL	9 - I	9 - L	9 - M
		36.7	0.9	8.6	7.8	49.1	10.2	8.4	32.4	48.4
DRAINAGE BASINS										
#	Intensity									
A	1.05									
B	0.73									
C	0.88									
D	1.46									
E	0.49									
F	0.92									
G	0.84									
H	1.13									
I	1.11	10.8			2.8			3.5		
J	1.06									
K	1.11									
L	0.72		0.2			11.4			8.8	
M	1.36									24.7
N	1.28									
O	1.54									
P	1.31									
TOTAL DISCHARGE		10.8	0.2	0.0	2.8	11.4	0.0	3.5	8.8	24.7

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

ULTIMATE BUILDOUT

Storm Water Discharge Analysis		10. Marina/Residential				11. Golf Course		
		Total Acreage			82.6	Total Acreage	170.8	
		Average C Value			0.37	Average C Value	0.22	
		SUBBASIN AREAS[1]				SUBBASIN AREAS[1]		
		10 - M	10 - N	10 - O	10 - P	11 - M	11 - N	11 - O
		15.4	21.1	26.8	19.3	3.4	37.2	26.3
DRAINAGE BASINS								
#	Intensity							
A	1.05							
B	0.73							
C	0.88							
D	1.46							
E	0.49							
F	0.92							
G	0.84							
H	1.13							
I	1.11							
J	1.06							
K	1.11							
L	0.72							
M	1.36	7.8				1.0		
N	1.28		10.0				10.6	
O	1.54			15.3				9.0
P	1.31				9.4			
TOTAL DISCHARGE		7.8	10.0	15.3	9.4	1.0	10.6	9.0

[1] Areas of sub-basins may not add to total due to reductions for overland flow.

ULTIMATE BUILDOUT

Storm Water Discharge Analysis		12. Regional Park				TOTAL
		Total Acreage			216.0	Total Acreage 1478.7
		Average C Value			0.22	Average C Value 0.37
		SUBBASIN AREAS[1]				DRAINAGE BASIN TOTAL DISCHARGE[2] (cfs)
		12 - M 3.6	12 - N 6.8	12 - O 9.7	12 - P 17.2	
DRAINAGE BASINS #	Intensity					
A	1.05					37.2
B	0.73					37.9
C	0.88					17.6
D	1.46					43.4
E	0.49					10.9
F	0.92					15.1
G	0.84					10.2
H	1.13					31.4
I	1.11					75.1
J	1.06					23.6
K	1.11					6.1
L	0.72					30.7
M	1.36	1.1				39.8
N	1.28		1.9			22.5
O	1.54			3.3		27.6
P	1.31				4.9	14.3
TOTAL DISCHARGE		1.1	1.9	3.3	4.9	443.3

[1] Areas of sub-basins may not add to total due to reductions for overland flow.
[2] Reuse Area 13 drains into surrounding dredge ponds and was excluded.

APPENDIX A3

SET – 3
COST ANALYSIS
BY
SYSTEM

MIRIS

InfraStrategy Analysis

Set 3 – Infrastructure Costs

- **Potable Water System**
- **Sanitary Sewer System**
- **Storm Water System**
- **Transportation**

December 30, 1997

Prepared by: Reimer Associates

35,282.53

PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST		UNITS	TOTAL COST
	ON-SITE SYSTEM UPGRADES (TO MEET CURRENT OPERATING STANDARDS)							
2000	NEW STORAGE TANK	W- 1	- NEW 5.7 MG TANK	ALL AREAS	$3,200,000	EA	1	$3,200,000
		W- 2	- 20" WATER LINE EXTENSION TO TANK	ALL AREAS	$90	LF	1,150	$104,000
	SUBTOTAL ON-SITE UPGRADES							$3,304,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 30% OF PIPELINES)							$9,400
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)							$4,572,000
	ON-SITE SYSTEM EXPANSION (TO MEET PROJECTED FUTURE DEVELOPMENT)							
1998	REPLACE MAIN	W- 3	- NEW 20" WATER MAIN & RECONNECTION	AREA 1	$100	LF	600	$60,000
1999	REPLACE MAIN	W- 4	- NEW 12" WATER MAIN & HYDRANTS	AREA 1	$65	LF	1,600	$104,000
2001	REPLACE MAIN	W- 5	- NEW 12" WATER MAIN & HYDRANTS	AREA 1	$65	LF	1,300	$85,000
2000	REPLACE MAIN	W- 6	- NEW 12" WATER MAIN & HYDRANTS	AREA 1	$65	LF	850	$55,000
2001	NEW MAIN	W- 7	- NEW 20" WATER MAIN & HYDRANTS	AREA 2,3,4,5,6,7,8,9,11	$105	LF	2,810	$295,000
2009	REPLACE MAIN	W- 8	- NEW 12" WATER MAIN & RECONNECTION	AREA 2,3,4,5,6,7,8,9,11	$65	LF	460	$30,000
			- REINFORCED CONCRETE EXCAVATION CST-*NOTE#1*		$150	LF	460	$69,000
2009	REPLACE MAIN	W- 9	- NEW 12" WATER MAIN & RECONNECTION	AREA 2,3,4,5,6,7,8,9,11	$65	LF	580	$38,000
			- REINFORCED CONCRETE EXCAVATION CST-*NOTE#1*		$150	LF	580	$87,000
2005	REPLACE MAIN	W- 10	- NEW 12" WATER MAIN & RECONNECTION	AREA 2,3,4,5,6,7,8,9,11	$65	LF	3,420	$222,000
2007	NEW MAIN	W- 11	- NEW 10" WATER MAIN & HYDRANTS	AREA 2,3,4,5,6,7,8,9,11	$60	LF	450	$27,000
2005	NEW MAIN	W- 12	- NEW 10" WATER MAIN & HYDRANTS	AREA 2,3,4,5,6,7,8,9,11	$60	LF	1,700	$102,000
1999	REPLACE MAIN	W- 13	- NEW 10" WATER MAIN & RECONNECTION	AREA 2,3,4,5,6,7,8,9,11	$60	LF	680	$41,000
			- REINFORCED CONCRETE EXCAVATION CST-*NOTE#1*		$150	LF	400	$60,000
2007	NEW MAIN	W- 14	- NEW 10" WATER MAIN & HYDRANTS	AREA 2,3,4,5,6,7,8,9,11	$60	LF	1,050	$63,000
20XX	NEW MAIN *(NOTE #2)*	W- 15	- NEW 12" WATER MAIN & HYDRANTS	AREA 10	$65	LF	4,900	$319,000
2003	BACKFLOW DEVICES	W- 16	- NEW BACKFLOW DEVICES (8" AND UNDER)	ALL AREAS	$6,000	EA	6	$36,000
2001	BOOSTER PUMPS	W- 17	- REMOVE BOOSTER PUMP STATIONS	ALL AREAS	$24,000	EA	3	$72,000
	SUBTOTAL ON-SITE EXPANSION							$1,765,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 30% OF PIPELINES)							$149,100
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)							$2,641,000

35,282.53

PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST		UNITS	TOTAL COST
	LIFE CYCLE REPLACEMENT COSTS (UNTIL YEAR 2017)							
	REPLACE PIPE SECTIONS	W- 18	- REPLACE WATER MAINS & RECONNECTION - 6"	ALL AREAS	$50	LF	4,500	$225,000
	EXCEEDING THEIR	W- 19	- REPLACE WATER MAINS & RECONNECTION - 8"	ALL AREAS	$55	LF	8,300	$457,000
	NORMAL LIFESPAN	W- 20	- REPLACE WATER MAINS & RECONNECTION - 10"	ALL AREAS	$60	LF	3,800	$228,000
		W- 21	- REPLACE WATER MAINS & RECONNECTION - 12"	ALL AREAS	$65	LF	3,400	$221,000
		W- 22	- REPLACE WATER MAINS & RECONNECTION - 14"	ALL AREAS	$75	LF	1,600	$120,000
		W- 23	- REPLACE WATER MAINS & RECONNECTION - 16"	ALL AREAS	$85	LF	300	$26,000
		W- 24	- REPLACE WATER MAINS - 20"	ALL AREAS	$100	LF	500	$50,000
	REPLACE FAILED VALVES	W- 25	- REPLACE GATE VALVES - (10" & UNDER)	ALL AREAS	$3,000	EA	130	$390,000
		W- 26	- REPLACE GATE VALVES - (12" & OVER)	ALL AREAS	$3,500	EA	33	$114,000
		W- 27	- NEW TAPS & BACKFLOW DEVICES FOR IRRIGATION	ALL AREAS	$1,600	EA	52	$83,000
	SUBTOTAL LIFE CYCLE COSTS							**$1,914,000**
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 30% OF PIPELINES & TAPS)							**$127,000**
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)							**$2,817,000**

	TOTAL WATER SYSTEM ESTIMATED COSTS (INC. ENG & CONT.)	**$10,030,000**

NOTE #1: *Cost for underground construction; Above ground construction would preclude these costs.*
NOTE #2: *Timeframe based on reuse development of Reuse Area #10.*
GENERAL A: *Costs based on Reimer Associates experience. These estimated costs do not include environmental related work - analysis, restoration or remediation.*
B: *All cost estimates are in 1997 dollars and no inflation has been added to improvement costs proposed in future years.*

Water System Cost Analysis	1. North Light Industrial						2. Neighborhood Center					
	Total Acreage		198.9				Total Acreage		89.4			
	Developable Acreage		159.1				Developable Acreage		71.5			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	173,282	13.3	19	$97,700	$36,500	$134,200	0	0.0	0	$0	$0	$0
LIGHT INDUSTRIAL	1,122,200	82.1	125	$629,100	$234,800	$863,900	118,147	9.0	13	$58,800	$24,200	$83,000
WAREHOUSE	1,199,810	87.7	76	$381,700	$142,500	$524,200	0	0.0	0	$0	$0	$0
OFFICE	108,250	8.3	20	$99,900	$37,300	$137,200	445,386	40.9	83	$375,600	$154,800	$530,400
RETAIL	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EDUCATION	0	0.0	0	$0	$0	$0	11,261	0.9	2	$7,300	$3,000	$10,300
SUBTOTAL	2,603,542	191.4	241	$1,208,000	$451,000	$1,660,000	574,794	50.8	97	$442,000	$182,000	$624,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
LIVE/WORK	0	0.0	0	$0	$0	$0	28,800	1.9	3	$13,700	$5,700	$19,400
DORMITORY BEDS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	0.0	0	$0	$0	$0	28,800	1.9	3	$14,000	$6,000	$19,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
DEVELOPED PARK	0	0.0	0	$0	$0	$0	0	25.0	21	$94,900	$39,100	$134,000
REGIONAL PARK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OPEN SPACE	0	7.5	0	$0	$0	$0	0	7.0	0	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0	$0	$0	$0	143,857	4.7	20	$90,700	$37,400	$128,100
MARINA	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	7.5	0	$0	$0	$0	143,857	36.7	41	$186,000	$77,000	$262,000
TOTAL	2,603,542	198.9	241	$1,208,000	$451,000	$1,660,000	747,451	89.4	141	$642,000	$265,000	$905,000

Water System Cost Analysis	3. Mixed Use						4. Historic District					
	Total Acreage		111.0				Total Acreage		52.7			
	Developable Acreage		88.8				Developable Acreage		42.2			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	95,023	7.3	11	$48,500	$20,000	$68,500	106,406	8.1	12	$54,300	$22,400	$76,700
LIGHT INDUSTRIAL	440,734	33.7	49	$224,100	$92,400	$316,500	339,871	13.0	37	$169,800	$70,000	$239,800
WAREHOUSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OFFICE	679,640	52.0	125	$568,200	$234,200	$802,400	151,728	7.0	27	$124,700	$51,400	$176,100
RETAIL	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EDUCATION	1,680	0.1	0	$1,100	$500	$1,600	0	0.0	0	$0	$0	$0
SUBTOTAL	1,217,077	93.1	185	$842,000	$347,000	$1,189,000	598,005	28.1	77	$349,000	$144,000	$493,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0	$0	$0	$0	112,438	6.0	4	$19,100	$7,900	$27,000
MULTI-FAMILY - REHAB	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
LIVE/WORK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
DORMITORY BEDS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	0.0	0	$0	$0	$0	112,438	6.0	4	$19,000	$8,000	$27,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
DEVELOPED PARK	0	9.0	8	$34,200	$14,100	$48,300	0	7.0	6	$26,600	$11,000	$37,600
REGIONAL PARK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OPEN SPACE	0	8.9	0	$0	$0	$0	0	11.5	0	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0	$0	$0	$0	3,561	0.1	0	$2,200	$900	$3,100
MARINA	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	17.9	8	$34,000	$14,000	$48,000	3,561	18.6	6	$29,000	$12,000	$41,000
TOTAL	1,217,077	111.0	193	$876,000	$361,000	$1,237,000	714,004	52.7	87	$397,000	$164,000	$561,000

Water System Cost Analysis	5. Heavy Industry						6. Farragut Village					
	Total Acreage		135.3				Total Acreage		105.2			
	Developable Acreage		108.2				Developable Acreage		84.2			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	1,170,313	68.9	132	$597,800	$246,400	$844,200	0	0.0	0	$0	$0	$0
LIGHT INDUSTRIAL	225,085	17.2	25	$114,500	$47,200	$161,700	0	0.0	0	$0	$0	$0
WAREHOUSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OFFICE	89,575	8.2	17	$75,500	$31,100	$106,600	0	0.0	0	$0	$0	$0
RETAIL	5,000	0.4	1	$3,300	$1,300	$4,600	0	0.0	0	$0	$0	$0
EDUCATION	0	0.0	0	$0	$0	$0	36,208	2.8	5	$23,500	$9,700	$33,200
SUBTOTAL	1,489,973	94.7	174	$791,000	$326,000	$1,117,000	36,208	2.8	5	$24,000	$10,000	$33,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0	$0	$0	$0	270,792	35.0	42	$190,500	$78,500	$269,000
EXISTING SINGLE FAMILY	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0	$0	$0	$0	313,344	31.6	38	$170,700	$70,400	$241,100
LIVE/WORK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
DORMITORY BEDS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	0.0	0	$0	$0	$0	584,136	66.6	80	$361,000	$149,000	$510,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
DEVELOPED PARK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
REGIONAL PARK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OPEN SPACE	0	40.6	0	$0	$0	$0	0	35.8	0	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0	$0	$0	$0	3,180	0.1	0	$2,000	$800	$2,800
MARINA	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	40.6	0	$0	$0	$0	3,180	35.9	0	$2,000	$1,000	$3,000
TOTAL	1,489,973	135.3	174	$791,000	$326,000	$1,117,000	623,524	105.2	85	$387,000	$160,000	$546,000

Water System Cost Analysis	7. Developed Recreation						8. Coral Sea Village					
	Total Acreage		46.2				Total Acreage		67.1			
	Developable Acreage		37.0				Developable Acreage		53.7			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0	$0	$0	$0	63	0.0	0	$0	$0	$0
WAREHOUSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OFFICE	0	0.0	0	$0	$0	$0	10,792	1.0	2	$9,100	$3,800	$12,900
RETAIL	0	0.0	0	$0	$0	$0	73,150	5.6	10	$47,600	$19,600	$67,200
EDUCATION	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	0.0	0	$0	$0	$0	84,005	6.6	12	$57,000	$23,000	$80,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0	$0	$0	$0	245,753	33.7	40	$183,400	$75,600	$259,000
EXISTING SINGLE FAMILY	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
LIVE/WORK	0	0.0	0	$0	$0	$0	60,000	4.0	6	$28,600	$11,800	$40,400
DORMITORY BEDS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	0.0	0	$0	$0	$0	305,753	37.7	47	$212,000	$87,000	$299,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
DEVELOPED PARK	20,373	46.2	38	$173,400	$71,500	$244,900	0	4.0	3	$15,200	$6,300	$21,500
REGIONAL PARK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OPEN SPACE	0	0.0	0	$0	$0	$0	0	18.8	0	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
MARINA	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	20,373	46.2	38	$173,000	$72,000	$245,000	0	22.8	3	$15,000	$6,000	$22,000
TOTAL	20,373	46.2	38	$173,000	$72,000	$245,000	389,758	67.1	63	$284,000	$116,000	$401,000

Water System Cost Analysis	9. Education/Office						10. Marina/Residential					
	Total Acreage		104.4				Total Acreage		82.6			
	Developable Acreage		83.5				Developable Acreage		66.1			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
LIGHT INDUSTRIAL	106,816	8.2	12	$54,300	$22,400	$76,700	5,249	0.4	1	$3,800	$1,100	$4,900
WAREHOUSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OFFICE	113,548	10.4	19	$85,900	$35,400	$121,300	9,040	0.8	2	$10,900	$3,100	$14,000
RETAIL	54,370	4.2	8	$35,400	$14,600	$50,000	42,663	3.3	6	$39,500	$11,400	$50,900
EDUCATION	388,040	29.7	56	$252,300	$104,000	$356,300	0	0.0	0	$0	$0	$0
SUBTOTAL	662,774	52.5	94	$428,000	$176,000	$604,000	56,952	4.5	8	$54,000	$16,000	$70,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0	$0	$0	$0	2,146,083	66.7	124	$803,300	$232,300	$1,035,600
EXISTING DUPLEXES	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
LIVE/WORK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
DORMITORY BEDS	30,000	5.0	34	$154,600	$63,700	$218,300	0	0.0	0	$0	$0	$0
SUBTOTAL	30,000	5.0	34	$155,000	$64,000	$218,000	2,146,083	66.7	124	$803,000	$232,000	$1,036,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
DEVELOPED PARK	0	8.0	7	$30,400	$12,500	$42,900	0	0.0	0	$0	$0	$0
REGIONAL PARK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OPEN SPACE	0	36.2	0	$0	$0	$0	0	0.1	0	$0	$0	$0
CIVIC/REC SPACE	84,214	2.8	12	$52,900	$21,800	$74,700	0	0.0	0	$0	$0	$0
MARINA	0	0.0	0	$0	$0	$0	1,800	11.3	5	$33,500	$9,700	$43,200
SUBTOTAL	84,214	46.9	18	$83,000	$34,000	$118,000	1,800	11.4	5	$34,000	$10,000	$43,000
TOTAL	776,988	104.4	147	$666,000	$274,000	$940,000	2,204,836	82.6	138	$891,000	$258,000	$1,149,000

Water System Cost Analysis	11. Golf Course						12. Regional Park					
	Total Acreage		170.8				Total Acreage		216.0			
	Developable Acreage		136.6				Developable Acreage		172.8			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND GPM	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
WAREHOUSE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
OFFICE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
RETAIL	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EDUCATION	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
RESIDENTIAL												
NEW CONDOS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
LIVE/WORK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
DORMITORY BEDS	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	27,913	122.3	198	$897,900	$370,000	$1,267,900	0	0.0	0	$0	$0	$0
DEVELOPED PARK	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
REGIONAL PARK	0	0.0	0	$0	$0	$0	0	163.0	0	$1,700	$700	$2,400
OPEN SPACE	0	48.5	0	$0	$0	$0	0	53.0	0	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
MARINA	0	0.0	0	$0	$0	$0	0	0.0	0	$0	$0	$0
SUBTOTAL	27,913	170.8	198	$898,000	$370,000	$1,268,000	0	216.0	0	$2,000	$1,000	$2,000
TOTAL	27,913	170.8	198	$898,000	$370,000	$1,268,000	0	216.0	0	$2,000	$1,000	$2,000

Water System Cost Analysis

13. Open Space/ Recreation

Total Acreage 99.1
Developable Acreage 79.3

	SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*	DEMAND *GPM*	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0	$0	$0	$0
WAREHOUSE	0	0.0	0	$0	$0	$0
OFFICE	0	0.0	0	$0	$0	$0
RETAIL	0	0.0	0	$0	$0	$0
EDUCATION	0	0.0	0	$0	$0	$0
SUBTOTAL	0	0.0	0	$0	$0	$0
RESIDENTIAL						
NEW CONDOS	0	0.0	0	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0	$0	$0	$0
LIVE/WORK	0	0.0	0	$0	$0	$0
DORMITORY BEDS	0	0.0	0	$0	$0	$0
SUBTOTAL	0	0.0	0	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0	$0	$0	$0
DEVELOPED PARK	0	0.0	0	$0	$0	$0
REGIONAL PARK	0	0.0	0	$0	$0	$0
OPEN SPACE	0	99.1	0	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0	$0	$0	$0
MARINA	0	0.0	0	$0	$0	$0
SUBTOTAL	0	99.1	0	$0	$0	$0
TOTAL	0	99.1	0	$0	$0	$0

SUMMARY OF COST ALLOCATIONS FOR WATER SYSTEM

Water System Cost Analysis	REUSE AREA 1 NORTH LIGHT INDUSTRIAL			REUSE AREA 10 MARINA/RESIDENTIAL			REUSE AREAS 2,3,4,5,6,7,8,9,11,12,13 (CENTRAL DEVELOPMENT AREA)			ALL AREAS
	SITE AC	TOTAL COSTS ($S)	COST PER ACRE ($S)	SITE AC	TOTAL COSTS ($S)	COST PER ACRE ($S)	SITE AC	TOTAL COSTS ($S)	COST PER ACRE ($S)	TOTAL COSTS ($S)
NON RESIDENTIAL										
HEAVY INDUSTRIAL	13.3	$134,200	$10,100	0.0	$0		84.3	$989,400	$11,700	$1,123,600
LIGHT INDUSTRIAL	82.1	$863,900	$10,500	0.4	$4,900	$12,200	81.2	$877,700	$10,800	$1,746,500
WAREHOUSE	87.7	$524,200	$6,000	0.0	$0		0.0	$0		$524,200
OFFICE	8.3	$137,200	$16,600	0.8	$14,000	$16,900	119.5	$1,749,700	$14,600	$1,900,900
RETAIL	0.0	$0		3.3	$50,900	$15,600	10.1	$121,800	$12,000	$172,700
EDUCATION	0.0	$0		0.0	$0		33.5	$401,400	$12,000	$401,400
SUBTOTAL	191.4	$1,660,000		4.5	$70,000		328.6	$4,140,000		$5,869,000
RESIDENTIAL										
NEW CONDOS	0.0	$0		66.7	$1,035,600	$15,500	0.0	$0		$1,035,600
EXISTING DUPLEXES	0.0	$0		0.0	$0		68.7	$528,000	$7,700	$528,000
EXISTING SINGLE FAMILY	0.0	$0		0.0	$0		6.0	$27,000	$4,500	$27,000
MULTI-FAMILY - REHAB	0.0	$0		0.0	$0		31.6	$241,100	$7,600	$241,100
LIVE/WORK	0.0	$0		0.0	$0		5.9	$59,800	$10,100	$59,800
DORMITORY BEDS	0.0	$0		0.0	$0		5.0	$218,300	NA	$218,300
SUBTOTAL	0.0	$0		66.7	$1,036,000		117.1	$1,074,000		$2,110,000
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE	0.0	$0		0.0	$0		122.3	$1,267,900	$10,400	$1,267,900
DEVELOPED PARK	0.0	$0		0.0	$0		99.2	$529,200	$5,300	$529,200
REGIONAL PARK	0.0	$0		0.0	$0		163.0	$2,400	$10	$2,400
OPEN SPACE	7.5	$0	$0	0.1	$0	$0	359.2	$0	$0	$0
CIVIC/REC SPACE	0.0	$0		0.0	$0		7.7	$208,700	$27,100	$208,700
MARINA	0.0	$0		11.3	$43,200	$3,800	0.0	$0		$43,200
SUBTOTAL	7.5	$0		11.4	$43,000		751.4	$2,008,000		$2,051,000
TOTAL	198.9	$1,660,000		82.6	$1,149,000		1197.2	$7,222,000		$10,030,000

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PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST		UNITS	TOTAL COST
	ON-SITE SYSTEM UPGRADES (TO MEET CURRENT OPERATING STANDARDS)							
1998	DOM 1 - DOMESTIC SEWAGE PUMP STATION	WW- 1	- ISOLATION & REMOVAL OF DOM 1	AREA 1	$5,000	LS		$5,000
1997	DOM 2 - DOMESTIC SEWAGE PUMP STATION	WW- 2	- REPLACE SUMP PUMP	AREA 1	$2,500	LS		$2,500
2001	SPS-1, SPS-2, SPS-3	WW- 3	- SPS3: REPAIR ELECTRICAL DISTRIBUTION SYS	AREA 1	$1,500	LS		$1,500
2001	SHIP TO SHORE	WW- 4	- SPS3: REPLACE CONTROLERS	AREA 1	$2,500	LS		$2,500
1998	SEWAGE PUMP STATION	WW- 5	- ISOLATION & REMOVAL OF SPS1 AND SPS2	AREA 1	$10,000	LS		$10,000
2000	SPS-4	WW- 6	- INSTALL TRANFORMER ON PAD & SAFETY IMPS.	AREA 1	$3,200	LS		$3,200
2000	SEWAGE PUMP STATION	WW- 7	- RAISE EQUIPMENT TO AVOID FLOODING	AREA 1	$2,960	LS		$3,000
1997	NEW SEWER MAIN	WW- 8	- NEW 12" MAIN & MANHOLES	AREA 1	$55	LF	900	$49,500
1998	SEWER MAIN	WW- 9	- REPLACE 21" MAIN & MANHOLES	AREA 1	$100	LF	1,200	$120,000
1999	REPLACEMENT	WW- 10	- REPLACE 12" MAIN & MANHOLES	AREA 1	$55	LF	1,000	$55,000
2000	*(NOTE #1)*	WW- 11	- REPLACE 12" MAIN & MANHOLES	AREA 1	$55	LF	700	$38,500
2000		WW- 12	- REPLACE 10" MAIN & MANHOLES	AREA 1	$50	LF	1,000	$50,000
2001		WW- 13	- REPLACE 21" MAIN & MANHOLES	AREA 1	$100	LF	1,000	$100,000
2001		WW- 14	- REPLACE 18" MAIN & MANHOLES	AREA 1	$85	LF	900	$76,500
2007		WW- 15	- REPLACE 15" MAIN & MANHOLES	AREA 1	$70	LF	400	$28,000
	SUBTOTAL ON-SITE UPGRADES							$545,200
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 10% OF PIPELINES)							$15,500
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)							$774,000
	ON-SITE SYSTEM EXPANSION (TO MEET PROJECTED FUTURE DEVELOPMENT)							
2008	DOM2	WW- 16	- NEW 500 HP PUMP & ELECTRICAL COMPONENTS	AREA 1	$700,000	EA	1	$700,000
2008		WW- 17	- NEW PUMP HOUSE	AREA 1	$150,000	EA	1	$150,000
2004	SEWER MAINS	WW- 18	- NEW 21" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$100	LF	790	$79,000
2004		WW- 19	- NEW 10" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$50	LF	300	$15,000
			- NEW 8" MAIN & MANHOLES		$45	LF	620	$27,900
2006		WW- 20	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#2*	AREA 2,3,4,5,6,7,8,9,11	$150	LF	620	$93,000
2004		WW- 21	- NEW 24" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$115	LF	880	$101,200
			- NEW 10" MAIN & MANHOLES		$50	LF	820	$41,000
2007		WW- 22	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#2*	AREA 2,3,4,5,6,7,8,9,11	$150	LF	240	$36,000
			- NEW 10" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$50	LF	750	$37,500
2010		WW- 23	- REINFORCED CONCRETE EXC[illegible]ION CST - *NOTE#2*	AREA 2,3,4,5,6,7,8,9,11	$150	LF	400	$60,000

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PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST		UNITS	TOTAL COST
	ON-SITE SYSTEM EXPANSION cont'd							
	SEWER MAINS		- NEW 10" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$50	LF	1,270	$63,500
2002		WW- 24	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#2*	AREA 2,3,4,5,6,7,8,9,11	$150	LF	800	$120,000
2004		WW- 26	- NEW 27" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$135	LF	1,100	$148,500
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	1,440	$79,200
2000		WW- 27	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#2*	AREA 2,3,4,5,6,7,8,9,11	$150	LF	1,440	$216,000
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	1,110	$61,050
2011		WW- 28	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#2*	AREA 2,3,4,5,6,7,8,9,11	$150	LF	550	$82,500
2009		WW- 29	- NEW 15" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$70	LF	450	$31,500
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	1,040	$57,200
2009		WW- 30	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#2*	AREA 2,3,4,5,6,7,8,9,11	$150	LF	550	$82,500
2003		WW- 31	- NEW 27" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$135	LF	710	$95,850
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	1,820	$100,100
2001		WW- 32	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#2*	AREA 2,3,4,5,6,7,8,9,11	$150	LF	150	$22,500
2003		WW- 33	- NEW 21" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$100	LF	1,640	$164,000
			- NEW 12" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$55	LF	2,220	$122,100
2008		WW- 34	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#2*	AREA 2,3,4,5,6,7,8,9,11	$150	LF	700	$105,000
2012		WW- 35	- NEW 15" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$70	LF	580	$40,600
2010		WW- 36	- NEW 18" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$85	LF	1,440	$122,400
2016		WW- 37	- NEW 15" MAIN & MANHOLES	AREA 2,3,4,5,6,7,8,9,11	$70	LF	1,620	$113,400
2017		WW- 39	- NEW 15" MAIN & MANHOLES	AREA 10	$70	LF	1,480	$103,600
20XX		WW- 40	- NEW 12" MAIN & MANHOLES	AREA 10	$55	LF	1,240	$68,200
20XX		WW- 41	- NEW 8" MAIN & MANHOLES	AREA 10	$45	LF	950	$42,750
2017	DOM9	WW- 38	- UPGRADE TO PUMP STATION	AREA 10	$130,000	EA	1	$130,000
	SUBTOTAL ON-SITE EXPANSION							$3,513,100
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 10% OF PIPELINES)							$76,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)							$4,953,000

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PROJECT PHASING	FACILITY	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COST	UNITS	TOTAL COST
	LIFE CYCLE REPLACEMENT COSTS (UNTIL YEAR 2017)						
2008	DOM4		- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$320,000 EA	1	$320,000
		WW- 25	- NEW 21" MAIN & MANHOLES	ALL AREAS	$100 LF	190	$19,000
2009	DOM3	WW- 42	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$160,000 EA	1	$160,000
2008	DOM5	WW- 43	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$115,000 EA	1	$115,000
2006	DOM6	WW- 44	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$130,000 EA	1	$130,000
2005	DOM7	WW- 45	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$130,000 EA	1	$130,000
2007	DOM8	WW- 46	- NEW PUMP & ELECTRICAL COMPONENTS	ALL AREAS	$130,000 EA	1	$130,000
	SEWER MAINS	WW- 47	- REPLACE 10" VCP LINE	ALL AREAS	$40 LF	1,000	$40,000
		WW- 48	- REPLACE 10" TC LINE	ALL AREAS	$40 LF	130	$5,200
		WW- 49	- REPLACE 8" STL LINE	ALL AREAS	$35 LF	400	$14,000
		WW- 50	- REPLACE 21" RCP LINE	ALL AREAS	$90 LF	900	$81,000
		WW- 51	- REPLACE 12" PVC LINE	ALL AREAS	$45 LF	600	$27,000
		WW- 52	- REPLACE 12" CMP LINE	ALL AREAS	$45 LF	4,000	$180,000
		WW- 53	- REPLACE 10" CIP LINE	ALL AREAS	$40 LF	130	$5,200
	SPS-3	WW- 54	- REPLACE ALL EQUIPMENT	ALL AREAS	$44,800 LS		$44,800
	SPS-4	WW- 55	- REPLACE ALL EQUIPMENT	ALL AREAS	$78,500 LS		$78,500
	SUBTOTAL LIFE CYCLE COSTS						$1,479,700
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 10% OF PIPELINES)						$11,100
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$2,057,000

TOTAL SANITARY SEWER SYSTEM ESTIMATED COSTS (INC. ENG & CONT.)	**$7,784,000**

NOTE #1: Phasing for sewer trunk line replacement along Railroad Avenue should be adjusted to watch future road construction.
NOTE #2: Cost for underground construction; Above ground construction would preclude these costs.
GENERAL A: These estimated costs do not include environmental related work - analysis, restoration or remediation.
B: Costs based on Reimer Associates experience and cross referenced with J.M. Montgomery 1987 Report with allowance for inflation.
C: All cost estimates are in 1997 dollars and no inflation has been added to improvement costs proposed in future years.

Sanitary Sewer System Analysis	1. North Light Industrial						2. Neighborhood Center					
	Total Acreage		198.9				Total Acreage		89.4			
	Developable Acreage		159.1				Developable Acreage		71.5			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	173,282	13.3	0.0416	$125,600	$36,300	$161,900	0	0.0	0.0000	$0	$0	$0
LIGHT INDUSTRIAL	1,122,200	82.1	0.3332	$1,007,000	$291,000	$1,298,000	118,147	9.0	0.0360	$78,700	$31,400	$110,100
WAREHOUSE	1,199,810	87.7	0.2464	$744,700	$215,200	$959,900	0	0.0	0.0000	$0	$0	$0
OFFICE	108,250	8.3	0.0313	$94,700	$27,400	$122,100	445,386	40.9	0.1350	$295,300	$117,900	$413,200
RETAIL	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
EDUCATION	0	0.0	0.0000	$0	$0	$0	11,261	0.9	0.0022	$4,800	$1,900	$6,700
SUBTOTAL	2,603,542	191.4	0.6525	$1,972,000	$570,000	$2,542,000	574,794	50.8	0.1732	$379,000	$151,000	$530,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
LIVE/WORK	0	0.0	0.0000	$0	$0	$0	28,800	1.9	0.0043	$9,400	$3,800	$13,200
DORMITORY BEDS	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0	28,800	1.9	0.0043	$9,000	$4,000	$13,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0000	$0	$0	$0	0	25.0	0.0041	$8,900	$3,500	$12,400
REGIONAL PARK	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
OPEN SPACE	0	7.5	0.0000	$0	$0	$0	0	7.0	0.0000	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0.0000	$0	$0	$0	143,857	4.7	0.0267	$58,300	$23,300	$81,600
MARINA	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	7.5	0.0000	$0	$0	$0	143,857	36.7	0.0307	$67,000	$27,000	$94,000
TOTAL	2,603,542	198.9	0.6525	$1,972,000	$570,000	$2,542,000	747,451	89.4	0.2082	$455,000	$182,000	$637,000

Sanitary Sewer System Analysis	3. Mixed Use						4. Historic District					
	Total Acreage		111.0				Total Acreage		52.7			
	Developable Acreage		88.8				Developable Acreage		42.2			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	95,023	7.3	0.0228	$49,900	$19,900	$69,800	106,406	8.1	0.0255	$55,800	$22,300	$78,100
LIGHT INDUSTRIAL	440,734	33.7	0.1342	$293,500	$117,200	$410,700	339,871	13.0	0.0745	$163,000	$65,100	$228,100
WAREHOUSE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
OFFICE	679,640	52.0	0.1967	$430,300	$171,800	$602,100	151,728	7.0	0.0398	$87,000	$34,700	$121,700
RETAIL	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
EDUCATION	1,680	0.1	0.0003	$700	$300	$1,000	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	1,217,077	93.1	0.3540	$774,000	$309,000	$1,084,000	598,005	28.1	0.1399	$306,000	$122,000	$428,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0000	$0	$0	$0	112,438	6.0	0.0044	$9,700	$3,900	$13,600
MULTI-FAMILY - REHAB	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
LIVE/WORK	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0	112,438	6.0	0.0044	$10,000	$4,000	$14,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
DEVELOPED PARK	0	9.0	0.0015	$3,200	$1,300	$4,500	0	7.0	0.0011	$2,500	$1,000	$3,500
REGIONAL PARK	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
OPEN SPACE	0	8.9	0.0000	$0	$0	$0	0	11.5	0.0000	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0.0000	$0	$0	$0	3,561	0.1	0.0007	$1,400	$600	$2,000
MARINA	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	17.9	0.0015	$3,000	$1,000	$5,000	3,561	18.6	0.0018	$4,000	$2,000	$6,000
TOTAL	1,217,077	111.0	0.3555	$777,000	$310,000	$1,089,000	714,004	52.7	0.1461	$320,000	$128,000	$448,000

Sanitary Sewer System Analysis

Sanitary Sewer System Analysis	5. Heavy Industry						6. Farragut Village					
	Total Acreage		135.3				Total Acreage		105.2			
	Developable Acreage		108.2				Developable Acreage		84.2			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	1,170,313	68.9	0.2531	$553,700	$221,100	$774,800	0	0.0	0.0000	$0	$0	$0
LIGHT INDUSTRIAL	225,085	17.2	0.0685	$149,900	$59,800	$209,700	0	0.0	0.0000	$0	$0	$0
WAREHOUSE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
OFFICE	89,575	8.2	0.0272	$59,400	$23,700	$83,100	0	0.0	0.0000	$0	$0	$0
RETAIL	5,000	0.4	0.0010	$2,200	$900	$3,100	0	0.0	0.0000	$0	$0	$0
EDUCATION	0	0.0	0.0000	$0	$0	$0	36,208	2.8	0.0065	$14,200	$5,700	$19,900
SUBTOTAL	1,489,973	94.7	0.3498	$765,000	$306,000	$1,071,000	36,208	2.8	0.0065	$14,000	$6,000	$20,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0000	$0	$0	$0	270,792	35.0	0.0485	$106,000	$42,300	$148,300
EXISTING SINGLE FAMILY	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0000	$0	$0	$0	313,344	31.6	0.0437	$95,600	$38,200	$133,800
LIVE/WORK	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0	584,136	66.6	0.0922	$202,000	$81,000	$282,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
REGIONAL PARK	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
OPEN SPACE	0	40.6	0.0000	$0	$0	$0	0	35.8	0.0000	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0.0000	$0	$0	$0	3,180	0.1	0.0006	$1,300	$500	$1,800
MARINA	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	40.6	0.0000	$0	$0	$0	3,180	35.9	0.0006	$1,000	$1,000	$2,000
TOTAL	1,489,973	135.3	0.3498	$765,000	$306,000	$1,071,000	623,524	105.2	0.0993	$217,000	$88,000	$304,000

Sanitary Sewer System Analysis	7. Developed Recreation						8. Coral Sea Village					
	Total Acreage		46.2				Total Acreage		67.1			
	Developable Acreage		37.0				Developable Acreage		53.7			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0.0000	$0	$0	$0	63	0.0	0.0000	$0	$0	$0
WAREHOUSE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
OFFICE	0	0.0	0.0000	$0	$0	$0	10,792	1.0	0.0033	$7,200	$2,900	$10,100
RETAIL	0	0.0	0.0000	$0	$0	$0	73,150	5.6	0.0149	$32,600	$13,000	$45,600
EDUCATION	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0	84,005	6.6	0.0182	$40,000	$16,000	$56,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0000	$0	$0	$0	245,753	33.7	0.0466	$102,000	$40,700	$142,700
EXISTING SINGLE FAMILY	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
LIVE/WORK	0	0.0	0.0000	$0	$0	$0	60,000	4.0	0.0090	$19,700	$7,900	$27,600
DORMITORY BEDS	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0	305,753	37.7	0.0556	$122,000	$49,000	$170,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
DEVELOPED PARK	20,373	46.2	0.0074	$16,200	$6,500	$22,700	0	4.0	0.0006	$1,400	$600	$2,000
REGIONAL PARK	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
OPEN SPACE	0	0.0	0.0000	$0	$0	$0	0	18.8	0.0000	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
MARINA	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	20,373	46.2	0.0074	$16,000	$7,000	$23,000	0	22.8	0.0006	$1,000	$1,000	$2,000
TOTAL	20,373	46.2	0.0074	$16,000	$7,000	$23,000	389,758	67.1	0.0745	$163,000	$66,000	$228,000

Sanitary Sewer System Analysis	9. Education/Office						10. Marina/Residential					
	Total Acreage		104.4				Total Acreage		82.6			
	Developable Acreage		83.5				Developable Acreage		66.1			
	SITE RELATED		AVG	ALLOCATED COSTS IN $S			SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS	FACILITY SF	SITE AC	DEMAND MGD	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL												
HEAVY INDUSTRIAL	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
LIGHT INDUSTRIAL	106,816	8.2	0.0325	$71,100	$28,400	$99,500	5,249	0.4	0.0016	$3,700	$1,400	$5,100
WAREHOUSE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
OFFICE	113,548	10.4	0.0318	$69,500	$27,700	$97,200	9,040	0.8	0.0027	$6,400	$2,400	$8,800
RETAIL	54,370	4.2	0.0111	$24,200	$9,700	$33,900	42,663	3.3	0.0087	$20,300	$7,600	$27,900
EDUCATION	388,040	29.7	0.0696	$152,300	$60,800	$213,100	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	662,774	52.5	0.1450	$317,000	$127,000	$444,000	56,952	4.5	0.0130	$30,000	$11,000	$42,000
RESIDENTIAL												
NEW CONDOS	0	0.0	0.0000	$0	$0	$0	2,146,083	66.7	0.1787	$417,000	$156,100	$573,100
EXISTING DUPLEXES	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
LIVE/WORK	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
DORMITORY BEDS	30,000	5.0	0.0879	$192,400	$76,800	$269,200	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	30,000	5.0	0.0879	$192,000	$77,000	$269,000	2,146,083	66.7	0.1787	$417,000	$156,000	$573,000
CIVIC/RECREATION/OPEN SPACE												
GOLF COURSE	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
DEVELOPED PARK	0	8.0	0.0013	$2,800	$1,100	$3,900	0	0.0	0.0000	$0	$0	$0
REGIONAL PARK	0	0.0	0.0000	$0	$0	$0	0	0.0	0.0000	$0	$0	$0
OPEN SPACE	0	36.2	0.0000	$0	$0	$0	0	0.1	0.0000	$0	$0	$0
CIVIC/REC SPACE	84,214	2.8	0.0156	$34,100	$13,600	$47,700	0	0.0	0.0000	$0	$0	$0
MARINA	0	0.0	0.0000	$0	$0	$0	1,800	11.3	0.0165	$38,600	$14,400	$53,000
SUBTOTAL	84,214	46.9	0.0169	$37,000	$15,000	$52,000	1,800	11.4	0.0165	$39,000	$14,000	$53,000
TOTAL	776,988	104.4	0.2498	$546,000	$219,000	$765,000	2,204,836	82.6	0.2083	$486,000	$181,000	$668,000

Sanitary Sewer System Analysis

11. Golf Course

Total Acreage 170.8
Developable Acreage 136.6

	SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*	DEMAND *MGD*	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0000	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0.0000	$0	$0	$0
WAREHOUSE	0	0.0	0.0000	$0	$0	$0
OFFICE	0	0.0	0.0000	$0	$0	$0
RETAIL	0	0.0	0.0000	$0	$0	$0
EDUCATION	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0000	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0000	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0000	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0000	$0	$0	$0
LIVE/WORK	0	0.0	0.0000	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	27,913	122.3	0.0036	$7,800	$3,100	$10,900
DEVELOPED PARK	0	0.0	0.0000	$0	$0	$0
REGIONAL PARK	0	0.0	0.0000	$0	$0	$0
OPEN SPACE	0	48.5	0.0000	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0.0000	$0	$0	$0
MARINA	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	27,913	170.8	0.0036	$8,000	$3,000	$11,000
TOTAL	27,913	170.8	0.0036	$8,000	$3,000	$11,000

12. Regional Park

Total Acreage 216.0
Developable Acreage 172.8

	SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*	DEMAND *MGD*	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0000	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0.0000	$0	$0	$0
WAREHOUSE	0	0.0	0.0000	$0	$0	$0
OFFICE	0	0.0	0.0000	$0	$0	$0
RETAIL	0	0.0	0.0000	$0	$0	$0
EDUCATION	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0000	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0000	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0000	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0000	$0	$0	$0
LIVE/WORK	0	0.0	0.0000	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0000	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0000	$0	$0	$0
REGIONAL PARK	0	163.0	0.0004	$1,000	$400	$1,400
OPEN SPACE	0	53.0	0.0000	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0.0000	$0	$0	$0
MARINA	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	216.0	0.0004	$1,000	$400	$1,000
TOTAL	0	216.0	0.0004	$1,000	$400	$1,000

13. Open Space/ Recreation

Sanitary Sewer System Analysis

Total Acreage 99.1
Developable Acreage 79.3

	SITE RELATED		AVG	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*	DEMAND *MGD*	UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0000	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0.0000	$0	$0	$0
WAREHOUSE	0	0.0	0.0000	$0	$0	$0
OFFICE	0	0.0	0.0000	$0	$0	$0
RETAIL	0	0.0	0.0000	$0	$0	$0
EDUCATION	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0000	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0000	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0000	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0000	$0	$0	$0
LIVE/WORK	0	0.0	0.0000	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	0.0	0.0000	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0000	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0000	$0	$0	$0
REGIONAL PARK	0	0.0	0.0000	$0	$0	$0
OPEN SPACE	0	99.1	0.0000	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0.0000	$0	$0	$0
MARINA	0	0.0	0.0000	$0	$0	$0
SUBTOTAL	0	99.1	0.0000	$0	$0	$0
TOTAL	0	99.1	0.0000	$0	$0	$0

SUMMARY OF COST ALLOCATIONS FOR SANITARY SEWER SYSTEM

Sanitary Sewer System Analysis	REUSE AREA 1 NORTH LIGHT INDUSTRIAL			REUSE AREA 10 MARINA/RESIDENTIAL			REUSE AREAS 2,3,4,5,6,7,8,9,11,12,13 (CENTRAL DEVELOPMENT AREA)			ALL AREAS
	SITE AC	TOTAL COSTS ($S)	COST PER ACRE ($S)	TOTAL COSTS	TOTAL COSTS ($S)	COST PER ACRE ($S)	PER ACRE ($S)	TOTAL COSTS ($S)	COST PER ACRE ($S)	TOTAL COSTS ($S)
NON RESIDENTIAL										
HEAVY INDUSTRIAL	13.3	$161,900	$12,200	0.0	$0		84.3	$922,700	$10,900	$1,084,600
LIGHT INDUSTRIAL	82.1	$1,298,000	$15,800	0.4	$5,100	$12,700	81.2	$1,058,100	$13,000	$2,361,200
WAREHOUSE	87.7	$959,900	$10,900	0.0	$0		0.0	$0		$959,900
OFFICE	8.3	$122,100	$14,700	0.8	$8,800	$10,600	119.5	$1,327,400	$11,100	$1,458,300
RETAIL	0.0	$0		3.3	$27,900	$8,500	10.1	$82,600	$8,100	$110,500
EDUCATION	0.0	$0		0.0	$0		33.5	$240,700	$7,200	$240,700
SUBTOTAL	191.4	$2,542,000		4.5	$42,000		328.6			$6,215,000
RESIDENTIAL										
NEW CONDOS	0.0	$0		66.7	$573,100	$8,600	0.0	$0		$573,100
EXISTING DUPLEXES	0.0	$0		0.0	$0		68.7	$291,000	$4,200	$291,000
EXISTING SINGLE FAMILY	0.0	$0		0.0	$0		6.0	$13,600	$2,300	$13,600
MULTI-FAMILY - REHAB	0.0	$0		0.0	$0		31.6	$133,800	$4,200	$133,800
LIVE/WORK	0.0	$0		0.0	$0		5.9	$40,800	$6,900	$40,800
DORMITORY BEDS	0.0	$0		0.0	$0		5.0	$269,200	NA	$269,200
SUBTOTAL	0.0	$0		66.7	$573,000		117.1	$748,000		$1,322,000
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE	0.0	$0		0.0	$0		122.3	$10,900	$100	$10,900
DEVELOPED PARK	0.0	$0		0.0	$0		99.2	$49,000	$500	$49,000
REGIONAL PARK	0.0	$0		0.0	$0		163.0	$1,400	$10	$1,400
OPEN SPACE	7.5	$0	$0	0.1	$0	$0	359.2	$0	$0	$0
CIVIC/REC SPACE	0.0	$0		0.0	$0		7.7	$133,100	$17,300	$133,100
MARINA	0.0	$0		11.3	$53,000	$4,700	0.0	$0		$53,000
SUBTOTAL	7.5	$0		11.4	$53,000		751.4	$194,000		$247,000
TOTAL	198.9	$2,542,000		82.6	$668,000		1197.2	$942,000		$7,784,000

PROJECT PHASING	BASIN	PRJ ID	IMPROVEMENT DESCRIPTION	UNIT COST		UNITS	TOTAL COST
	SYSTEM UPGRADES (TO MEET CURRENT STANDARDS)						
1997	A (SDPS15)	SD - 1	- REPAIR PUMP 1 VALUES & PIPES	$5,800	LS		$5,800
1997		SD - 2	- REFURBISH PUMP 2	$12,700	LS		$12,700
1998	B (SDPS14)	SD - 3	- REPAIR PUMP 1 SEALS, VALUES & PIPES	$5,600	LS		$5,600
1998		SD - 4	- REFURBISH PUMP 2	$12,700	LS		$12,700
	SUBTOTAL EXISTING SYSTEM MODIFICATIONS COSTS						$36,800
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 5% OF PIPELINES)						$0
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$51,000
	SYSTEM EXPANSION (TO MEET PROJECTED FUTURE DEVELOPMENT)						
2003	A-C	SD - 7	- CONSTRUCT 4'x2' CHANNEL *(NOTE #2)*	$200	LF	800	$160,000
2000	*(NOTE #1)*	SD - 8	- CONSTRUCT 6'x5' CHANNEL	$500	LF	1,000	$500,000
2003	MAIN CHANNEL	SD - 9	- CONSTRUCT 4'x2' CHANNEL *(NOTE #2)*	$200	LF	1,400	$280,000
2005		SD - 10	- 18" COLLECTOR TO MAIN CHANNEL & MANHOLES	$85	LF	300	$25,500
2006		SD - 11	- 18" COLLECTOR TO MAIN CHANNEL & MANHOLES	$85	LF	200	$17,000
2007		SD - 12	- 18" COLLECTOR TO MAIN CHANNEL & MANHOLES	$85	LF	200	$17,000
2004		SD - 13	- 24" COLLECTOR TO MAIN CHANNEL & MANHOLES	$115	LF	500	$57,500
2003		SD - 14	- 24" COLLECTOR TO MAIN CHANNEL & MANHOLES	$115	LF	500	$57,500
2003		SD - 15	- 24" COLLECTOR TO MAIN CHANNEL & MANHOLES	$115	LF	500	$57,500
2000	A-C FORCE MAIN	SD - 16	- 36" HDPE FORCE MAIN	$110	LF	1,850	$203,500
2000	A-C	SD - 17	- NEW PUMP AND EQUIPMENT	$700,000	EA	2	$1,400,000
2000	PUMP STATION	SD - 18	- NEW PUMP HOUSE	$150,000	LS		$150,000
1999		SD - 19	- DREDGE DETENTION BASIN - 400'X500'X5'	$2.36	CY	111,000	$262,200
1999	A-C	SD - 20	- 3'x5' CHANNEL	$400	LF	2,400	$960,000
2000	GRAVITY LINE	SD - 21	- 36" TRUNK LINE & MANHOLES - RCP	$185	LF	600	$111,000
2001		SD - 22	- 24" TRUNK LINE & MANHOLES - RCP	$115	LF	600	$69,000
2001		SD - 23	- 30" TRUNK LINE & MANHOLES - RCP	$150	LF	1,500	$225,000
2001		SD - 24	- 24" TRUNK LINE & MANHOLES - RCP	$115	LF	500	$57,500
2003		SD - 25	- 3'X2' CHANNEL	$200	LF	1,200	$240,000
2002		SD - 26	- 24" COLLECTOR & MANHOLES - RCP	$115	LF	1,000	$115,000
2001		SD - 27	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2000		SD - 28	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000

PROJECT PHASING	BASIN	PRJ ID	IMPROVEMENT DESCRIPTION	UNIT COST		UNITS	TOTAL COST
SYSTEM EXPANSION (CONT'D)							
1999	D CHANNEL	SD - 29	- CONSTRUCT 4'x3' CHANNEL	$300	LF	300	$90,000
1998	D GRAVITY LINE	SD - 30	- 15" COLLECTOR & MANHOLES - RCP	$70	LF	100	$7,000
1999		SD - 31	- 24" COLLECTOR & MANHOLES - RCP	$115	LF	550	$63,000
20XX		SD - 32	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	150	$13,000
20XX		SD - 33	- 21" COLLECTOR & MANHOLES - RCP	$100	LF	150	$15,000
2004		SD - 34	- 30" TRUNK LINE & MANHOLES - RCP	$150	LF	1,350	$203,000
2005		SD - 35	- 27" COLLECTOR & MANHOLES - RCP	$135	LF	350	$47,000
2005		SD - 36	- 24" COLLECTOR & MANHOLES - RCP	$115	LF	750	$86,000
2005		SD - 37	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	600	$51,000
2006	E GRAVITY LINE	SD - 38	- 15" COLLECTOR & MANHOLES - RCP	$70	LF	1,100	$77,000
2005		SD - 39	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	600	$51,000
			- REINFORCED CONCRETE EXCAVATION CST - *NOTE#3*	$150	LF	500	$75,000
2006		SD - 40	- 12" COLLECTOR & MANHOLES - RCP	$55	LF	700	$39,000
2006		SD - 41	- 12" COLLECTOR & MANHOLES - RCP	$55	LF	700	$39,000
2009	F GRAVITY LINE	SD - 42	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	1,650	$140,000
			- REINFORCED CONCRETE EXCAVATION CST - *NOTE#3*	$150	LF	500	$75,000
20XX	G GRAVITY LINE	SD - 43	- 10" COLLECTOR & MANHOLES - RCP	$50	LF	50	$3,000
2007	H GRAVITY LINE	SD - 44	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2007		SD - 45	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2001		SD - 46	- 36" COLLECTOR & MANHOLES - RCP	$185	LF	600	$111,000
2002		SD - 47	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	600	$51,000
2007	I GRAVITY LINE	SD - 48	- 21" COLLECTOR & MANHOLES - RCP	$100	LF	1,000	$100,000
2006		SD - 49	- 33" COLLECTOR & MANHOLES - RCP	$170	LF	1,550	$264,000
2006		SD - 50	- 42" TRUNK LINE & MANHOLES - RCP	$205	LF	1,000	$205,000
2006		SD - 51	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	800	$68,000
2006		SD - 52	- 48" TRUNK LINE & MANHOLES - RCP	$225	LF	650	$146,000
			- REINFORCED CONCRETE EXCAVATION CST - *NOTE#3*	$150	LF	650	$97,500
2004		SD - 53	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	500	$43,000
2002		SD - 54	- 60" TRUNK LINE & MANHOLES - RCP	$275	LF	300	$83,000
			- REINFORCED CONCRETE EXCAVATION CST - *NOTE#3*	$150	LF	300	$45,000

PROJECT PHASING	BASIN	PRJ ID	IMPROVEMENT DESCRIPTION	UNIT COST		UNITS	TOTAL COST
	SYSTEM EXPANSION (CONT'D)						
	J		- 36" TRUNK LINE & MANHOLES - RCP	$185	LF	1,600	$296,000
2003	GRAVITY LINE	SD- 55	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#3*	$150	LF	500	$75,000
2007	K	SD- 56	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2007	GRAVITY LINE	SD- 57	- 15" COLLECTOR & MANHOLES - RCP	$70	LF	300	$21,000
2007		SD- 58	- 21" COLLECTOR & MANHOLES - RCP	$100	LF	1,200	$120,000
2006		SD- 59	- 30" TRUNK LINE & MANHOLES - RCP	$150	LF	750	$113,000
2006		SD- 60	- 42" TRUNK LINE & MANHOLES - RCP	$205	LF	350	$72,000
2012	L	SD- 61	- 36" TRUNK LINE & MANHOLES - RCP	$185	LF	200	$37,000
2012	GRAVITY LINE	SD- 62	- 18" COLLECTOR & MANHOLES - RCP	$85	LF	400	$34,000
2014	M	SD- 63	- 27" COLLECTOR & MANHOLES - RCP	$135	LF	400	$54,000
2014	GRAVITY LINE	SD- 64	- 33" COLLECTOR & MANHOLES - RCP	$170	LF	300	$51,000
2014		SD- 65	- 33" COLLECTOR & MANHOLES - RCP	$170	LF	300	$51,000
20XX	N,O,P	SD- 66	- CONSTRUCT 3'x4' CHANNEL	$350	LF	1,500	$525,000
20XX	CHANNEL	SD- 67	- CONSTRUCT 3'X2' CHANNEL	$200	LF	1,300	$260,000
20XX		SD- 68	- CONSTRUCT 5'x4' CHANNEL	$450	LF	400	$180,000
20XX		SD- 69	- CONSTRUCT 3'x4' CHANNEL	$350	LF	1,500	$525,000
	SUBTOTAL SYSTEM EXPANSION COSTS						$9,836,700
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 5% OF PIPELINES)						$120,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$13,740,000
	OUTFALL CONSOLIDATION PROJECTS						
2003	A (SDPS15)	SD- 5	- REMOVAL OF PUMP STATION	$10,000	LS		$10,000
2003	B (SDPS14)	SD- 6	- REMOVAL OF PUMP STATION	$8,000	LS		$8,000
2000	E	SD- 70	- PLUG MANHOLE OUTFALLS @ GL002,3,4,11,12,13,15,17,18	$150	MH	8	$1,200
			- 18" INTERCEPTOR - RCP	$85	LF	500	$43,000
20XX		SD- 71	- REINFORCED CONCRETE EXCAVATION CST - *NOTE#3*	$150	LF	500	$75,000
20XX		SD- 72	- PLUG MANHOLE OUTFALLS @GL010,16	$150	MH	2	$300
20XX	J,K,L	SD- 73	- 36" INTERCEPTOR - HDPE	$85	LF	1,100	$94,000
20XX		SD- 74	- MONITORING STATION	$6,500	EA	1	$7,000
	SUBTOTAL OUTFALL CONSOLIDATION COSTS						$239,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 5% OF PIPELINES)						$3,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$334,000

PROJECT PHASING	BASIN	PRJ ID	IMPROVEMENT DESCRIPTION	UNIT COST		UNITS	TOTAL COST
	LIFE CYCLE REPLACEMENT COSTS (UNTIL YEAR 2011)						
	GRAVITY LINES	SD- 75	- REPLACE 18" ACP LINE	$85	LF	100	$9,000
		SD- 76	- REPLACE 18" BOX LINE	$85	LF	400	$34,000
		SD- 77	- REPLACE 18" BRICK LINE	$85	LF	500	$43,000
		SD- 78	- REPLACE 18" CIP LINE	$85	LF	100	$9,000
		SD- 79	- REPLACE 18" CMP LINE	$85	LF	7,000	$595,000
		SD- 80	- REPLACE 18" RCP LINE	$85	LF	800	$68,000
		SD- 81	- REPLACE 18" TC LINE	$85	LF	300	$26,000
		SD- 82	- REPLACE 18" VCP LINE	$85	LF	700	$60,000
	PUMPS	SD- 83	- REPLACE 2 EX. PUMPS W/ HIGHER CAPACITY	$53,000	EA	2	$106,000
	SUBTOTAL LIFE CYCLE COSTS						$950,000
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 5% OF PIPELINES)						$13,000
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						$1,329,000

	TOTAL STORM DRAINAGE SYSTEM UPGRADES	$15,454,000

NOTE #1: *Consolidation of basins A, B, & C into new drainage basin A-C.*
NOTE #2: *Cross section of channel increases approaching SD-8.*
NOTE #3: *Cost for underground construction; Above ground construction would preclude these costs.*
GENERAL A: *All line improvements include costs for manholes*
B: *Improvement construction assumes stable construction conditions due to concurrent roadway improvements.*
C: *Costs based on Reimer Associates experience and cross referenced with J.M. Montgomerey 1987 Report with allowance for inflation.*
D: *All cost estimates are in 1997 dollars and no inflation has been added to improvement costs proposed in future years.*

Storm Drainage System Analysis

1. North Light Industrial

Total Acreage 198.9
Developable Acreage 159.1

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	173,282	13.3	10.8%	$774,800	$0	$774,800
LIGHT INDUSTRIAL	1,122,200	82.1	37.1%	$2,670,600	$0	$2,670,600
WAREHOUSE	1,199,810	87.7	47.2%	$3,401,400	$0	$3,401,400
OFFICE	108,250	8.3	3.1%	$226,900	$0	$226,900
RETAIL	0	0.0	0.0%	$0	$0	$0
EDUCATION	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	2,603,542	191.4	98.2%	$7,074,000	$0	$7,074,000
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0%	$0	$0	$0
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	7.5	1.8%	$132,300	$0	$132,300
CIVIC/REC SPACE	0	0.0	0.0%	$0	$0	$0
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	7.5	1.8%	$132,000	$0	$132,000
TOTAL	2,603,542	198.9	100.0%	$7,206,000	$0	$7,206,000

Storm Drainage System Analysis

2. Neighborhood Center

Total Acreage 89.4
Developable Acreage 71.5

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
LIGHT INDUSTRIAL	118,147	9.0	14.1%	$86,400	$19,000	$105,400
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	445,386	40.9	53.1%	$325,400	$71,700	$397,100
RETAIL	0	0.0	0.0%	$0	$0	$0
EDUCATION	11,261	0.9	1.3%	$8,000	$1,800	$9,800
SUBTOTAL	574,794	50.8	68.4%	$420,000	$93,000	$512,000
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	28,800	1.9	1.9%	$11,600	$2,600	$14,200
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	28,800	1.9	1.9%	$12,000	$3,000	$14,000
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	25.0	20.7%	$126,800	$28,000	$154,800
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	7.0	5.9%	$36,300	$8,000	$44,300
CIVIC/REC SPACE	143,857	4.7	3.1%	$18,800	$4,200	$23,000
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	143,857	36.7	29.7%	$182,000	$40,000	$222,000
TOTAL	747,451	89.4	100.0%	$614,000	$136,000	$748,000

Storm Drainage System Analysis

3. Mixed Use

Total Acreage 111.0
Developable Acreage 88.8

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	95,023	7.3	13.2%	$109,700	$29,200	$138,900
LIGHT INDUSTRIAL	440,734	33.7	33.7%	$280,100	$74,700	$354,800
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	679,640	52.0	44.3%	$367,900	$98,100	$466,000
RETAIL	0	0.0	0.0%	$0	$0	$0
EDUCATION	1,680	0.1	0.1%	$1,000	$300	$1,300
SUBTOTAL	1,217,077	93.1	91.3%	$759,000	$202,000	$961,000
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	9.0	3.9%	$32,100	$8,600	$40,700
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	8.9	4.8%	$40,100	$10,700	$50,800
CIVIC/REC SPACE	0	0.0	0.0%	$0	$0	$0
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	17.9	8.7%	$72,000	$19,000	$92,000
TOTAL	1,217,077	111.0	100.0%	$831,000	$221,000	$1,053,000

Storm Drainage System Analysis

4. Historic District

Total Acreage 52.7
Developable Acreage 42.2

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	106,406	8.1	28.8%	$82,900	$30,900	$113,800
LIGHT INDUSTRIAL	339,871	13.0	31.6%	$91,000	$33,900	$124,900
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	151,728	7.0	12.6%	$36,300	$13,500	$49,800
RETAIL	0	0.0	0.0%	$0	$0	$0
EDUCATION	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	598,005	28.1	73.0%	$210,000	$78,000	$289,000
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	112,438	6.0	7.6%	$21,800	$8,100	$29,900
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	112,438	6.0	7.6%	$22,000	$8,000	$30,000
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	7.0	7.2%	$20,800	$7,800	$28,600
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	11.5	12.2%	$35,100	$13,100	$48,200
CIVIC/REC SPACE	3,561	0.1	0.1%	$300	$100	$400
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	3,561	18.6	19.5%	$56,000	$21,000	$77,000
TOTAL	714,004	52.7	100.0%	$288,000	$107,000	$396,000

Storm Drainage System Analysis

5. Heavy Industry

Total Acreage 135.3

Developable Acreage 108.2

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	1,170,313	68.9	72.9%	$1,371,700	$293,500	$1,665,200
LIGHT INDUSTRIAL	225,085	17.2	10.0%	$188,800	$40,400	$229,200
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	89,575	8.2	4.0%	$75,100	$16,100	$91,200
RETAIL	5,000	0.4	0.2%	$4,400	$900	$5,300
EDUCATION	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	1,489,973	94.7	87.1%	$1,640,000	$351,000	$1,991,000
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0%	$0	$0	$0
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	40.6	12.9%	$242,400	$51,900	$294,300
CIVIC/REC SPACE	0	0.0	0.0%	$0	$0	$0
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	40.6	12.9%	$242,000	$52,000	$294,000
TOTAL	1,489,973	135.3	100.0%	$1,882,000	$403,000	$2,285,000

Storm Drainage System Analysis

6. Farragut Village

Total Acreage 105.2

Developable Acreage 84.2

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	0	0.0	0.0%	$0	$0	$0
RETAIL	0	0.0	0.0%	$0	$0	$0
EDUCATION	36,208	2.8	4.0%	$22,400	$6,300	$28,700
SUBTOTAL	36,208	2.8	4.0%	$22,000	$6,000	$29,000
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	270,792	35.0	33.7%	$188,100	$52,700	$240,800
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	313,344	31.6	33.1%	$184,500	$51,600	$236,100
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	584,136	66.6	66.8%	$373,000	$104,000	$477,000
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0%	$0	$0	$0
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	35.8	29.2%	$162,700	$45,500	$208,200
CIVIC/REC SPACE	3,180	0.1	0.1%	$300	$100	$400
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	3,180	35.9	29.2%	$163,000	$46,000	$209,000
TOTAL	623,524	105.2	100.0%	$558,000	$156,000	$715,000

Storm Drainage System Analysis

7. Developed Recreation

Total Acreage 46.2
Developable Acreage 37.0

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	0	0.0	0.0%	$0	$0	$0
RETAIL	0	0.0	0.0%	$0	$0	$0
EDUCATION	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	20,373	46.2	100.0%	$224,900	$54,000	$278,900
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	0.0	0.0%	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0.0%	$0	$0	$0
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	20,373	46.2	100.0%	$225,000	$54,000	$279,000
TOTAL	20,373	46.2	100.0%	$225,000	$54,000	$279,000

Storm Drainage System Analysis

8. Coral Sea Village

Total Acreage 67.1

Developable Acreage 53.7

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
LIGHT INDUSTRIAL	63	0.0	0.0%	$0	$0	$0
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	10,792	1.0	1.9%	$2,100	$1,300	$3,400
RETAIL	73,150	5.6	13.7%	$14,800	$9,500	$24,300
EDUCATION	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	84,005	6.6	15.6%	$17,000	$11,000	$28,000
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	245,753	33.7	49.9%	$54,200	$34,800	$89,000
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	60,000	4.0	5.9%	$6,400	$4,100	$10,500
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	305,753	37.7	55.8%	$61,000	$39,000	$100,000
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	4.0	4.9%	$5,300	$3,400	$8,700
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	18.8	23.7%	$25,800	$16,600	$42,400
CIVIC/REC SPACE	0	0.0	0.0%	$0	$0	$0
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	22.8	28.6%	$31,000	$20,000	$51,000
TOTAL	389,758	67.1	100.0%	$109,000	$70,000	$179,000

Storm Drainage System Analysis

9. Education/Office

Total Acreage 104.4
Developable Acreage 83.5

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY SF	SITE AC		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
LIGHT INDUSTRIAL	106,816	8.2	10.4%	$29,000	$19,000	$48,000
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	113,548	10.4	11.1%	$30,800	$20,200	$51,000
RETAIL	54,370	4.2	5.6%	$15,600	$10,200	$25,800
EDUCATION	388,040	29.7	36.6%	$101,700	$66,700	$168,400
SUBTOTAL	662,774	52.5	63.7%	$177,000	$116,000	$293,000
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	30,000	5.0	4.3%	$12,000	$7,900	$19,900
SUBTOTAL	30,000	5.0	4.3%	$12,000	$8,000	$20,000
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	8.0	5.4%	$15,000	$9,900	$24,900
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	36.2	25.1%	$69,900	$45,800	$115,700
CIVIC/REC SPACE	84,214	2.8	1.4%	$3,900	$2,600	$6,500
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	84,214	46.9	32.0%	$89,000	$58,000	$147,000
TOTAL	776,988	104.4	100.0%	$278,000	$182,000	$460,000

Storm Drainage System Analysis

10. Marina/Residential

Total Acreage 82.6

Developable Acreage 66.1

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
LIGHT INDUSTRIAL	5,249	0.4	0.7%	$7,600	$0	$7,600
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	9,040	0.8	1.1%	$13,100	$0	$13,100
RETAIL	42,663	3.3	5.6%	$65,500	$0	$65,500
EDUCATION	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	56,952	4.5	7.4%	$86,000	$0	$86,000
RESIDENTIAL				$0		
NEW CONDOS	2,146,083	66.7	75.7%	$882,200	$0	$882,200
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	2,146,083	66.7	75.7%	$882,000	$0	$882,000
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0%	$0	$0	$0
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	0.1	0.1%	$1,400	$0	$1,400
CIVIC/REC SPACE	0	0.0	0.0%	$0	$0	$0
MARINA	1,800	11.3	16.7%	$195,000	$0	$195,000
SUBTOTAL	1,800	11.4	16.9%	$196,000	$0	$196,000
TOTAL	2,204,836	82.6	100.0%	$1,164,000	$0	$1,164,000

Storm Drainage System Analysis

11. Golf Course

Total Acreage 170.8
Developable Acreage 136.6

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	0	0.0	0.0%	$0	$0	$0
RETAIL	0	0.0	0.0%	$0	$0	$0
EDUCATION	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	27,913	122.3	65.1%	$415,100	$0	$415,100
DEVELOPED PARK	0	0.0	0.0%	$0	$0	$0
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	48.5	34.9%	$222,300	$0	$222,300
CIVIC/REC SPACE	0	0.0	0.0%	$0	$0	$0
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	27,913	170.8	100.0%	$637,000	$0	$637,000
TOTAL	27,913	170.8	100.0%	$637,000	$0	$637,000

Storm Drainage System Analysis

12. Regional Park

Total Acreage 216.0
Developable Acreage 172.8

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	0	0.0	0.0%	$0	$0	$0
RETAIL	0	0.0	0.0%	$0	$0	$0
EDUCATION	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0%	$0	$0	$0
REGIONAL PARK	0	163.0	69.5%	$231,400	$0	$231,400
OPEN SPACE	0	53.0	30.5%	$101,500	$0	$101,500
CIVIC/REC SPACE	0	0.0	0.0%	$0	$0	$0
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	216.0	100.0%	$333,000	$0	$333,000
TOTAL	0	216.0	100.0%	$333,000	$0	$333,000

Storm Drainage System Analysis

13. Open Space/ Recreation

Total Acreage 99.1
Developable Acreage 79.3

	SITE RELATED		% CA	ALLOCATED COSTS IN $S		
	FACILITY *SF*	SITE *AC*		UPGRADES & EXPANSION	LIFE CYCLE	TOTAL COSTS
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
LIGHT INDUSTRIAL	0	0.0	0.0%	$0	$0	$0
WAREHOUSE	0	0.0	0.0%	$0	$0	$0
OFFICE	0	0.0	0.0%	$0	$0	$0
RETAIL	0	0.0	0.0%	$0	$0	$0
EDUCATION	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
RESIDENTIAL						
NEW CONDOS	0	0.0	0.0%	$0	$0	$0
EXISTING DUPLEXES	0	0.0	0.0%	$0	$0	$0
EXISTING SINGLE FAMILY	0	0.0	0.0%	$0	$0	$0
MULTI-FAMILY - REHAB	0	0.0	0.0%	$0	$0	$0
LIVE/WORK	0	0.0	0.0%	$0	$0	$0
DORMITORY BEDS	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	0.0	0.0%	$0	$0	$0
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0	0.0	0.0%	$0	$0	$0
DEVELOPED PARK	0	0.0	0.0%	$0	$0	$0
REGIONAL PARK	0	0.0	0.0%	$0	$0	$0
OPEN SPACE	0	99.1	100.0%	$0	$0	$0
CIVIC/REC SPACE	0	0.0	0.0%	$0	$0	$0
MARINA	0	0.0	0.0%	$0	$0	$0
SUBTOTAL	0	99.1	100.0%	$0	$0	$0
TOTAL	0	99.1	100.0%	$0	$0	$0

SUMMARY OF COST ALLOCATIONS FOR STORM WATER SYSTEM

Storm Drainage System Analysis	REUSE AREA 1 NORTH LIGHT INDUSTRIAL			REUSE AREA 10 MARINA/RESIDENTIAL			REUSE AREAS 2,3,4,5,6,7,8,9,11,12,13 (CENTRAL DEVELOPMENT AREA)			ALL AREAS
	SITE AC	TOTAL COSTS ($S)	COST PER ACRE ($S)	TOTAL COSTS	TOTAL COSTS ($S)	COST PER ACRE ($S)	PER ACRE ($S)	TOTAL COSTS ($S)	COST PER ACRE ($S)	TOTAL COSTS ($S)
NON RESIDENTIAL										
HEAVY INDUSTRIAL	13.3	$774,800	$58,400	0.0	$0		84.3	$1,917,900	$22,800	$2,692,700
LIGHT INDUSTRIAL	82.1	$2,670,600	$32,500	0.4	$7,600	$18,900	81.2	$862,300	$10,600	$3,540,500
WAREHOUSE	87.7	$3,401,400	$38,800	0.0	$0		0.0	$0		$3,401,400
OFFICE	8.3	$226,900	$27,400	0.8	$13,100	$15,800	119.5	$1,058,500	$8,900	$1,298,500
RETAIL	0.0	$0		3.3	$65,500	$20,100	10.1	$55,400	$5,500	$120,900
EDUCATION	0.0	$0		0.0	$0		33.5	$208,200	$6,200	$208,200
SUBTOTAL	191.4	$7,073,700		4.5	$86,200		328.6	$4,102,300		$11,262,200
RESIDENTIAL										
NEW CONDOS	0.0	$0		66.7	$882,200	$13,200	0.0	$0		$882,200
EXISTING DUPLEXES	0.0	$0		0.0	$0		68.7	$329,800	$4,800	$329,800
EXISTING SINGLE FAMILY	0.0	$0		0.0	$0		6.0	$29,900	$5,000	$29,900
MULTI-FAMILY - REHAB	0.0	$0		0.0	$0		31.6	$236,100	$7,500	$236,100
LIVE/WORK	0.0	$0		0.0	$0		5.9	$24,700	$4,200	$24,700
DORMITORY BEDS	0.0	$0		0.0	$0		5.0	$19,900	NA	$19,900
SUBTOTAL	0.0	$0		66.7	$882,200		117.1	$640,400		$1,522,600
CIVIC/RECREATION/OPEN SPACE										
GOLF COURSE	0.0	$0		0.0	$0		122.3	$415,100	$3,400	$415,100
DEVELOPED PARK	0.0	$0		0.0	$0		99.2	$536,600	$5,400	$536,600
REGIONAL PARK	0.0	$0		0.0	$0		163.0	$231,400	$1,420	$231,400
OPEN SPACE	7.5	$132,300	$17,500	0.1	$1,400	$10,200	359.2	$1,127,700	$3,100	$1,261,400
CIVIC/REC SPACE	0.0	$0		0.0	$0		7.7	$30,300	$3,900	$30,300
MARINA	0.0	$0		11.3	$195,000	$17,300	0.0	$0		$195,000
SUBTOTAL	7.5	$132,000		11.4	$196,400		751.4	$2,341,100		$2,669,500
TOTAL	198.9	$7,206,000		82.6	$1,165,000		1197.2	$7,084,000		$15,454,000

Summary of All Infrastructure Improvement Costs	REUSE AREA #1 NORTH LIGHT INDUSTRIAL					
		TOTAL COSTS				COST
	SITE (AC)	WATER ($S)	WASTEWATER ($S)	STORM ($S)	ALL ($S)	PER ACRE ($S)
NON RESIDENTIAL						
HEAVY INDUSTRIAL	13.3	$134,500	$161,900	$774,800	$1,071,200	$80,800
LIGHT INDUSTRIAL	82.1	$865,900	$1,298,000	$2,670,600	$4,834,500	$58,900
WAREHOUSE	87.7	$525,400	$959,900	$3,401,400	$4,886,700	$55,700
OFFICE	8.3	$137,500	$122,100	$226,900	$486,500	$58,800
RETAIL	0.0	$0	$0	$0	$0	
EDUCATION	0.0	$0	$0	$0	$0	
SUBTOTAL	191.4	$1,663,000	$2,542,000	$7,074,000	$11,279,000	
RESIDENTIAL						
NEW CONDOS	0.0	$0	$0	$0	$0	
EXISTING DUPLEXES	0.0	$0	$0	$0	$0	
EXISTING SINGLE FAMILY	0.0	$0	$0	$0	$0	
MULTI-FAMILY - REHAB	0.0	$0	$0	$0	$0	
LIVE/WORK	0.0	$0	$0	$0	$0	
DORMITORY BEDS	0.0	$0	$0	$0	$0	
SUBTOTAL	0.0	$0	$0	$0	$0	
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0.0	$0	$0	$0	$0	
DEVELOPED PARK	0.0	$0	$0	$0	$0	
REGIONAL PARK	0.0	$0	$0	$0	$0	
OPEN SPACE	7.5	$0	$0	$132,300	$132,300	$17,500
CIVIC/REC SPACE	0.0	$0	$0	$0	$0	
MARINA	0.0	$0	$0	$0	$0	
SUBTOTAL	7.5	$0	$0	$132,000	$132,000	
TOTAL	198.9	$1,663,000	$2,542,000	$7,206,000	$11,411,000	

Summary of All Infrastructure Improvement Costs	REUSE AREA 10 MARINA/RESIDENTIAL					
		TOTAL COSTS				COST
	SITE (AC)	WATER ($S)	WASTEWATER ($S)	STORM ($S)	ALL ($S)	PER ACRE ($S)
NON RESIDENTIAL						
HEAVY INDUSTRIAL	0.0	$0	$0	$0	$0	
LIGHT INDUSTRIAL	0.4	$4,900	$5,100	$7,600	$17,600	$43,800
WAREHOUSE	0.0	$0	$0	$0	$0	
OFFICE	0.8	$14,100	$8,800	$13,100	$36,000	$43,400
RETAIL	3.3	$51,000	$27,900	$65,500	$144,400	$44,200
EDUCATION	0.0	$0	$0	$0	$0	
SUBTOTAL	4.5	$70,000	$42,000	$86,000	$198,000	
RESIDENTIAL						
NEW CONDOS	66.7	$1,037,600	$573,100	$882,200	$2,492,900	$37,400
EXISTING DUPLEXES	0.0	$0	$0	$0	$0	
EXISTING SINGLE FAMILY	0.0	$0	$0	$0	$0	
MULTI-FAMILY - REHAB	0.0	$0	$0	$0	$0	
LIVE/WORK	0.0	$0	$0	$0	$0	
DORMITORY BEDS	0.0	$0	$0	$0	$0	
SUBTOTAL	66.7	$1,038,000	$573,000	$882,000	$2,493,000	
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	0.0	$0	$0	$0	$0	
DEVELOPED PARK	0.0	$0	$0	$0	$0	
REGIONAL PARK	0.0	$0	$0	$0	$0	
OPEN SPACE	0.1	$0	$0	$1,400	$1,400	$10,200
CIVIC/REC SPACE	0.0	$0	$0	$0	$0	
MARINA	11.3	$43,300	$53,000	$195,000	$291,300	$25,800
SUBTOTAL	11.4	$43,000	$53,000	$196,000	$293,000	
TOTAL	82.6	$1,151,000	$668,000	$1,164,000	$2,984,000	

Summary of All Infrastructure Improvement Costs	REUSE AREAS 2,3,4,5,6,7,8,9,11,12,13 (CENTRAL DEVELOPMENT AREA)					
		TOTAL COSTS				COST
	SITE (AC)	WATER ($S)	WASTEWATER ($S)	STORM ($S)	ALL ($S)	PER ACRE ($S)
NON RESIDENTIAL						
HEAVY INDUSTRIAL	84.3	$991,800	$922,700	$1,917,900	$3,832,400	$45,460
LIGHT INDUSTRIAL	81.2	$879,700	$1,058,100	$862,300	$2,800,100	$34,495
WAREHOUSE	0.0	$0	$0	$0	$0	
OFFICE	119.5	$1,753,900	$1,327,400	$1,058,500	$4,139,800	$34,638
RETAIL	10.1	$122,200	$82,600	$55,400	$260,200	$25,659
EDUCATION	33.5	$402,400	$240,700	$208,200	$851,300	$25,446
SUBTOTAL	328.6	$4,150,000	$3,632,000	$4,102,000	$11,884,000	
RESIDENTIAL						
NEW CONDOS	0.0	$0	$0	$0	$0	
EXISTING DUPLEXES	68.7	$529,300	$291,000	$329,800	$1,150,100	$16,749
EXISTING SINGLE FAMILY	6.0	$27,000	$13,600	$29,900	$70,500	$11,750
MULTI-FAMILY - REHAB	31.6	$241,700	$133,800	$236,100	$611,600	$19,380
LIVE/WORK	5.9	$59,900	$40,800	$24,700	$125,400	$21,182
DORMITORY BEDS	5.0	$218,800	$269,200	$19,900	$507,900	NA
SUBTOTAL	117.1	$1,077,000	$748,000	$640,000	$2,466,000	
CIVIC/RECREATION/OPEN SPACE						
GOLF COURSE	122.3	$1,271,000	$10,900	$415,100	$1,697,000	$13,877
DEVELOPED PARK	99.2	$530,300	$49,000	$536,600	$1,115,900	$11,249
REGIONAL PARK	163.0	$2,400	$1,400	$231,400	$235,200	$1,443
OPEN SPACE	359.2	$0	$0	$1,127,700	$1,127,700	$3,139
CIVIC/REC SPACE	7.7	$209,200	$133,100	$30,300	$372,600	$48,385
MARINA	0.0	$0	$0	$0	$0	
SUBTOTAL	751.4	$2,013,000	$194,000	$2,341,000	$4,548,000	
TOTAL	1197.2	$7,240,000	$4,574,000	$7,083,000	$18,898,000	

Summary of All Infrastructure Improvement Costs	ALL AREAS TOTAL SYSTEM COSTS				
		TOTAL COSTS			
	SITE (AC)	WATER ($S)	WASTEWATER ($S)	STORM ($S)	ALL ($S)
NON RESIDENTIAL					
HEAVY INDUSTRIAL	97.6	$1,126,300	$1,084,600	$2,692,700	$4,903,600
LIGHT INDUSTRIAL	163.6	$1,750,500	$2,361,200	$3,540,500	$7,652,200
WAREHOUSE	87.7	$525,400	$959,900	$3,401,400	$4,886,700
OFFICE	128.6	$1,905,500	$1,458,300	$1,298,500	$4,662,300
RETAIL	13.4	$173,200	$110,500	$120,900	$404,600
EDUCATION	33.5	$402,400	$240,700	$208,200	$851,300
SUBTOTAL	524.4	$5,883,000	$6,215,000	$11,262,000	$23,361,000
RESIDENTIAL					
NEW CONDOS	66.7	$1,037,600	$573,100	$882,200	$2,492,900
EXISTING DUPLEXES	68.7	$529,300	$291,000	$329,800	$1,150,100
EXISTING SINGLE FAMILY	6.0	$27,000	$13,600	$29,900	$70,500
MULTI-FAMILY - REHAB	31.6	$241,700	$133,800	$236,100	$611,600
LIVE/WORK	5.9	$59,900	$40,800	$24,700	$125,400
DORMITORY BEDS	5.0	$218,800	$269,200	$19,900	$507,900
SUBTOTAL	183.8	$2,114,000	$1,322,000	$1,522,600	$4,958,000
CIVIC/RECREATION/OPEN SPACE					
GOLF COURSE	122.3	$1,271,000	$10,900	$415,100	$1,697,000
DEVELOPED PARK	99.2	$530,300	$49,000	$536,600	$1,115,900
REGIONAL PARK	163.0	$2,400	$1,400	$231,400	$235,200
OPEN SPACE	366.9	$0	$0	$1,261,400	$1,261,400
CIVIC/REC SPACE	7.7	$209,200	$133,100	$30,300	$372,600
MARINA	11.3	$43,300	$53,000	$195,000	$291,300
SUBTOTAL	770.4	$2,056,000	$247,000	$2,669,800	$4,973,000
TOTAL	1,478.7	$10,053,000	$7,784,000	$15,454,000	$33,292,000

35,262.53

TYPE	TRANSPORTATION IMPROVEMENT	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COSTS		UNITS	TOTAL COSTS
	ON-SITE SYSTEM EXPANSION (TO MEET PROJECTED FUTURE DEVELOPMENT)							
A	6 LANE ARTERIAL	T 1	**RAILROAD AVENUE**	ALL	$823	LF	3,500	$2,882,000
	NO PARKING		NORTH GATE TO G STREET					
	SUB-BASE FILL COSTS				$43	LF	3,500	$152,000
	CONSTRUCT 6/8 LANE INTERCHANGE	I 1			$798	LF	200	$160,000
	CONSTRUCT 2 LANE RAMP & ACCESS RDS				$542	LF	500	$271,000
	CONSTRUCT 1 LANE RD				$479	LF	900	$431,000
	INSTALL 4-WAY TRAFFIC SIGNAL				$95,000	EA	1	$95,000
	INSTALL 3-WAY TRAFFIC SIGNAL	I 2			$80,000	EA	1	$80,000
	INSTALL 3-WAY TRAFFIC SIGNAL	I 3			$80,000	EA	1	$80,000
	INSTALL 3-WAY TRAFFIC SIGNAL	I 4			$80,000	EA	1	$80,000
	RELOCATE EXISTING TRAFFIC SIGNAL	I 5			$12,500	EA	1	$12,500
G	INDUSTRIAL COLLECTOR	T 2	**ACACIA STREET**	ALL	$726	LF	1,100	$799,000
	4 LANES W/ PARKING		NORTH GATE TO CEDAR AVE					
	SUB-BASE FILL COSTS				$149	LF	1,100	$164,000
G	INDUSTRIAL COLLECTOR	T 3	**P STREET**	ALL	$726	LF	1,050	$763,000
	4 LANES W/ PARKING		CEDAR AVE TO RAILROAD AVE					
	SUB-BASE FILL COSTS				$131	LF	1,050	$137,000
F	INDUSTRIAL COLLECTOR	T 4	**M STREET**	ALL	$587	LF	1,100	$646,000
	4 LANES W/ PARKING		CEDAR AVE TO RAILROAD AVE					
	SUB-BASE FILL COSTS				$112	LF	1,100	$123,000
E	INDUSTRIAL LOCAL	T 5	**CEDAR AVE**	ALL	$797	LF	3,150	$2,512,000
	2 LANES - PARKING PERMITTED		P STREET TO G STREET					
	SUB-BASE FILL COSTS				$20	LF	2,600	$52,000
	INSTALL 3-WAY TRAFFIC SIGNAL	I 6			$83,500	EA	1	$83,500
	INSTALL 2 LANE R/R BARRICADE SIGNAL				$43,000	EA	4	$172,000
	INSTALL R/R CROSSING SIGN	I 26			$700	EA	2	$1,400
	INSTALL R/R CROSSING SIGN	I 27			$700	EA	2	$1,400
	INSTALL R/R CROSSING SIGN	I 28			$700	EA	2	$1,400

35,282.53

TYPE	TRANSPORTATION IMPROVEMENT	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COSTS		UNITS	TOTAL COSTS
	ON-SITE SYSTEM EXPANSION CONT'D							
F	INDUSTRIAL COLLECTOR	T 6	**NEW STREET**	ALL	$587	LF	1,050	$617,000
	4 LANES W/ PARKING		CEDAR AVE TO RAILROAD AVE					
	SUB-BASE FILL COSTS				$57	LF	400	$23,000
B	4 LANE ARTERIAL	T 7	**G STREET**	ALL	$710	LF	1,400	$993,000
	NO PARKING		CEDAR AVE TO CALIFORNIA AVE					
	SUB-BASE FILL COSTS				$7.78	LF	1,100	$8,600
	INSTALL 2 LANE R/R CROSSING BARRICADES	I 7			$43,000	EA	2	$86,000
	INSTALL 2 LANE R/R CROSSING BARRICADES	I 8			$43,000	EA	2	$86,000
	REPLACE 4-WAY TRAFFIC SIGNAL W/ 3-WAY				$4,000	EA	1	$4,000
G	INDUSTRIAL LOCAL	T 8	**CEDAR AVE**	ALL	$726	LF	1,100	$799,000
	2 LANES - PARKING PERMITTED		G STREET TO C STREET					
	SUB-BASE FILL COSTS				$7.56	LF	1,100	$8,300
K	SPECIAL TRANSITWAY	T 9	**WALNUT STREET**	ALL	$496	LF	5,500	$2,727,000
	SHARED VEHICLE/NON-MOTOR CORRIDOR		G STREET TO 10TH STREET					
	SUB-BASE FILL COSTS				$1.33	LF	5,500	$7,300
	INSTALL R/R CROSSING SIGNAL	I 12			$26,000	EA	3	$78,000
	INSTALL R/R CROSSING SIGNAL	I 21			$26,000	EA	2	$52,000
B	4 LANE ARTERIAL	T 10	**RAILROAD AVENUE**	ALL	$710	LF	4,400	$3,122,000
	NO PARKING		G STREET TO 8TH STREET					
	SUB-BASE FILL COSTS				$8.44	LF	4,400	$37,000
	INSTALL R/R CROSSING SIGNAL	I 10			$26,000	EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 18			$26,000	EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 19			$26,000	EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 20			$26,000	EA	2	$52,000
	INSTALL R/R CROSSING SIGNS	I 22			$700	EA	2	$1,400
	INSTALL R/R CROSSING SIGNAL	I 23			$26,000	EA	2	$52,000
H	INDUSTRIAL CORRIDOR	T 11	**CALIFORNIA AVENUE**	ALL	$560	LF	10,100	$5,652,000
	2 LANES - PARKING PERMITTED		CAUSEWAY TO BERTH 24					
	INSTALL R/R CROSSING SIGNAL	I 9			$26,000	EA	2	$52,000

35,282.53

TYPE	TRANSPORTATION IMPROVEMENT	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COSTS		UNITS	TOTAL COSTS
	ON-SITE SYSTEM EXPANSION CONT'D							
I	RESIDENTIAL COLLECTOR	T 12	**EXTENSION OF C STREET**	ALL	$542	LF	750	$406,000
	2 LANES - PARKING PERMITTED		RAILROAD AVE TO WATERFRONT AVE					
F	INDUSTRIAL COLLECTOR	T 13	**WATERFRONT AVENUE LOOP**	ALL	$587	LF	5,000	$2,937,000
	4 LANES W/ PARKING		EXT. OF E TO CONC. WAYS 1					
G	INDUSTRIAL LOCAL	T 14	**C STREET**	ALL	$726	LF	1,050	$763,000
	2 LANES, PARKING PERMITTED		CEDAR AVE TO RAILROAD AVE					
	SUB-BASE FILL COSTS				$5.78	LF	1,050	$6,100
	INSTALL R/R CROSSING SIGNAL	I 11			$26,000	EA	2	$52,000
I	RESIDENTIAL COLLECTOR	T 15	**CEDAR AVE**	ALL	$542	LF	7,200	$3,900,000
	2 LANES - PARKING PERMITTED		C STREET TO CLUB CIRCLE DR					
	INSTALL R/R CROSSING SIGNAL	I 13			$26,000	EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 15			$26,000	EA	3	$78,000
I	RESIDENTIAL COLLECTOR	T 16	**A STREET**	ALL	$542	LF	2,500	$1,354,000
	2 LANES - PARKING PERMITTED		DUMP RD TO CALIFORNIA AVE					
	SUB-BASE FILL COSTS				$4.44	LF	1,800	$8,000
	INSTALL R/R CROSSING SIGNAL	I 14			$26,000	EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 16			$26,000	EA	2	$52,000
	INSTALL R/R CROSSING SIGNAL	I 17			$26,000	EA	2	$52,000
Aa	REDUCED RIGHT-OF-WAY (60')	T 17	**RAILROAD AVE**	ALL	$635	LF	650	$413,000
	CONSTRAINED 4 LANE ARTERIALS		8TH STREET TO 9TH STREET					
	SUB-BASE FILL COSTS				$4.44	LF	650	$2,900
	INSTALL R/R CROSSING SIGNAL	I 24			$26,000	EA	3	$78,000
Ab	REDUCED RIGHT-OF-WAY (53')	T 18	**RAILROAD AVE**	ALL	$531	LF	1,200	$637,000
	CONSTRAINED 4 LANE ARTERIALS		9TH STREET TO 12TH STREET					
	SUB-BASE FILL COSTS				$12	LF	1,200	$15,000
I	RESIDENTIAL COLLECTOR	T 19	**WALNUT STREET**	ALL	$542	LF	750	$406,000
	2 LANES - PARKING PERMITTED		10TH STREET TO CEDAR AVE					
	SUB-BASE FILL COSTS				$3.56	LF	750	$2,700

35,262.53

TYPE	TRANSPORTATION IMPROVEMENT	PRJ ID	IMPROVEMENT DESCRIPTION	CONTRIBUTING REUSE AREAS	UNIT COSTS	UNITS	TOTAL COSTS
	ON-SITE SYSTEM EXPANSION CONT'D						
H	INDUSTRIAL CORRIDOR	T 20	**RAILROAD AVE**	ALL	$560 LF	4,000	$2,239,000
	2 LANES - PARKING PERMITTED		12 STREET TO GARINO LANE				
	SUB-BASE FILL COSTS		*Note 1*		$3.11 LF	2,400	$7,000
	INSTALL R/R CROSSING SIGNAL	I 26			$26,000 EA	4	$104,000
I	RESIDENTIAL COLLECTOR	T 21	**7TH STREET**	ALL	$542 LF	1,150	$623,000
	2 LANES - PARKING PERMITTED		WALNUT AVE TO CRISP AVE				
	SUB-BASE FILL COSTS				$3.56 LF	1,150	$4,100
H	INDUSTRIAL CORRIDOR	T 22	**9TH STREET**	ALL	$560 LF	450	$252,000
	2 LANES - PARKING PERMITTED		RAILROAD AVE TO CALIFORNIA AVE				
I	INDUSTRIAL LOCAL	T 23	**NEW ROAD**	ALL	$542 LF	1,200	$650,000
	2 LANES - PARKING PERMITTED		RAILROAD AVE TO CALIFORNIA AVE				
	SUB-BASE FILL COSTS				$2.22 LF	700	$1,600
I	INDUSTRIAL LOCAL	T 24	**14 STREET**	ALL	$542 LF	1,300	$704,000
	2 LANES - PARKING PERMITTED		CALIFORNIA AVE TO CEDAR AVE				
	SUB-BASE FILL COSTS				$7.11 LF	750	$5,300
	SUBTOTAL ON-SITE UPGRADES						**$40,170,000**
	ENVIRONMENTAL WORK STOPPAGE CONTINGENCY (30% CONTINGENCY ON 30% OF ROADWAYS)						**$3,615,000**
	SUBTOTAL + ENVIRONMENTAL WORK STOPPAGE CONTINGENCY + CONTINGENCY & ENGINEERING (15% + 20%)						**$60,420,000**

TOTAL ROADWAY SYSTEM ESTIMATED COSTS (INC. ENG & CONT.)	**$60,420,000**

Note 1: *No improvements have been extended to serve Reuse Area 10 since development is expected to occure in the far future, past the 20 year plannng horizon.*

Transportation System Analysis

Transportation figures/allocation from Fehr & Peers - Mare Island Transportation Plan 8/97 with modifications as directed 11/97.

1. North Light Industrial
Total Acreage 198.9
Developable Acreage 159.1

2. Neighborhood Center
Total Acreage 89.4
Developable Acreage 71.5

	1. SITE	1. TRANSPORTATION FACTORS				1. ALLOCATED COSTS		2. SITE	2. TRANSPORTATION FACTORS				2. ALLOCATED COSTS	
	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC
NON RESIDENTIAL														
HEAVY INDUSTRIAL	13.3	0.15	KSF	254	3.69%	$2,227,000	$167,900	0.0	0.15	KSF		0.00%	$0	$0
LIGHT INDUSTRIAL	82.1	0.76	KSF	214	3.10%	$1,876,000	$22,900	9.0	0.76	KSF	90	1.31%	$789,000	$87,300
WAREHOUSE	87.7	0.58	KSF	439	6.37%	$3,848,000	$43,900	0.0	0.58	KSF		0.00%	$0	$0
OFFICE/INCUBATOR	8.3	1.18	KSF	1,384	20.08%	$12,134,000	$1,465,500	40.9	1.18	KSF	525	7.62%	$4,602,000	$112,500
RETAIL	0.0	3.62	KSF		0.00%	$0	$0	0.0	3.62	KSF		0.00%	$0	$0
EDUCATION	0.0	0.83	KSF		0.00%	$0	$0	0.9	0.83	KSF	9	0.13%	$79,000	$91,700
SUBTOTAL	191.4			2,291	33.24%	$20,085,000		50.8			624	9.05%	$5,470,000	
RESIDENTIAL														
NEW CONDOS	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
EXISTING DUPLEXES	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
EXISTING SINGLE FAMILY	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
MULTI-FAMILY - REHAB	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
LIVE/WORK	0.0	0.48	DU		0.00%	$0	$0	1.9	0.48	DU	9	0.13%	$79,000	$41,100
DORMITORY BEDS	0.0	0.06	BEDS		0.00%	$0	$0	0.0	0.06	BEDS		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0		1.9			9	0.13%	$79,000	
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.39	AC		0.00%	$0	$0	0.0	0.39	AC		0.00%	$0	$0
DEVELOPED PARK	0.0	0.47	AC		0.00%	$0	$0	25.0	0.47	AC	25	0.36%	$219,000	$8,800
REGIONAL PARK	0.0	0.47	AC		0.00%	$0	$0	0.0	0.47	AC		0.00%	$0	$0
OPEN SPACE	7.5				0.00%	$0	$0	7.0	0.00			0.00%	$0	$0
CIVIC/REC SPACE	0.0	1.08	KSF		0.00%	$0	$0	4.7	1.08	KSF	155	2.25%	$1,359,000	$288,100
MARINA	0.0	0.15	BERTH		0.00%	$0	$0	0.0	0.15	BERTH		0.00%	$0	$0
SUBTOTAL	7.5			0	0.00%	$0		36.7			180	2.61%	$1,578,000	
TOTAL	198.9			2,291	33.24%	$20,085,000		89.4			813	11.80%	$7,127,000	

Transportation System Analysis

Transportation figures/allocation from Fehr & Peers - Mare Island Transportation Plan 8/97 with modifications as directed 11/97.

3. Mixed Use — Total Acreage 111.0; Developable Acreage 88.8

4. Historic District — Total Acreage 52.7; Developable Acreage 42.2

	3. Mixed Use							4. Historic District							
	SITE	TRANSPORTATION FACTORS				ALLOCATED COSTS		SITE	TRANSPORTATION FACTORS				ALLOCATED COSTS	
	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC
NON RESIDENTIAL														
HEAVY INDUSTRIAL	7.3	0.15	KSF	14	0.20%	$123,000	$16,900	8.1	0.15	KSF	16	0.23%	$140,000	$17,200
LIGHT INDUSTRIAL	33.7	0.76	KSF	337	4.89%	$2,954,000	$87,600	13.0	0.76	KSF	260	3.77%	$2,279,000	$175,300
WAREHOUSE	0.0	0.58	KSF		0.00%	$0	$0	0.0	0.58	KSF		0.00%	$0	$0
OFFICE/INCUBATOR	52.0	1.18	KSF	800	11.61%	$7,013,000	$134,800	7.0	1.18	KSF	179	2.60%	$1,569,000	$225,200
RETAIL	0.0	3.62	KSF		0.00%	$0	$0	0.0	3.62	KSF		0.00%	$0	$0
EDUCATION	0.1	0.83	KSF	1	0.01%	$9,000	$70,000	0.0	0.83	KSF		0.00%	$0	$0
SUBTOTAL	93.1			1,152	16.71%	$10,099,000		28.1			455	6.60%	$3,988,000	
RESIDENTIAL														
NEW CONDOS	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
EXISTING DUPLEXES	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
EXISTING SINGLE FAMILY	0.0	0.48	DU		0.00%	$0	$0	6.0	0.48	DU	9	0.13%	$79,000	$13,200
MULTI-FAMILY - REHAB	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
LIVE/WORK	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
DORMITORY BEDS	0.0	0.06	BEDS		0.00%	$0	$0	0.0	0.06	BEDS		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0		6.0			9	0.13%	$79,000	
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.39	AC		0.00%	$0	$0	0.0	0.39	AC		0.00%	$0	$0
DEVELOPED PARK	9.0	0.47	AC	26	0.38%	$228,000	$25,300	7.0	0.47	AC	7	0.10%	$61,000	$8,700
REGIONAL PARK	0.0	0.47	AC		0.00%	$0	$0	0.0	0.47	AC		0.00%	$0	$0
OPEN SPACE	8.9	0.00			0.00%	$0	$0	11.5	0.00			0.00%	$0	$0
CIVIC/REC SPACE	0.0	1.08	KSF		0.00%	$0	$0	0.1	1.08	KSF	4	0.06%	$35,000	$299,700
MARINA	0.0	0.15	BERTH		0.00%	$0	$0	0.0	0.15	BERTH		0.00%	$0	$0
SUBTOTAL	17.9			26	0.38%	$228,000		18.6			11	0.16%	$96,000	
TOTAL	111.0			1,178	17.09%	$10,327,000		52.7			475	6.89%	$4,163,000	

Transportation System Analysis

Transportation figures/allocation from Fehr & Peers - Mare Island Transportation Plan 8/97 with modifications as directed 11/97.

5. Heavy Industry — Total Acreage 135.3; Developable Acreage 108.2

6. Farragut Village — Total Acreage 105.2; Developable Acreage 84.2

	5. SITE	5. TRANSPORTATION FACTORS				5. ALLOCATED COSTS		6. SITE	6. TRANSPORTATION FACTORS				6. ALLOCATED COSTS	
	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC
NON RESIDENTIAL														
HEAVY INDUSTRIAL	68.9	0.15	KSF	173	2.51%	$1,517,000	$22,000	0.0	0.15	KSF		0.00%	$0	$0
LIGHT INDUSTRIAL	17.2	0.76	KSF	171	2.48%	$1,499,000	$87,000	0.0	0.76	KSF		0.00%	$0	$0
WAREHOUSE	0.0	0.58	KSF		0.00%	$0	$0	0.0	0.58	KSF		0.00%	$0	$0
OFFICE/INCUBATOR	8.2	1.18	KSF	106	1.54%	$929,000	$112,900	0.0	1.18	KSF		0.00%	$0	$0
RETAIL	0.4	3.62	KSF	18	0.26%	$159,000	$415,600	0.0	3.62	KSF		0.00%	$0	$0
EDUCATION	0.0	0.83	KSF		0.00%	$0	$0	2.8	0.83	KSF	30	0.44%	$263,000	$94,900
SUBTOTAL	94.7			468	6.79%	$4,104,000		2.8			30	0.44%	$263,000	
RESIDENTIAL														
NEW CONDOS	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
EXISTING DUPLEXES	0.0	0.48	DU		0.00%	$0	$0	35.0	0.48	DU	103	1.49%	$899,000	$25,700
EXISTING SINGLE FAMILY	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
MULTI-FAMILY - REHAB	0.0	0.48	DU		0.00%	$0	$0	31.6	0.48	DU	91	1.33%	$801,000	$25,400
LIVE/WORK	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
DORMITORY BEDS	0.0	0.06	BEDS		0.00%	$0	$0	0.0	0.06	BEDS		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0		66.6			194	2.81%	$1,700,000	
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.39	AC		0.00%	$0	$0	0.0	0.39	AC		0.00%	$0	$0
DEVELOPED PARK	0.0	0.47	AC	6	0.09%	$53,000	$0	0.0	0.47	AC	19	0.28%	$167,000	$0
REGIONAL PARK	0.0	0.47	AC		0.00%	$0	$0	0.0	0.47	AC		0.00%	$0	$0
OPEN SPACE	40.6	0.00			0.00%	$0	$0	35.8	0.00			0.00%	$0	$0
CIVIC/REC SPACE	0.0	1.08	KSF		0.00%	$0	$0	0.1	1.08	KSF	3	0.04%	$26,000	$249,300
MARINA	0.0	0.15	BERTH		0.00%	$0	$0	0.0	0.15	BERTH		0.00%	$0	$0
SUBTOTAL	40.6			6	0.09%	$53,000		35.9			22	0.32%	$193,000	
TOTAL	135.3			474	6.88%	$4,157,000		105.2			246	3.57%	$2,156,000	

Transportation System Analysis

Transportation figures/allocation from Fehr & Peers - Mare Island Transportation Plan 8/97 with modifications as directed 11/97.

7. Developed Recreation — Total Acreage 46.2; Developable Acreage 37.0

8. Coral Sea Village — Total Acreage 67.1; Developable Acreage 53.7

	7. SITE	7. TRANSPORTATION FACTORS				7. ALLOCATED COSTS		8. SITE	8. TRANSPORTATION FACTORS				8. ALLOCATED COSTS	
	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.15	KSF		0.00%	$0	$0	0.0	0.15	KSF		0.00%	$0	$0
LIGHT INDUSTRIAL	0.0	0.76	KSF		0.00%	$0	$0	0.005	0.76	KSF	0	0.00%	$0	$0
WAREHOUSE	0.0	0.58	KSF		0.00%	$0	$0	0.0	0.58	KSF		0.00%	$0	$0
OFFICE/INCUBATOR	0.0	1.18	KSF		0.00%	$0	$0	1.0	1.18	KSF	13	0.19%	$114,000	$115,000
RETAIL	0.0	3.62	KSF		0.00%	$0	$0	5.6	3.62	KSF	265	3.85%	$2,324,000	$415,200
EDUCATION	0.0	0.83	KSF		0.00%	$0	$0	0.0	0.83	KSF		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0		6.6			278	4.03%	$2,438,000	
RESIDENTIAL														
NEW CONDOS	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
EXISTING DUPLEXES	0.0	0.48	DU		0.00%	$0	$0	33.7	0.48	DU	98	1.42%	$859,000	$25,500
EXISTING SINGLE FAMILY	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
MULTI-FAMILY - REHAB	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
LIVE/WORK	0.0	0.48	DU		0.00%	$0	$0	4.0	0.48	DU	19	0.28%	$167,000	$41,800
DORMITORY BEDS	0.0	0.06	BEDS		0.00%	$0	$0	0.0	0.06	BEDS	15	0.22%	$131,000	$0
SUBTOTAL	0.0			0	0.00%	$0		37.7			132	1.92%	$1,157,000	
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.39	AC		0.00%	$0	$0	0.0	0.39	AC		0.00%	$0	$0
DEVELOPED PARK	46.2	0.47	AC	20	0.29%	$175,000	$3,800	4.0	0.47	AC	14	0.20%	$123,000	$30,800
REGIONAL PARK	0.0	0.47	AC		0.00%	$0	$0	0.0	0.47	AC		0.00%	$0	$0
OPEN SPACE	0.0	0.00			0.00%	$0	$0	18.8	0.00			0.00%	$0	$0
CIVIC/REC SPACE	0.0	1.08	KSF	22	0.32%	$193,000	$0	0.0	1.08	KSF		0.00%	$0	$0
MARINA	0.0	0.15	BERTH		0.00%	$0	$0	0.0	0.15	BERTH		0.00%	$0	$0
SUBTOTAL	46.2			42	0.61%	$368,000		22.8			14	0.20%	$123,000	
TOTAL	46.2			42	0.61%	$368,000		67.1			424	6.15%	$3,718,000	

Transportation System Analysis

Transportation figures/allocation from Fehr & Peers - Mare Island Transportation Plan 8/97 with modifications as directed 11/97.

9. Education/Office — Total Acreage 104.4; Developable Acreage 83.5

10. Marina/Residential — Total Acreage 82.6; Developable Acreage 66.1

Road Improvements have not been allocated to the this area since development is expected to occure in the far future, past the 20 year plannng horizon.

	9. SITE TTL AC	9. PM PEAK	9. UNITS	9. TOTAL PM PEA	9. % OF TOTAL DEMAND	9. TOTAL COSTS	9. COST PER AC	10. SITE TTL AC	10. PM PEAK	10. UNITS	10. TOTAL PM PEA	10. % OF TOTAL DEMAND	10. TOTAL COSTS	10. COST PER AC
NON RESIDENTIAL														
HEAVY INDUSTRIAL	0.0	0.15	KSF		0.00%	$0	$0	0.0	0.15	KSF		0.00%	$0	$0
LIGHT INDUSTRIAL	8.2	0.76	KSF	82	1.19%	$719,000	$88,000	0.4	0.76	KSF		0.00%	$0	$0
WAREHOUSE	0.0	0.58	KSF		0.00%	$0	$0	0.0	0.58	KSF		0.00%	$0	$0
OFFICE/INCUBATOR	10.4	1.18	KSF	134	1.94%	$1,175,000	$112,700	0.8	1.18	KSF		0.00%	$0	$0
RETAIL	4.2	3.62	KSF	197	2.86%	$1,726,000	$414,800	3.3	3.62	KSF		0.00%	$0	$0
EDUCATION	29.7	0.83	KSF	321	4.66%	$2,814,000	$94,800	0.0	0.83	KSF		0.00%	$0	$0
SUBTOTAL	52.5			734	10.65%	$6,434,000		4.5			0	0.00%	$0	
RESIDENTIAL														
NEW CONDOS	0.0	0.48	DU		0.00%	$0	$0	66.7	0.48	DU		0.00%	$0	$0
EXISTING DUPLEXES	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
EXISTING SINGLE FAMILY	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
MULTI-FAMILY - REHAB	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
LIVE/WORK	0.0	0.48	DU		0.00%	$0	$0	0.0	0.48	DU		0.00%	$0	$0
DORMITORY BEDS	5.0	0.06	BEDS	31	0.45%	$272,000	$54,400	0.0	0.06	BEDS		0.00%	$0	$0
SUBTOTAL	5.0			31	0.45%	$272,000		66.7			0	0.00%	$0	
CIVIC/RECREATION/OPEN SPACE														
GOLF COURSE	0.0	0.39	AC		0.00%	$0	$0	0.0	0.39	AC		0.00%	$0	$0
DEVELOPED PARK	8.0	0.47	AC	16	0.23%	$140,000	$17,500	0.0	0.47	AC		0.00%	$0	$0
REGIONAL PARK	0.0	0.47	AC		0.00%	$0	$0	0.0	0.47	AC		0.00%	$0	$0
OPEN SPACE	36.2	0.00			0.00%	$0	$0	0.1	0.00			0.00%	$0	$0
CIVIC/REC SPACE	2.8	1.08	KSF	91	1.32%	$798,000	$288,900	0.0	1.08	KSF		0.00%	$0	$0
MARINA	0.0	0.15	BERTH		0.00%	$0	$0	11.3	0.15	BERTH		0.00%	$0	$0
SUBTOTAL	46.9			107	1.55%	$938,000		11.4			0	0.00%	$0	
TOTAL	104.4			872	12.65%	$7,644,000		82.6			0	0.00%	$0	

Transportation System Analysis

Transportation figures/allocation from Fehr & Peers - Mare Island Transportation Plan 8/97 with modifications as directed 11/97.

11. Golf Course

Total Acreage 170.8
Developable Acreage 136.6

	SITE	TRANSPORTATION FACTORS				ALLOCATED COSTS	
	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.15	KSF		0.00%	$0	$0
LIGHT INDUSTRIAL	0.0	0.76	KSF		0.00%	$0	$0
WAREHOUSE	0.0	0.58	KSF		0.00%	$0	$0
OFFICE/INCUBATOR	0.0	1.18	KSF		0.00%	$0	$0
RETAIL	0.0	3.62	KSF		0.00%	$0	$0
EDUCATION	0.0	0.83	KSF		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0	
RESIDENTIAL							
NEW CONDOS	0.0	0.48	DU		0.00%	$0	$0
EXISTING DUPLEXES	0.0	0.48	DU		0.00%	$0	$0
EXISTING SINGLE FAMILY	0.0	0.48	DU		0.00%	$0	$0
MULTI-FAMILY - REHAB	0.0	0.48	DU		0.00%	$0	$0
LIVE/WORK	0.0	0.48	DU		0.00%	$0	$0
DORMITORY BEDS	0.0	0.06	BEDS		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0	
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	122.3	0.39	AC	47	0.68%	$412,000	$3,400
DEVELOPED PARK	0.0	0.47	AC		0.00%	$0	$0
REGIONAL PARK	0.0	0.47	AC		0.00%	$0	$0
OPEN SPACE	48.5	0.00			0.00%	$0	$0
CIVIC/REC SPACE	0.0	1.08	KSF	30	0.44%	$263,000	$0
MARINA	0.0	0.15	BERTH		0.00%	$0	$0
SUBTOTAL	170.8			77	1.12%	$675,000	
TOTAL	170.8			77	1.12%	$675,000	

12. Regional Park

Total Acreage 216.0
Developable Acreage 172.8

	SITE	TRANSPORTATION FACTORS				ALLOCATED COST	
	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.15	KSF		0.00%	$0	$0
LIGHT INDUSTRIAL	0.0	0.76	KSF		0.00%	$0	$0
WAREHOUSE	0.0	0.58	KSF		0.00%	$0	$0
OFFICE/INCUBATOR	0.0	1.18	KSF		0.00%	$0	$0
RETAIL	0.0	3.62	KSF		0.00%	$0	$0
EDUCATION	0.0	0.83	KSF		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0	
RESIDENTIAL							
NEW CONDOS	0.0	0.48	DU		0.00%	$0	$0
EXISTING DUPLEXES	0.0	0.48	DU		0.00%	$0	$0
EXISTING SINGLE FAMILY	0.0	0.48	DU		0.00%	$0	$0
MULTI-FAMILY - REHAB	0.0	0.48	DU		0.00%	$0	$0
LIVE/WORK	0.0	0.48	DU		0.00%	$0	$0
DORMITORY BEDS	0.0	0.06	BEDS		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0	
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.39	AC		0.00%	$0	$0
DEVELOPED PARK	0.0	0.47	AC		0.00%	$0	$0
REGIONAL PARK	163.0	0.47	AC		0.00%	$0	$0
OPEN SPACE	53.0	0.00			0.00%	$0	$0
CIVIC/REC SPACE	0.0	1.08	KSF		0.00%	$0	$0
MARINA	0.0	0.15	BERTH		0.00%	$0	$0
SUBTOTAL	216.0			0	0.00%	$0	
TOTAL	216.0			0	0.00%	$0	

Transportation System Analysis

Transportation figures/allocation from Fehr & Peers - Mare Island Transportation Plan 8/97 with modifications as directed 11/97.

13. Open Space/ Recreation

Total Acreage 99.1

Developable Acrea 79.3

	SITE	TRANSPORTATION FACTORS				ALLOCATED COSTS	
	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC
NON RESIDENTIAL							
HEAVY INDUSTRIAL	0.0	0.15	KSF		0.00%	$0	$0
LIGHT INDUSTRIAL	0.0	0.76	KSF		0.00%	$0	$0
WAREHOUSE	0.0	0.58	KSF		0.00%	$0	$0
OFFICE/INCUBATOR	0.0	1.18	KSF		0.00%	$0	$0
RETAIL	0.0	3.62	KSF		0.00%	$0	$0
EDUCATION	0.0	0.83	KSF		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0	
RESIDENTIAL							
NEW CONDOS	0.0	0.48	DU		0.00%	$0	$0
EXISTING DUPLEXES	0.0	0.48	DU		0.00%	$0	$0
EXISTING SINGLE FAMILY	0.0	0.48	DU		0.00%	$0	$0
MULTI-FAMILY - REHAB	0.0	0.48	DU		0.00%	$0	$0
LIVE/WORK	0.0	0.48	DU		0.00%	$0	$0
DORMITORY BEDS	0.0	0.06	BEDS		0.00%	$0	$0
SUBTOTAL	0.0			0	0.00%	$0	
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	0.0	0.39	AC		0.00%	$0	$0
DEVELOPED PARK	0.0	0.47	AC		0.00%	$0	$0
REGIONAL PARK	0.0	0.47	AC		0.00%	$0	$0
OPEN SPACE	99.1	0.00			0.00%	$0	$0
CIVIC/REC SPACE	0.0	1.08	KSF		0.00%	$0	$0
MARINA	0.0	0.15	BERTH		0.00%	$0	$0
SUBTOTAL	99.1			0	0.00%	$0	
TOTAL	99.1			0	0.00%	$0	

Transportation System Analysis

Transportation figures/allocation from Fehr & Peers - Mare Island Transportation Plan 8/97 with modifications as directed 11/97.

TOTAL

Total Acreage 1,478.7

Developable Acreage 1,182.9

	SITE	TRANSPORTATION FACTORS				ALLOCATED COSTS	
	TTL AC	PM PEAK	UNITS	TOTAL PM PEA	% OF TOTAL DEMAND	TOTAL COSTS	COST PER AC
NON RESIDENTIAL							
HEAVY INDUSTRIAL	97.6	0.15	KSF	457	6.63%	$4,006,000	$41,100
LIGHT INDUSTRIAL	163.6	0.76	KSF	1,154	16.74%	$10,116,000	$61,800
WAREHOUSE	87.7	0.58	KSF	439	6.37%	$3,848,000	$43,900
OFFICE/INCUBATOR	128.6	1.18	KSF	3,141	45.57%	$27,536,000	$214,100
RETAIL	13.4	3.62	KSF	480	6.97%	$4,209,000	$314,000
EDUCATION	33.5	0.83	KSF	361	5.24%	$3,165,000	$94,600
SUBTOTAL	524.4			6,032	87.52%	$52,880,000	
RESIDENTIAL							
NEW CONDOS	66.7	0.48	DU	0	0.00%	$0	$0
EXISTING DUPLEXES	68.7	0.48	DU	201	2.91%	$1,758,000	$25,600
EXISTING SINGLE FAMILY	6.0	0.48	DU	9	0.13%	$79,000	$13,200
MULTI-FAMILY - REHAB	31.6	0.48	DU	91	1.33%	$801,000	$25,400
LIVE/WORK	5.9	0.48	DU	28	0.41%	$245,000	$41,400
DORMITORY BEDS	5.0	0.06	BEDS	46	0.67%	$403,000	$80,600
SUBTOTAL	183.8			375	5.44%	$3,290,000	
CIVIC/RECREATION/OPEN SPACE							
GOLF COURSE	122.3	0.39	AC	47	0.68%	$412,000	$3,400
DEVELOPED PARK	99.2	0.47	AC	133	1.93%	$1,166,000	$11,800
REGIONAL PARK	163.0	0.47	AC	0	0.00%	$0	$0
OPEN SPACE	366.9	0.00		0	0.00%	$0	$0
CIVIC/REC SPACE	7.7	1.08	KSF	305	4.43%	$2,674,000	$347,200
MARINA	11.3	0.15	BERTH	0	0.00%	$0	$0
SUBTOTAL	770.4			485	7.04%	$4,250,000	
TOTAL	1478.7			6,892	100.00%	$60,420,000	

APPENDIX B

PUMP STATION ANALYSIS

PREPARED BY

OCAMPO – ESTA CORPORATION

APPENDIX B1

REPORT OF FINDINGS
FOR
PUMP HOUSES

OPERATIONS AND MAINTENANCE (O&M)

Repair actions and associated costs are identified. These actions correspond to deficiencies identified in Appendix B4.

- In some cases, for smaller sized pumps and motors where actions ordinarily would require disassembly, it was found advantageous to indicate replacement in lieu of repair.
- Where pumps and motors could not be tested during the inspection of Task B it is recommended that power be provided and the items operated so that condition may be evaluated.
- Where National Electrical Code (NEC) violations were involved, replacement of equipment where necessary, is covered as an O&M action.

Evidence of poor maintenance occurred on all systems. A regular maintenance program should be initiated where all machines are operated once a month and unusual noises, failures, deleterious conditions are noted and reported. Painting should be an ongoing process as well as a concerted effort to identify and reduce sources of moisture in the pump houses. A mechanic and a painter should be assigned to these tasks full time. Estimates were not provided for this action as it should not be considered above and beyond a normal maintenance responsibility. Some actions specified such as monitoring a machine's noise or continuously operating a ventilation system were not provided cost estimates because those actions should be done during normal maintenance. Some examples of poor maintenance and some contributing reasons are:

- Most stations had widespread corrosion.
- Many pumps had excessively leaking seals which contributed to the corrosive environment.
- A leaking roof. Makeshift plywood and tarps used to cover interior electrical controls.
- Failure to repair leaking pipes.
- Some stations were difficult to access..
- Some equipment was exposed to the weather.

CAPITAL IMPROVEMENTS

Several capital improvements are recommended.

- Install pump houses where equipment is exposed to the weather. These are marked as "C".
- Increase the capacity of pump stations where projections indicate inadequacies. These are marked as "CU" for "Capacity Upgrade" . This is discussed further in the section titled "Ability to Meet Demand".
- Permanently install equipment which will allow safe and singular entry into some deep pit-type pump houses. This are marked as "CR" for "Cost Reduction". This action will reduce cost of entry into such spaces on a regular monthly basis for maintenance. Currently, it takes three men with winches, harnesses, flood lights, vent fans and gas detectors to effect an entry. Lighting, ventilation, gas detection with local alarm and ladders with cage are proposed to be installed. This will allow one man to do monthly maintenance. It is estimated that it currently

takes a three man crew 8 hours to enter inspect and test each location per month. With the new equipment it would take one man only 4 hours. Twenty hours saving for each entry once a month for each of fourteen pump houses receiving the modifications would cause the investment of $278,931 to be amortized in 43 months for men costing $65 per hour. Most importantly the ease of access will encourage regular maintenance. To save cost this modification is phased as early as possible.

Note: Many of these stations are on the Ship To Shore Waste Water System and were not inspected. Stations STS-A and STS-C were visually checked from the top and found to have inadequate ladders (no cage) and no lighting, ventilation or gas detectors that could be operated from the opening. Because the outward appearance of the rest of these STS stations is similar it is assumed they are the same. Every station for which this modification is recommended should be checked for all safety features when doing an operational check of the machinery. Adjust specific actions for each station. The estimates that are provided here are planning level estimates only. Cost estimate worksheets are included as Appendix B5 for guidance in case new estimates need to be made.

PRIORITY

Priorities have been assigned each O&M and Capital Improvement item and are shown. Priority is based upon importance of the defect or condition to the operation of the system. Assigned priorities are intended to show the sequence that actions should be taken. They do not imply that some actions are not important.

High priority work is repair of those "broken, seized and failed" items listed in the section titled "Determine Areas of High Maintenance, Failure or Blockage". Also included, are failure of structures or systems designed to protect equipment. Replacement of electrical equipment not meeting National Electrical Code (NEC) is included in this category because of it's relation to safety. Capacity Upgrade (CU) modifications are given a high (H) priority because they are needed to allow the system to operate correctly.

Medium priority work includes machinery making noises indicative of mechanical problems.

Low priority items require actions to prevent further deterioration of equipment. Addition of pump houses to protect exposed equipment is marked (C) and given a low (L) priority consistent. The Cost Reduction (CR) item which installs safety equipment to allow singular entry is given a low (L) priority. (This alteration if not done will still allow entry of personnel with proper portable equipment. So, it is not a "safety" item.)

USEFUL REMAINING LIFE

Useful remaining life is determined for two equipment condition states - without repair and/or upgrade and after repair and/or upgrade. The former indicates the importance of repair and/or upgrade. The latter is used to determine when to plan for replacement of equipment due to age -

also known as Life Cycle Replacement. Life Cycle Replacement costs are identified and marked with an "L". Appendix B3 shows how Useful Remaining Life was determined

Useful Remaining Life is based upon a baseline lifetime modified by running time, cyclic or steady use, and existing condition. The useful remaining life determination is primarily based upon non-quantified assessments and as such is purely a judgment. These determinations do not apply to piping and cabling unless noted otherwise. Piping and cabling usually appeared to be in good condition. Unless noted otherwise it is assumed that all equipment at each station was installed at the same time. Some factors considered are:

- Experience has shown that equipment life can range between twenty and thirty years. Thirty years was chosen as the baseline expected life for pumps, motors, valves and electrical control components.
- Running time is proportional to the age of the equipment. Data from hour-meters when present in pump houses is noted in Appendix B3. All stations operated cyclically (intermittently).
- All equipment normally operates intermittently, i.e. on demand.
- Two condition states are applicable to each station - without repair/upgrade and after repair/upgrade. Useful Remaining Life is estimated for each state.
- When an item has exceeded a normal lifetime it may continue to operate for undetermined additional number of years after repair. It is assumed for this study that fifty-two year old or younger items will continue to operate an additional twenty years. Fifteen years is given to sixty-five year old items. If old items with exposed moving parts are in a High Maintenance Area, their remaining life is halved.
- Where a pump could not be operated because of no power available at the time of inspection, it is assumed that the pump does not operate satisfactorily. An action is added in such cases to provide power and test operate to assess condition.

PHASING OF ACTIONS

The following provides all the information relative to each station which supports the decisions on phasing of actions and associated costs. It includes a list of useful remaining life for components, repair actions, priorities, funding source (type) and the year by which actions should be taken. It also, includes assessment of capacity, whether or not it is satisfactory and when it must be upgraded if necessary. Service is discussed and comments supporting the rationale for phasing or canceling of work. The last table on the sheet for each station is the culmination of all previous assessments.

Causeway Water Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	10	10
Controllers	10	10
Motors	10	10
Lighting	0	0
Pump #1	10	10
Pump #2	10	10
Piping	20	20
Valves	0	10

Action	Priority	Cost ($)	Funding	Year
Electrical distribution system: Replace corroded equipment, rewire to correct code infractions, install existing transformers on elevated concrete pad.	H	6300	O&M	1997
Controllers: Replace the 50 hp low voltage motor magnetic starter with new in corrosion resistant enclosure. Inspect, clean, torque connections, and paint exterior enclosure. Install HV motor starter on new elevated concrete pad.	H	3500	O&M	1997
Motors, Pumps, Piping: Clean, inspect, paint.	H	930	O&M	1997
Lighting: Replace lighting fixtures with new corrosion resistant, fluorescent, outdoor type	H	2600	O&M	1997
#1 Motor & Pump: Provide power and test operate.	H	460	O&M	1997
#2 Motor & Pump: Provide drainage or sump pump to maintain water free environment.	H	4700	C	2007
#2 Pump: Adjust or repair mechanical seal	H	1580	O&M	1997
Valves	H	13460	O&M	1997
Replace all equipment	-	47060	L	2007
Install protective cover structure/ pumphouse	H	24500	C	2007

Priority: L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Currently marginal for support of firefighting. System is being modeled by the City of Vallejo. Preliminary results indicate the need to install a large tank on Mare Island. This will eliminate the need for this station. The tank should be constructed and in service prior to 2007.

Service:
Pumps at this station boost pressure to Mare Island of supply water when demand is high. This station is on one of the two fresh water supply pipes to Mare Island.

Comments:
This station, with it's very old equipment which is in poor condition, should have code violations corrected immediately (for safety of operators) and be maintained until the new tank is in service. Accordingly, only the O&M actions are included (Capital Improvements and Lifecycle replacements are excluded) from the following plan. Plan on abandonment once the new tank is in service.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	28830	-	-
Capital Improvements (Total)	-	-	-
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

Building 774 Water Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1	0	15
Pump #2	0	15
Pump #3	15	15
Piping	20	20
Valves	20	20
4 & 8 inch Gate Valves	10	15

Action	Priority	Cost ($)	Funding	Year
Electrical distribution system: Repair corroded equipment enclosures and paint.	L	2000	O&M	1997
Controllers: Repair malfunctioning controller.	H	2500	O&M	1997
Pumps, Piping & Valves: Clean and preserve.	H	3240	O&M	1997
#1 & #2 Pumps: Provide power and test operate.	H	920	O&M	1997
Replace all equipment	-	125850	L	2007

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade ~~Cap. Improv., CR =~~ Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. This station is required now and after installation of the new tank (prior to 2007). System analysis being performed by the City will account for the existing capacity of this station.

Service:
Boosts pressure.

Comments:
Because the pumps are very old and in a High Maintenance area where equipment is subject to a very moist environment, the pumps (and associated motors) should be replaced by 2007. The investment should be protected by installing a ventilation system at that time. Maintenance actions should be taken soon.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	7890	-	-
Capital Improvements (Total)	-	125850	-
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	125850	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

Building 645 Water Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	5	20
Controllers	10	20
Motors	10	20
Lighting	10	20
Pump	10	15
Valves	15	15
Piping	20	20

Action	Priority	Cost ($)	Funding	Year
Electrical distribution system: Correct code infractions. Replace existing fuse cutouts mounted on wall with new NEMA 3R high voltage fused load interrupter. Replace panelboards with new NEMA 3R. Inspect and clean transformer.	H	35000	O&M	1997
Pump & coupling, Valves and Piping: Clean and preserve.	L	E	O&M	1997
Repair roof to prevent leaking on electrical equipment.	H	1460	O&M	1997
Install equipment for safe independent entry	H	E	CR	1997
Tank Level Indicator	H	E	O&M	1997
~~Replace all equipment~~	~~-~~	~~44960~~	~~L~~	~~2007~~

E: Estimate not completed. Not required - see comments.

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity: Not applicable. See Comments.

Service:
Boosts pressure.

Comments:
This station is currently shut-down and abandoned. The pipe supplying the reservoir it services at Cedar and 5th Street leaks and has been abandoned. No action is planned.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	-	-	-
Capital Improvements (Total)	-	-	-
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

Building 880 Water Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump	20	20
Valves and piping	20	20

Action	Priority	Cost ($)	Funding	Year
Controllers: Provide working clearance in front of controller per code.	M	2500	O&M	1997
Pump: Test operate the pump	H	460	O&M	1997
Pump fasteners, bedplate, mounting bosses, coupling guard supports: Clean and paint.	L	360	O&M	1997
Pumphouse: Clean and paint	L	3000	O&M	1997
Replace all equipment	-	39000	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., ~~CR = Cost Reduction~~ Cap. Improv.

Capacity:
Satisfactory through 2017. The City is currently performing a study of the system. Preliminary results show this station will be needed after installation of the new tank. System design will account for the capacity of this station.

Service:
Sends water to Tank 920. Currently used by the Fire Department to boost pressure.

Comments:
This is the newest pump station on Mare Island being only eight years old and is in relatively good condition. Safety issues with the controller should be resolved soon as well as the maintenance items.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	6320	-	-
Capital Improvements (Total)	-	-	39000
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	39000
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-1 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Pump #1	1	20
Pump #2	20	20
Pumphouse	10	30
Valves	20	20
Piping	20	20

Action	Priority	Cost ($)	Funding	Year
Transformer: Tape exposed energized terminals & ground tanks. (Safety)	H	400	O&M	1997
Fence: Install new DANGER signs. (Safety)	H	150	O&M	1997
Pump #1: Tighten set screw on loose coupling.	H	260	O&M	1997
Pumphouse: Paint door and door frame.	L	310	O&M	1997
Replace all equipment	-	44800	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Pumping capacity is two pumps at 400 gpm each or 800 gpm total. Current demand is estimated at 81 gpm daily average and 167 gpm peak. This increases to 151 gpm and 273 gpm respectively in 2007 and 2017 years. The area served (1/3 of Reuse Area 1) will be fully developed by 2007.

Service:
Lifts wastewater in the North West portion of Mare Island to the main line along Railroad Avenue. This is in Area 1, North Light Industry, which will be redeveloped in the near future.

Comments:
This pump house and equipment are in good condition. After repair of the loose coupling, normal maintenance should result in another twenty years service. The safety items should be corrected at the earliest opportunity.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	1120	-	-
Capital Improvements (Total)	-	-	44800
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	44800
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-2 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1	5	10
Pump #2	0	10
Pump #3	5	10
Piping	20	20
Valves	20	20
Ventilation system	10	10
Sump pump	0	15

Action	Priority	Cost ($)	Funding	Year
Pumps, valves, piping: Clean and preserve.	L	3520	O&M	1997
#1 & #3 Pumps: Adjust packing to reduce leakage	H	1400	O&M	1997
#2 Pump: Provide power and operate the pump.	H	380	O&M	1997
#3 Pump: Observe vibration monthly and note any trends	H	NA	NA	-
Sump Pump: Replace	H	2500	O&M	1997
Ventilation System: Monitor mechanical condition of ventilation system. Operate it continuously to reduce moist environment.	H	NA	NA	-
Exterior water pipe: Repair leak.	M	380	O&M	1997
Replace all equipment	-	145930	L	2007

NA: These items should be covered under routine maintenance during regular monthly rounds.

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017 and beyond. This station has three pumps each having a capacity of 1070 gpm. The estimated ultimate flow demand is 151 gpm average daily and 273 gpm peak.

Service:
Lifts wastewater in the North West portion of Mare Island, Southerly from DOM-1, to the main line along Railroad Avenue. This is in Area 1, North Light Industry, which will be redeveloped in the near future.

Comments:
This is a high maintenance area and as such the life of this old equipment will be limited. Life can be extended with regular maintenance and operation of the ventilation system to reduce moisture. Perform the maintenance actions first. Plan for replacement of the equipment by 2007.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	8180	-	-
Capital Improvements (Total)	-	145930	-
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	145930	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-3 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1	10	10
Pump #2	0	10
Ventilation system	10	10
Piping	20	20
Valves	10	20
Other valves	20	20

Action	Priority	Cost ($)	Funding	Year
Pumps, Valves, Piping: Clean and preserve.	M	2620	O&M	1997
#2 Pump: Provide power and test run the pump	H	460	O&M	1997
Ventilation system: Continuously operate to minimize moist environment.	M	NA	NA	-
Exterior water pipe: Permanently repair the pipe and remove temporary hose.	M	700	O&M	1997
Install safety equipment to allow independent entry	L	7900	CR	1997
Replace all equipment	-	158240	L	2007

NA: These items should be covered under routine maintenance during regular monthly rounds

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Adequate through 2017. Current pump capacity is not known for sure. However, each of the two motors is rated at 3 hp. Estimated capacity based upon the horsepower and flow from pumps of the same horsepower is estimated at 180 to 504 gpm each. Estimated peak demand increases through 1997, 2007 and 2017 from 40, 58 and 84 gpm respectively. Average daily flow similarly increases from 19, 34 and 50 gpm during the same period.

Service:
Lifts wastewater from areas immediately South of the causeway and East of Railroad Avenue in reuse Area 3, Office/Light Industry, to the main line along Railroad Avenue.

Comments:
This is a High Maintenance area causing estimated life of equipment to be reduced from twenty to ten years. Close attention to regular maintenance and ventilation can extend the life. Plan for replacement of equipment by year 2007. Operate and assess the condition of #2 Pump first and perform necessary repairs and maintenance. Equipment is in a deep pit. And, to save cost, the station should receive modifications allowing singular entry as soon as possible.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	3780	-	-
Capital Improvements (Total)	7900	158240	-
Cost Reduction (CR)	7900	-	-
Life Cycle Replacement (L)	-	158240	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-4 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Emergency generator	20	20
Emergency generator starting batteries	20	20
Pump #1	1	10
Pump #2	1	10
Pump #3	0	10
Pump #4	1	10
Valves	5	10
Air Compressor	5	10
Sump pump	15	15
Piping	10	15

Action	Priority	Cost ($)	Funding	Year
Emergency Generator: Perform general maintenance, repair broken coolant sensor, install emergency push-button on the exterior wall, repair or replace water jacket heater.	H	5000	O&M	1997
Emergency Generator starting batteries: Replace with new lead acid type.	H	3000	O&M	1997
All four pumps: Refurbish, clean and preserve	H	84000	O&M	1997
Air compressor: Refurbish.	M	8200	O&M	1997
Operate ventilation continuously to minimize moisture	H	NA	NA	1997
Water supply line backflow preventer: Repair leak	H	380	O&M	1997
Install safety equipment to allow individual entry	L	11200	CR	1997
Replace all equipment	-	321300	L	2007

NA: These items should be covered under routine maintenance during regular monthly rounds

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Capacity is one pump at 1600 gpm and three pumps at 4600 gpm each. Maximum demand occurs in 2017 and is estimated at 2741 gpm.

Service:
This station receives all wastewater on the Island and forwards it to Vallejo via the causeway for processing.

Comments:
This is a High Maintenance area causing estimated life of equipment to be reduced from twenty to ten years. Close attention to regular maintenance and ventilation can extend the life.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	100580	-	-
Capital Improvements (Total)	11200	321300	-
Cost Reduction (CR)	11200	-	-
Life Cycle Replacement (L)	-	321300	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-4W Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1,2 & 3	20	20
Piping & Valves	20	20
Air Compressor	20	20
Ventilation system	20	20

Action	Priority	Cost ($)	Funding	Year
Valves and Piping: Clean and preserve	L	6400	O&M	1997
Both DOM-4 and DOM-4W are served by a common power distribution switchboard. See DOM-4 for actions required for electrical equipment.	-	-	-	-
Install safety equipment to allow individual entry	L	11200	CR	1997
Replace all equipment	-	316350	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Capacity is three pumps at 1800 gpm each. Maximum demand occurs in 2017 and is estimated at 2741 gpm.

Service:
This station receives all wastewater on the Island and forwards it to DOM-4 for pumping to Vallejo for processing. This station formerly forwarded wastewater to the Islands treatment plant.

Comments:
This station is in relatively good condition. Plan for replacement in twenty years. Perform maintenance and install cost reduction modifications as soon as possible.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	6400	-	-
Capital Improvements (Total)	11200	-	316350
Cost Reduction (CR)	11200	-	-
Life Cycle Replacement (L)	-	-	316350
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-5 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1 & 2	0	15
Valves	15	20
Piping	15	20
Sump pump	10	10
Blower	10	10

Action	Priority	Cost ($)	Funding	Year
Provide working 36" clearance in front of blower motor and sump pump controller per code	H	2500	O&M	1997
#1 & #2 Pumps: Operate pumps to check condition. Check for cause of corrosion, e.g. loose packing.	H	760	O&M	1997
Both Pumps stuffing and bearing areas, cases, shafts, suction gauges, inlet piping, pump hold-down bolts: Clean and preserve	M	720	O&M	1997
Ventilation blower: Operate continuously to minimize moisture.	H	NA	NA	1997
Replace all equipment	-	113100	L	2007

NA: These items should be covered under routine maintenance during regular monthly rounds

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Existing capacity is two pumps each rated at 650 gpm. Maximum estimated demand is 52 gpm (in 2017).

Service:
This station lifts wastewater from areas East of Railroad Avenue in the vicinity of Building 91 to the main running along Railroad Avenue. This is in Area 3, Office/Light Industry, of the reuse plan.

Comments:
This is a High Maintenance area causing estimated life of equipment to be reduced from twenty to ten years. Close attention to regular maintenance and ventilation can extend the life. The pumps should be operated and condition assessed. Repair, maintenance and safety actions should be performed as soon as possible.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	3980	-	-
Capital Improvements (Total)	-	113100	-
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	113100	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-6 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1 & 2	1	10
Valves & Piping	10	10
Sump pump	5	10
Air compressor	5	10

Action	Priority	Cost ($)	Funding	Year
#1 & #2 Motors and Pumps: Refurbish (Noisy bearings, leaking mechanical seals)	H	16200	O&M	1997
~~Pumps, valves, piping: Clean and preserve~~	~~M~~	~~1240~~	O&M	~~1997~~
Ventilation system, Air Compressor, Sump Pump: Clean..	M	1470	O&M	1997
Operate ventilation system continuously to reduce moist environment	H	NA	NA	1997
Install safety equipment to allow independent entry	L	11200	CR	2007
Replace all equipment	-	129000	L	2007

NA: These items should be covered under routine maintenance during regular monthly rounds

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Station has two pumps having capacity of 850 gpm each. Estimated maximum demand will be 105 gpm in 2017.

Service:
This station lifts wastewater from the vicinity of Wichels Park to the main running down Railroad Avenue. It is in reuse Area 3, Office/Light Industry.

Comments:
This is a High Maintenance area causing estimated life of equipment to be reduced from twenty to ten years. Close attention to regular maintenance and ventilation can extend the life. Perform maintenance and install cost reduction modifications as soon as possible.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	18910	-	-
Capital Improvements (Total)	-	140200	-
Cost Reduction (CR)	-	11200	-
Life Cycle Replacement (L)	-	129000	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-7 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1	1	15
Pump #2	0	15
Pump #3	15	15
Piping & Valves	15	15
Ventilation system	10	15
Air Dryer	2	15

Action	Priority	Cost ($)	Funding	Year
Controllers: Repair malfunctioning motor speed indicator.	H	300	O&M	1997
#1 Pump & Motor: Disassemble and repair (Loud noise when stopping)	H	4200	O&M	1997
#2 Pump: Provide power and test operate.	H	460	O&M	1997
#1, #2 & #3 Pumps: Adjust or replace mechanical seals.	H	3840	O&M	1997
All pumps, piping and valves: Clean and preserve (especially pump couplings)	M	3100	O&M	1997
Ventilation system: Clean	L	2750	O&M	1997
Air Dryer: Refurbish	H	3000	O&M	1997
Install safety equipment to allow independent entry	L	8200	CR	1997
Add a pump to meet increased demand after 2007	H	25000	CU	2007
Replace all equipment	-	129000	L	2007

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2007. The station has three pumps each having a capacity of 400 gpm. Estimated demand is peak 1167, 502 and 985 gpm in years 1997, 2007 and 2017 respectively. Estimated average daily demand is similarly 288, 297 and 614 gpm. Current peak demand is highly influenced by tidal action and inflow by ground water in the South end of the Island. That is expected to be resolved by 2007. With the inflow the station is currently operating near the limit of it's capacity with all three pumps operating. In year 2007 two of the three pumps would be required to meet the peak demand. Ultimately, in year 2017, the peak demand would require all three pumps to operate. Another pump must be installed to provide necessary redundancy for year 2017.

Service:
The South half of the Island. It receives flow from DOM-9, -8, -17, -18; SPS-5, SPS-NAD-1, -2, -3; STS-K, -L, -M, -N, -O, R, -S, -T, -V and numerous connector lines. It sends wastewater to DOM-4W.

Comments: This station is very old and equipment useful remaining life is limited. Equipment should be programmed for replacement in year 2007 and an additional pump added at that time to meet increased demand. Perform maintenance and install cost reduction modifications as soon as possible.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	17650	-	-
Capital Improvements (Total)	8200	154000	-
Cost Reduction (CR)	8200	-	-
Life Cycle Replacement (L)	-	129000	-
Capacity Upgrade (CU)	-	25000	-
Other Capital Improvements (C)	-	-	-

DOM-8 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1 & 2	2	15
Piping & Valves	15	15
Air compressor	5	15
Blower	5	15

Action	Priority	Cost ($)	Funding	Year
#1 & # 2 Pumps: Repair major leaks on mechanical seals.	H	4720	O&M	1997
Pumps, valves and piping: Clean and preserve	L	1240	O&M	1997
Air Compressor: Groom	M	460	O&M	1997
Ventilation System: Refurbish (loud and noisy)	H	2750	O&M	1997
Water supply to building: Repair leak	M	380	O&M	1997
Install safety equipment to allow independent entry	L	8200	CR	1997
Replace all equipment	-	129000	L	2007

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. This station has two 850 gpm pumps. The maximum peak flow occurs in 2017 and is estimated at 83 gpm.

Service:
Lifts wastewater from the South end of Area 5, Heavy Industry, and sends it to the main running along Railroad Avenue.

Comments:
Perform repairs, maintenance and install cost reduction modifications as soon as possible. Replace this old equipment by 2007.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	9550	-	-
Capital Improvements (Total)	8200	129000	-
Cost Reduction (CR)	8200	-	-
Life Cycle Replacement (L)	-	129000	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-9 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system		
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1	10	15
Pump #2	1	15
Piping & Valves	15	15
Ventilation System	10	15
Sump pump	10	15
Compressor	10	15

Action	Priority	Cost ($)	Funding	Year
All pumps, valves and piping: Clean and preserve (especially at the couplings)	H	2270	O&M	1997
#2 Pump motor: Refurbish (bearing noise)	H	4100	O&M	1997
#2 Pump mechanical seal: Replace seals	H	2750	O&M	1997
Groom and clean Ventilation system	M	3070	O&M	1997
Monitor condition of Sump Pump	M	NA	NA	1997
Install safety equipment to allow independent entry	L	8200	CR	1997
Replace all equipment	-	129000	L	2007

NA: These items should be covered under routine maintenance during regular monthly rounds

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. The station has two 600 gpm pumps. Maximum peak flow occurs in year 2017 with estimated value of 218 gpm.

Service:
Areas South of the South finger piers. This includes Area 10 (Marina/Residential) and Area 12 (Regional Park). The station is receives flow from SPS-5, SPS-NAD-1, -2, -3; STS-R, -V; and local connector lines. Flow is forwarded to DOM-7. Both area are not likely to be developed until beyond year 2007.

Comments:
Perform repairs, maintenance and install cost reduction modifications as soon as possible. Replace this old equipment by 2007.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	12190	-	-
Capital Improvements (Total)	8200	129000	-
Cost Reduction (CR)	8200	-	-
Life Cycle Replacement (L)	-	129000	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-10 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Pump	20	20
Valves & Piping	20	20
Controller & Electrical Equipment	20	20

Action	Priority	Cost ($)	Funding	Year
Safety item: Install railing to prevent inadvertent tripping or falling onto equipment.	M	7200	O&M	1997
Safety item: Secure cabling in standard cable hangers.	H	180	O&M	1997
Turn lighting on in building M37 and assure sufficient lighting in area of pump controls and piping.	L	100	O&M	1997
Replace all equipment	-	129000	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Estimated capacity is 30 to 34 gpm. Very little growth, if any, in demand is anticipated.

Service:
The station serves only the waste generated in Building M37. It also prevents flow from nearby main lines from flowing back into the basement of the building. It is located in reuse Area 8, Coral Sea Village.

Comments:
Maintain these submersible pumps and motors and replace in 2017. Correct safety items in 1997.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	7480	-	-
Capital Improvements (Total)	-	-	129000
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	129000
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-12 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers - Obsolete and in code violation	20	20
Motors	20	20
Pump #1	0	20
Pump #2	0	20
Piping & Valves	20	20

Action	Priority	Cost ($)	Funding	Year
Controllers: Replace with new in corrosion resistant Nema 3R enclosure.	H	1500	O&M	1997
#1 & #2 Pumps: Provide power and test operate.	H	920	O&M	1997
Valves: Clean and preserve	L	310	O&M	1997
Install protective pump house *See comments.	L	7200	C	1997
Install temporary protective cover over equipment	L	500	O&M	1997
Replace all equipment *See comments.	-	102900	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. The station has two pumps with each rated at 240 gpm. Demand is currently zero gpm, not likely to increase significantly, and certainly will not approach the capacity of this station.

Service:
The station serves a restroom between the Building Ways and was used to collect from STS-E and STS-F. STS-E and STS-F have been removed. The only possible use is to service the restroom which might in the future be used by visitors to the Historical District, Area 4.

Comments:
This station should be maintained until clear plans for use of the Historical District have been

completed. Install temporary protective cover. If it is determined that the restroom will no longer be needed in this location the station can be abandoned. Do not install the protective pump house or lifecycle replace equipment until it is clear that the pumps will be needed.*

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	3230	-	-
Capital Improvements (Total)	-	-	102900
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	102900
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-16 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Pump #1 & 2	20	20
Piping & Valves	2	20
Check valve for #1 Pump	1	20

Action	Priority	Cost ($)	Funding	Year
Check valve for #1 Pump: Replace broken valve	H	360	O&M	1997
Install safety equipment to allow independent entry	L	8200	CR	1997
Replace all equipment	-	66500	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. The station has two pumps each having a capacity of 315 gpm. The maximum peak flow will occur in 2017 and is estimated at 53 gpm.

Service:
Area 6, Farragut Village and housing areas at the center of the Island. Lifts wastewater to the main at Railroad Avenue.

Comments:
Station is in relatively good condition. Plan for replacement of equipment in twenty years. Install the cost reduction alteration, repair and maintain starting in 1997.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	360	-	-
Capital Improvements (Total)	8200	-	66500
Cost Reduction (CR)	8200	-	-
Life Cycle Replacement (L)	-	-	66500
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

DOM-17 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Pump	20	20
Piping & Valves	20	20

Action	Priority	Cost ($)	Funding	Year
Valves and Piping: Clean and preserve	L	720	O&M	1997
Install additional pump	H	45700	CU	1997
Replace all equipment (Including additional pump)	-	66500	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Capacity of the one pump is not known. The pump motor is rated at 3hp. Demand is currently estimated at 4 gpm peak flow. A doubling of demand probably would not exceed the capacity of this pump.

Service:
The station serves the restaurant and restroom facilities at the golf course clubhouse. Wastewater is pumped over the hill to the main along Railroad Avenue.

Comments:
The golf course is planned for twice as many holes which should cause expansion of the clubhouse with associated increase in demand on this pumping station.. This expansion is expected to occur in early years. Two pumps are required to provide sufficient redundancy to allow repairs and to avoid disruption of service. Initiate maintenance actions immediately.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	720	-	-
Capital Improvements (Total)	45700	-	66500
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	66500
Capacity Upgrade (CU)	45700	-	-
Other Capital Improvements (C)	-	-	-

DOM-18 Domestic Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Pump #2 & #3	0	20
Valves & Piping	20	20
Check valve on #2 Pump	0	20

Action	Priority	Cost ($)	Funding	Year
Motor: Repair grounded motor	H	400	O&M	1997
#3 Pump and Motor: Provide power and test operate.	H	360	O&M	1997
Discharge check valve for #2 Pump: Install missing counterbalance.	H	2160	O&M	1997
Replace all equipment	-	41900	L	2017

NOTE: Pump labeled #1 is in adjacent pit. It is actually SDPS-13. It has same equipment.

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Pump capacity is not known for sure. The motor rated horsepower is 1.5. Estimated capacity is 90 to 252 gpm for each pump. Maximum peak demand will occur in 2017 at an estimated rate of 27 gpm.

Service:
This station services a ~~small~~ ~~group of buil~~dings in the Western central portion of ~~reuse~~ Area 9, Education/Office.

Comments:
Perform the repair actions and test operate pump having grounded motor. Cost reduction modifications for singular entry into this pit are not necessary as all necessary safety equipment is

installed (ladder, ventilation, lighting, gas test equipment is not required here). Equipment is in relatively good condition and should be replaced by year 2017.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	2920	-	-
Capital Improvements (Total)	-	-	41900
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	41900
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

STS-H Ship To Shore Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Pumps #1 & #2	0	15
Oilers	10	15

Action	Priority	Cost ($)	Funding	Year
#1 & #2 Pump Pneumatic Controls, inlet and outlet gate valves and air lines. #1 & #2 Oiler assemblies in particular the bonnet of spring loaded diaphragm valve. : Remove rust and apply preservative coating.	M	1120	O&M	1997
Pneumatic lines at pumps: Connect lines.	H	720	O&M	1997
Four oil bowls and fittings: Clean out caked oil and repair leak	H	760	O&M	1997
Replace all equipment (not including the tank)	-	78840	L	2007

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2007. Two ejector pumps rated at 100 gpm each. No increase in demand will occur.

Service:
This serviced ships that were in the Dry-dock #1. None are located there presently. And, none are expected to be docked there. This Dry-dock is a historical landmark within the Historical District, reuse Area 4. Future use could involve restrooms associated with displays within the dry-dock and attendant visitors. Wastewater is pumped to a header which runs along California Street which in turn drains to the main which runs along Railroad Avenue.

Comments:
Recommend this station be maintained until a decision is made as to the nature and extent of displays in the area and need for restrooms in the dry-dock. If needed, the equipment should be programmed for replacement by 2007.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	2600	-	-
Capital Improvements (Total)	-	78840	-
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	78840	-
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

STS-I Ship To Shore Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	5	5
Motor/Pump #1 & 2	0	20

Action	Priority	Cost ($)	Funding	Year
Controllers: Clean and refurbish	H	4500	O&M	1997
Sump Pump: Clean and preserve	L	310	O&M	1997
Pumps, Motors and Sump Pump: Provide power and test operate.	H	1250	O&M	1997
Replace all equipment (not including tanks)	-	117120	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Three submersible pumps rated at 350 gpm each. Increase in demand will not occur.

Service:
This serviced ships that were in the Dry-dock #2. None are located there presently. And, none are expected to be docked there. This Dry-dock is within the Historical District, Reuse Area 4. Future use could involve restrooms associated with displays within the dry-dock and attendant visitors. Wastewater is pumped to a header which runs along California Street which in turn drains to the main which runs along Railroad Avenue.

Comments:
Recommend this station be maintained until a decision is made as to the nature and extent of displays in the area and need for restrooms in the dry-dock. The equipment is programmed for replacement by 2017. If not needed, do not lifecycle replace.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	6060	-	-
Capital Improvements (Total)	-	-	117120
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	117120
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

STS-R, STS-S & STS-T Ship To Shore Sewage Pump Stations

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system (ea)	20	20
Controllers (2 ea)	0	0
Motors (2 ea)	20	20
Pump #1 & 2 (ea)	0	20

Action	Priority	Cost ($)	Funding	Year
All controllers: Replace with (3) new motor magnetic starters in Nema 3R corrosion resistant enclosure. * See note.	H	5400	C	-
STS-S Motor: Repair corroded grease fittings	H	200	O&M	1997
STS-S Controller: Replace broken alarm indicating light. *	H	400	O&M	-
All (6) pumps and motors: Disassemble, repair & test. * See note.	H	70800	O&M	-
Replace (6) level controls and accessories. * See note.	H	22800	O&M	-
Clean and preserve pumps and motors	H	1860	O&M	1997
Pumphouses: Provide (3) permanent structures to cover and protect equipment..	H	22800	C	2017
Temporary enclosures (3) to protect equipment.	H	1500	O&M	1997
Replace all equipment	-	250880	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Stations -R & -S are rated at 880 gpm. Station -T is rated at 1000 gpm. This should be adequate for the marina which the pumps will ultimately serve.

Service:
The pumps used to serve ships homeported at the three finger piers. The Reuse plan for Area 10 (Marina/Residential) indicates that these piers will be used for a marina. These pumps could serve the marina.

Comments:
The pumps will not be needed possibly until year 2017 when they will have exceeded their useful remaining life. Plan for replacement of pumps, motors and control equipment in 2017. Because this is a High Maintenance area, equipment, if used, should be protected with a permanent pump house structure. The pump stations should be cleaned, painted and protected with temporary covers until precise plans are developed for the area. These pumps should be considered for use at SDPS-13 where pumps of this size are needed.

Note: Items in the above table should not have the actions marked by an asterisk (*) taken until it is decided to reuse the equipment. The cost information is provided for reference and not included in the time phased costs below.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	3560	-	-
Capital Improvements (Total)	-	-	273681
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	250881
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	22800

STS-A, STS-C, STS-J, STS-K, STS-L, STS-M, STS-N, STS-O & STS-V Ship To Shore Sewage Pump Stations

Useful Remaining Life	Without Repair	With Repair
Pumps #1 & 2 (ea)	0	20

Action	Priority	Cost ($)	Funding	Year
All (18) pumps and motors: Inspect and test equipment for proper operation.	H	75600	O&M	1997
Pump houses: Install permanent safety equipment in each pumphouse (9) to allow independent entry for routine maintenance. (Includes lighting, ventilation, gas detection with local alarm and ladder with cage)	L	238535	CR	1997
Replace all equipment (9 stations)	-	926415	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. No increase in demand is foreseen.

Service:
These stations serve ships berthed along the waterfront. STS-V serves ships at the land side of the Southern finger piers. STS-K, -L & -M service Dry-docks #2, #3 and #4. The remainder

service berths along the waterfront from the Northern end of Area 3 (Office/Light Industry), South through Area 4 (Historical District) and to the South end of Area 5 (Heavy Industrial). There is no mention in the reuse plan of berthing of ships at the waterfront. The Northernmost station, STS-A, is being prepared currently for pumping fuel oil to a visiting ship. And, the adjacent station, STS-C, is being prepared for use also.

Comments:
STS-A through STS-V should be maintained in operating condition until future use of the waterfront is better defined. This equipment has not been inspected nor test operated yet to assess it's condition. Accomplishment of safety equipment modifications will reduce the cost of maintenance dramatically.

Time Phased Costs ($) for 9 stations	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	75600	-	-
Capital Improvements (Total)	238535	-	926415
Cost Reduction (CR)	238535	-	-
Life Cycle Replacement (L)	-	-	926415
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

SPS-1, SPS-2, SPS-3 Sewage Pump Stations

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	10	20
Controllers		
SPS-1	0	20
SPS-2	20	20
SPS-3	10	20
Motors	20	20
Lighting	5	5
Pump #1 & 2	0	15
Valves & Piping	20	20
Fans	0	15

Action	Priority	Cost ($)	Funding	Year
SPS-3: Electrical distribution system: Replace corroded equipment. Replace disconnect switches with fusible type.	H	1500	O&M	1997
Controllers for SPS-3: Refurbish	H	2500	O&M	1997
SPS-3: Lighting system: Replace corroded lighting fixtures with new corrosion resistant, fluorescent type.	H	200	C	1997
SPS-3: pumps and motors and fans: Provide power and operationally test.	H	1010	O&M	1997
SPS-3: Install missing bubbler pump and connect tubing.	H	907	O&M	1997
SPS-3: Pumphouse steel supports: Clean and preserve	L	620	O&M	1997
SPS-3: Pumphouse weather-stripping: replace.	H	480	O&M	1997
SPS-3: Replace all equipment	-	78500	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. Each of the two pumps at each station has the capacity of 300 gpm. The recreational demand will not exceed the capacity of one station.

Service:
SPS-1, -2 and -3 service the finger piers at the North end of the Island. These SPS stations are connected in series with each station downstream (including SPS-4) boosting waste water to the trunk line at Railroad Avenue. The Reuse Plan says that the piers will be used for recreation (fishing) in the far future. Station SPS-3 is on the pier but closest to land. SPS-4 is on land and boosts waste water from SPS-3 to the trunk line.

Comments:
Abandon SPS-1 and SPS-2. Repair and maintain SPS-3 and SPS-4. Plan for replacement of SPS-3 and SPS-4 by year 2017.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	6250		
Capital Improvements (Total)	200		78500
Cost Reduction (CR)			
Life Cycle Replacement (L)			78500
Capacity Upgrade (CU)			
Other Capital Improvements (C)	200		

SPS-4 Ship To Shore Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	20	20
Lighting	20	20
Pump #1 & 2	5	20
Valves & Piping	20	20
Fans	20	20

Action	Priority	Cost ($)	Funding	Year
Electrical distribution system: Install transformers on a higher concrete pad to prevent from flooding. Remove weeds around transformer. Restore transformer nameplate. Install new DANGER signs on fence.	H	3200	C	1997

SPS-4 Ship To Shore Sewage Pump Station (continued)

Pumphouse steel supports: Clean and preserve	L	620	O&M	1997
Pumphouse weather-stripping: replace.	H	480	O&M	1997
Pumphouse and equipment: Raise all to avoid flooding (observed during winter)	H	2960	C	1997
Replace all mechanical equipment and motors	-	78500	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017.

Service:
See service comments for SPS-1,-2 and -3.

Comments:
See comments for SPS-1, -2 and -3. Raise the electrical and mechanical equipment at SPS-4 to avoid flooding during heavy rainstorms. Maintain equipment. Plan to replace this relatively new station by 2017.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	1100	-	-
Capital Improvements (Total)	6160	-	78500
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	78500
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	6160	-	-

SPS-5 Sewage Pump Station

Comments:
SPS-5 has been abandoned.

SPS-NAD-1 Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	10	10
Pumps # 1& 2	20	20
Valves & Piping	20	20

Action	Priority	Cost ($)	Funding	Year
Power cables: Tie cables into bundle and place alongside ladder rungs to avoid tripping.	M	140	O&M	1997
Replace all equipment	-	78080	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. This station has two submersible pumps which are each rated at 400 gpm. Maximum peak flow will occur in year 2017 with an estimated demand of 189 gpm.

Service:
This station services the Marina/Residential and Recreational areas, Reuse Areas 10 and 12, at the South end of the Island. It boosts flow from SPS-5, SPS-NAD-2 and SPS-NAD-3 stations to DOM-9.

Comments:
This area will be one of the last developed. The station should be replaced by year 2017 and maintained in the meantime.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	140	-	-
Capital Improvements (Total)	-	-	78080
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	78080
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

SPS-NAD-2 Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	10	20
Pumps # 1& 2	0	20
Valves & Piping	20	20

Action	Priority	Cost ($)	Funding	Year
Float switch circuit: Troubleshoot and repair (Log reports it is not working)	H	770	O&M	1997
#2 Pump: Troubleshoot and repair (Log reports no flow from pump). Remove obstructions, check valves as necessary.	H	770	O&M	1997
Replace all equipment	-	78080	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. This station has two submersible pumps which are each rated at 400 gpm. Maximum peak flow will occur in year 2017 with an estimated demand of 73 gpm.

Service:
This station services portions of the Marina/Residential area, Reuse Area 10, at the South end of the Island. It forwards flow to SPS-NAD-1 station.

Comments:
This area will be one of the last developed. The station should be replaced by year 2017 and maintained in the meantime.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	1540	-	-
Capital Improvements (Total)	-	-	78080
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	78080
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

SPS-NAD-3 Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	10	20
Pumps # 1& 2	0	20
Valves & Piping	20	20

Action	Priority	Cost ($)	Funding	Year
No Repairs	-	0	-	-
Replace all equipment	-	78080	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Satisfactory through 2017. This station has two submersible pumps which are each rated at 400 gpm. Maximum peak flow will occur in year 2017 with an estimated demand of 189 gpm.

Service:
This station services a small portion of the Marina/Residential plus Recreational areas, Reuse Areas 10 and 12, at the South end of the Island. It boosts flow from SPS-5 station to SPS-NAD-1 station.

Comments:
This area will be one of the last developed. The station should be replaced by year 2017 and maintained in the meantime.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	0	-	-
Capital Improvements (Total)	-	-	78080
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	78080
Capacity Upgrade (CU)	-	-	-
Other Capital Improvements (C)	-	-	-

SDPS-13 Storm Drain Water Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	10	20
Pump	20	20
Valves & Piping	20	20
Ventilation System	10	20

Action	Priority	Cost ($)	Funding	Year
Valves and piping: Clean and preserve	L	620	O&M	1997
Ventilation system: Monitor noise at regular intervals and report any increase in noise.	M	NA	NA	1997
Replace the existing pump with two at 800 gpm.	H	106900	CU	1997
Replace all new and old equipment	-	41560	L	2017

Priority: L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Not currently adequate. Capacity of the pump is not known for sure; but, is estimated at 90 to 252 gpm. Estimated demand is 754 gpm in 2017. Estimate of current demand is 652 gpm

Service:
This pump services approximately 1/5 of drainage basin 9L which is in the Education/Office Reuse Area 9.

Comments:
Remove the existing pump and replace it with two pumps each having 800 gpm capacity. Do this during the summer. The existing pump and equipment should be maintained until replaced. Plan on replacement of the new equipment in twenty years.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	620	-	-
Capital Improvements (Total)	106900	-	41560
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	41560
Capacity Upgrade (CU)	106900	-	-
Other Capital Improvements (C)	-	-	-

SDPS-14 Storm Drain Water Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	10	20
Pump # 1	0	20
Pump # 2	1	20
Valves & Piping	20	20

Action	Priority	Cost ($)	Funding	Year
#1 Pump: Provide power and test operate	H	4200	O&M	1997
#2 Pump: Refurbish	H	12750	O&M	1997
Valves and piping: Clean and preserve	L	1550	O&M	1997
Install new pumphouse with 3-4600 gpm pumps	H	780000	CU	1997
Replace new pumphouse equipment	-	117120	L	2017
Replace all existing equipment *See comments.	-	78080	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Not currently adequate. Estimated demand is 9443 gpm. Each of the two pumps is rated at 300 gpm. A new pumphouse and pumps are required.

Service:
This pump services approximately 9/16 of drainage basin 1B which is in the Northern Light Industry, Reuse Area 1.

Comments:
The existing pumps and equipment should be maintained until a new pump house with larger pumps may be installed. Plan on replacement of the new equipment in twenty years. Abandon the old pump station when the new one is on line (Don't replace old equipment).* Maintain the old station in the interim.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	18500	-	-
Capital Improvements (Total)	780000	-	117120
Cost Reduction (CR)	-	-	-
Life Cycle Replacement (L)	-	-	117120
Capacity Upgrade (CU)	780000	-	-
Other Capital Improvements (C)	-	-	-

SDPS-15 Sewage Pump Station

Useful Remaining Life	Without Repair	With Repair
Electrical distribution system	20	20
Controllers	20	20
Motors	10	20
Pump # 1	2	20
Pump # 2	0	20
Valves & Piping	15	20

Action	Priority	Cost ($)	Funding	Year
#1 Pump: Adjust seals	H	3400	O&M	1997
#2 Pump: Provide power and test operate	H	12750	O&M	1997
Pumps, valves and piping: Clean and preserve	L	2170	O&M	1997
Add Pump to provide redundancy (incl' add'l pump house)	L	255000	CU	1997
Replace new and old pumps and assoc. equip.	-	73620	L	2017

L = Low, M = Medium, H = High
Funding: O&M = Operations and Maintenance, L = Lifecycle Replacement, C = Other Capital Improvement, CU = Capacity Upgrade Cap. Improv., CR = Cost Reduction Cap. Improv.

Capacity:
Capacity of the two pumps are 4200 gpm each. Estimated demand in year 2007 and 2017 is 6359 gpm. Current demand is estimated at 4926 gpm. So, as long as the two pumps are operational, sufficient capacity exists. Development of Reuse Area 1 which this station serves should be complete by 2007.

Service:
This pump services approximately 5/12 of drainage basin 1A which is in the Northern Light Industry, Reuse Area 1.

Comments:
No redundancy exists during peak of a storm. A pump needs to be added. Since the area is being developed in the immediate future the increased capacity should be added concurrent with development. Repair and maintain existing pumps now and plan for replacement of all equipment by year 2017.

Time Phased Costs ($)	Current 1997	Long Term 2007	Ultimate 2017
Repair (O&M) (Total)	18320		
Capital Improvements (Total)	255000		49080
Cost Reduction (CR)			
Life Cycle Replacement (L)			49080
Capacity Upgrade (CU)	255000		
Other Capital Improvements (C)			

APPENDIX B2

PUMP STATION CAPACITY ANALYSIS

MARE ISLAND INFRASTRUCTURE STUDY - OCAMPO-ESTA CORPORATION

WASTEWATER FLOW AT EACH PUMP STATION FOR ULTIMATE BUILDOUT (2017)

Station	Tributary Portions of ReUse Areas and Pump Stations	Demand Peak Flow (gpm)	Demand Ave. Daily Flow (gpm)	Capacity Number of Pumps	Capacity Flow, each (gpm)	Capacity Other	URL without Repair (end year)	URL with Repair (end year)	Sufficient Capacity (Y/N)
DOM-1	1/3 A1	273	151	2	400 (4)	20 ft (3)	1	20	Y
DOM-2	1/3 A1	273	151	3	1070 (4)	-	0	10	Y
DOM-3	1/5 A3	84	50	2	180-504 ((1)	3 hp (2)	0	10	Y
DOM-4	DOM-7 + A1 + A2 + A3 + A4 + A6	2741	1348	3/1	4600/1600 (4)	-	0	10	Y
DOM-4W	DOM-7 + A1 + A2 + A3 + A4 + A6	2741	1348	3	1800 (4)	-	20	20	Y
DOM-5	1/8 A3	52	31	2	650 (4)	-	0	15	Y
DOM-6	1/4 A3	105	62	2	850 (4)	-	1	10	Y
DOM-7	DOM-9 + A5 + A8 + A9 + A11	985	614	3	400 (4)	-	0	15	N
DOM-8	1/5 A5	83	49	2	850 (3)(4)	28 ft TDH (3)	2	15	Y
DOM-9	A10 + A12	218	143	2	600 (4)	-	1	15	Y
DOM-10	2/5 A8	32	21	2	30-84 (1)	1/2 hp (2)	20	20	Y
DOM-12	0 A4	0	0	2	240 (4)	32 ft TH (3)	0	20	Y
DOM-16	1/2 A6	53	34	2	315 (4)	34 ft head (3)	0	20	Y
DOM-17	A11	4	2.5	1	180-504 (1)	3 hp (2)	20	20	N
DOM-18	1/10 A9	27	17	3	90-252 (1)	1.5 hp (3)	0	20	Y
SPS-1	0 A1	0	0.0	2	300 (4)	-	0	20	Y
SPS-2	0 A1	0	0.0	2	300 (4)	-	0	20	Y
SPS-3	0.25	0.3	0.0002	2	300 (4)	-	0	20	Y
SPS-4	0.25	0.3	0.0002	2	300 (4)	-	5	20	Y
SPS-5	1/2 A12	0.2	0.0002	2	82.3 (4)	-	0	20	Y
SPS-NAD-1	SPS-NAD-3 + SPS-NAD-2 + 1/3 A10	189	0.18	2	400 (2)	5 bhp (2)	20	20	Y
SPS-NAD-2	1/3 A10	73	0.07	2	400 (2)	5 bhp (2)	0	20	Y
SPS-NAD-3	SPS-5 + 1/5 A10 + 4/5 A12	44	0.04	2	400 (2)	5 bhp (2)	0	20	Y
STS	All stations have no tributary area. Demand is based upon ships serviced. No more ships will be docked than in the past, so future demand will not exceed capacity.								

Information Sources

(1) Estimate. See sheets titled "Estimating Flow Capacity (gpm) of Pumps From Power and Head.
(2) Conversation with Bob Gard of Vallejo Sanitation and Flood Control District on March 6, 1997.
(3) Inspection of nameplates by OEC personnel.
(4) Typewritten sheet titled "Mare Island Wastewater Pumping and Treatment and Treatment Stations" provided by Bill Schuneman, Reimers Associates.

MARE ISLAND INFRASTRUCTURE STUDY - OCAMPO-ESTA CORPORATION

WASTEWATER FLOW AT EACH PUMP STATION
FOR LONG TERM BUILDOUT (2007)

Station	Tributary Portions of ReUse Areas and Pump Stations	Demand Peak Flow (gpm)	Demand Ave. Daily Flow (gpm)	Capacity Number of Pumps	Capacity Flow, each (gpm)	Capacity Other Other	URL without Repair (end year)	URL with Repair (end year)	Sufficient Capacity (Y/N)
DOM-1	1/3 A1	273	151	2	400 (4)	20 ft (3)	1	20	Y
DOM-2	1/3 A1	273	151	3	1070 (4)	-	0	10	Y
DOM-3	1/5 A3	58	34	2	180-504 ((1)	3 hp (2)	0	10	Y
DOM-4	DOM-7 + A1 + A2 + A3 + A4 + A6	2014	1164	3/1	4600/1600 (4)	-	0	10	Y
DOM-4W	DOM-7 + A1 + A2 + A3 + A4 + A6	2014	1164	3	1800 (4)	-	20	20	Y
DOM-5	1/8 A3	36	21	2	650 (4)	-	0	15	Y
DOM-6	1/4 A3	72	42	2	850 (4)	-	1	10	Y
DOM-7	DOM-9 + A5 + A8 + A9 + A11	502	297	3	400 (4)	-	0	15	Y
DOM-8	1/5 A5	61	36	2	850 (3)(4)	28 ft TDH (3)	2	15	Y
DOM-9	A10 + A12	3	1.4	2	600 (4)	-	1	15	Y
DOM-10	2/5 A8	31	20	2	30-84 (1)	1/2 hp (2)	20	20	Y
DOM-12	0 A4	0	0	2	240 (4)	32 ft TH (3)	0	20	Y
DOM-16	1/2 A6	36	23	2	315 (4)	34 ft head (3)	0	20	Y
DOM-17	A11	4	2.5	1	180-504 (1)	3 hp (2)	20	20	N
DOM-18	1/10 A9	11	6.6	3	90-252 (1)	1.5 hp (3)	0	20	Y
SPS-1	0 A1	0	0	2	300 (4)	-	0	20	Y
SPS-2	0 A1	0	0	2	300 (4)	-	0	20	Y
SPS-3	0.25	0.25	0.0002	2	300 (4)	-	0	20	Y
SPS-4	0.25	0.25	0.0002	2	300 (4)	-	5	20	Y
SPS-5	1/2 A12	0.24	0.0002	2	82.3 (4)	-	0	20	Y
SPS-NAD-1	SPS-NAD-3 + SPS-NAD-2 + 1/3 A10	2.50	0.0019	2	400 (2)	5 bhp (2)	20	20	Y
SPS-NAD-2	1/3 A10	0.72	0.0005	2	400 (2)	5 bhp (2)	0	20	Y
SPS-NAD-3	SPS-5 + 1/5 A10 + 4/5 A12	1.07	0.0008	2	400 (2)	5 bhp (2)	0	20	Y
STS	All stations have no tributary area. Demand is based upon ships serviced. No more ships will be docked than in the past, so future demand will not exceed capacity.								

Information Sources

(1) Estimate. See sheets titled "Estimating Flow Capacity (gpm) of Pumps From Power and Head.
(2) Conversation with Bob Gard of Vallejo Sanitation and Flood Control District on March 6, 1997.
(3) Inspection of nameplates by OEC personnel.
(4) Typewritten sheet titled "Mare Island Wastewater Pumping and Treatment and Treatment Stations" provided by Bill Schuneman, Reimers Associates.

WASTEWATER FLOW AT EACH PUMP STATION
CURRENT (1997)

Station	Tributary Portions of ReUse Areas and Pump Stations	Demand Peak Flow (gpm)	Demand Ave. Daily Flow (gpm)	Capacity Number of Pumps	Capacity Flow, each (gpm)	Capacity Other Other	URL without Repair (end year)	URL with Repair (end year)	Sufficient Capacity (Y/N)
DOM-1	1/3 A1	167	81	2	400 (4)	20 ft (3)	1	20	Y
DOM-2	1/3 A1	167	81	3	1070 (4)	-	0	10	Y
DOM-3	1/5 A3	40	19	2	180-504 ((1)	3 hp (2)	0	10	Y
DOM-4	DOM-7 + A1 + A2 + A3 + A4 + A6	1488	1023	3/1	4600/1600 (4)	-	0	10	Y
DOM-4W	DOM-7 + A1 + A2 + A3 + A4 + A6	1488	1023	3	1800 (4)	-	20	20	Y
DOM-5	1/8 A3	25	12	2	650 (4)	-	0	15	Y
DOM-6	1/4 A3	49.8	24	2	850 (4)	-	1	10	Y
DOM-7	DOM-9 + A5 + A8 + A9 + A11	572	288	3	400 (4)	-	0	15	Y
DOM-8	1/5 A5	53	27	2	850 (3)(4)	28 ft TDH (3)	2	15	Y
DOM-9	A10 + A12	209	100	2	600 (4)	-	1	15	Y
DOM-10	2/5 A8	4	1.8	2	30-84 (1)	1/2 hp (2)	20	20	Y
DOM-12	0 A4	0	0	2	240 (4)	32 ft TH (3)	0	20	Y
DOM-16	1/2 A6	6	3	2	315 (4)	34 ft head (3)	0	20	Y
DOM-17	A11	4	2.5	1	180-504 (1)	3 hp (2)	20	20	N
DOM-18	1/10 A9	8	4.7	3	90-252 (1)	1.5 hp (3)	0	20	Y
SPS-1	0 A1	0	0	2	300 (4)	-	0	20	Y
SPS-2	0 A1	0	0	2	300 (4)	-	0	20	Y
SPS-3	0.25	0.25	0.0002	2	300 (4)	-	0	20	Y
SPS-4	0.25	0.25	0.0002	2	300 (4)	-	5	20	Y
SPS-5	1/2 A12	0	0	2	82.3 (4)	-	0	20	Y
SPS-NAD-1	SPS-NAD-3 + SPS-NAD-2 + 1/3 A10	181	0.125	2	400 (2)	5 bhp (2)	20	20	Y
SPS-NAD-2	1/3 A10	70	0.048	2	400 (2)	5 bhp (2)	0	20	Y
SPS-NAD-3	SPS-5 + 1/5 A10 + 4/5 A12	42	0.029	2	400 (2)	5 bhp (2)	0	20	Y
STS	All stations have no tributary area. Demand is based upon ships serviced. No more ships will be docked than in the past, so future demand will not exceed capacity.								

Information Sources
(1) Estimate. See sheets titled "Estimating Flow Capacity (gpm) of Pumps From Power and Head.
(2) Conversation with Bob Gard of Vallejo Sanitation and Flood Control District on March 6, 1997.
(3) Inspection of nameplates by OEC personnel.
(4) Typewritten sheet titled "Mare Island Wastewater Pumping and Treatment and Treatment Stations" provided by Bill Schuneman, Reimers Associates.

MARE ISLAND INFRASTRUCTURE STUDY - OCAMPO-ESTA CORPORATION

WASTEWATER FLOW IN EACH REUSE AREA
AT ULTIMATE BUILDOUT (2017)

(7) = e^0.33 = 1.390968

ReUse Area	Ave. Daily Flow-Total (mgd) (1)	Ave. Daily Flow by Acre (AC) (2)	(1)-(2) (3)	(3)^0.97 x (7) (4)	(2)x2.1 (5)	Peak Flow (4) + (5) (mgd) (6)	Peak Flow (6)x10^6/1440 (gpm)
1	0.6525	0.3639	0.2886	0.4167	0.7642	1.1809	820.0499
2	0.2082	0.0617	0.1465	0.2159	0.1296	0.3454	239.8845
3	0.3555	0.1325	0.2230	0.3245	0.2783	0.6027	418.5547
4	0.1461	0.0477	0.0984	0.1467	0.1002	0.2469	171.4591
5	0.3498	0.1378	0.2120	0.3089	0.2894	0.5983	415.4945
6	0.0993	0.0059	0.0934	0.1395	0.0124	0.1519	105.4746
7	0.0077	0.0076	0.0001	0.0002	0.0160	0.0161	11.2107
8	0.0745	0.0074	0.0671	0.1012	0.0155	0.1168	81.0787
9	0.2498	0.0315	0.2183	0.3178	0.0662	0.3840	266.6550
10	0.2059	0.0191	0.1868	0.2732	0.0401	0.3134	217.6078
11	0.0036	0	0.0036	0.0059	0.0000	0.0059	4.1169
12	0.0004	0	0.0004	0.0007	0.0000	0.0007	0.4886
13	0	0	0.0000	0.0000	0.0000	0.0000	0.0000

(1) & (2) Data source is InfraStrategy Analysis spreadsheet for Ultimate Buildout prepared by Reimers associates.

(6) Computed Peak Flow per instructions from Bill Schuneman, Reimers Associates.

WASTEWATER FLOW IN EACH REUSE AREA
AT LONG TERM BUILDOUT (2007)

(7) = e^0.33 = 1.390968

ReUse Area	Ave. Daily Flow-Total (mgd) (1)	Ave. Daily Flow by Acre (AC) (2)	(1)-(2) (3)	(3)^0.97 x (7) (4)	(2)x2.1 (5)	Peak Flow (4) + (5) (mgd) (6)	Peak Flow (6)x10^6/1440 (gpm)
1	0.6525	0.3639	0.2886	0.4167	0.7642	1.1809	820.0499
2	0.139	0.0391	0.0999	0.1489	0.0821	0.2310	160.4238
3	0.2441	0.0883	0.1558	0.2291	0.1854	0.4146	287.8983
4	0.1461	0.0477	0.0984	0.1467	0.1002	0.2469	171.4591
5	0.256	0.1009	0.1551	0.2281	0.2119	0.4400	305.5797
6	0.0669	0.0039	0.0630	0.0952	0.0082	0.1034	71.8048
7	0.0082	0.0082	0.0000	0.0000	0.0172	0.0172	11.9583
8	0.0712	0.0065	0.0647	0.0977	0.0137	0.1113	77.3263
9	0.0952	0.0311	0.0641	0.0968	0.0653	0.1621	112.5910
10	0.0016	0.0009	0.0007	0.0012	0.0019	0.0031	2.1533
11	0.0036	0	0.0036	0.0059	0.0000	0.0059	4.1169
12	0.0004	0	0.0004	0.0007	0.0000	0.0007	0.4886
13	0	0	0.0000	0.0000	0.0000	0.0000	0.0000

(1) & (2) Data source is InfraStrategy Analysis spreadsheet for Long Term Buildout prepared by Reimers associates.
(6) Computed Peak Flow per instructions from Bill Schuneman, Reimers Associates.

MARE ISLAND INFRASTRUCTURE STUDY - OCAMPO-ESTA CORPORATION

WASTEWATER FLOW IN EACH REUSE AREA
CURRENT (1997)

(7)= e^0.33 = 1.390968

ReUse Area	Ave. Daily Flow-Total (mgd) (1)	Ave. Daily Flow by Acre (AC) (2)	(1)-(2) (3)	(3)^0.97 x (7) (4)	(2)x2.1 (5)	Peak Flow (4) + (5) (mgd) (6)	Peak Flow (6)x10^6/1440 (gpm)
1	0.3504	0.3233	0.0271	0.0420	0.6789	0.7209	500.6491
2	0.1064	0.0489	0.0575	0.0871	0.1027	0.1898	131.8232
3	0.1397	0.1272	0.0125	0.0198	0.2671	0.2869	199.2707
4	0.0495	0.0486	0.0009	0.0015	0.1021	0.1036	71.9479
5	0.1928	0.1531	0.0397	0.0608	0.3215	0.3823	265.5164
6	0.0087	0.0057	0.0030	0.0050	0.0120	0.0169	11.7620
7	0	0	0.0000	0.0000	0.0000	0.0000	0.0000
8	0.0063	0.0063	0.0000	0.0000	0.0132	0.0132	9.1875
9	0.0679	0.0303	0.0376	0.0577	0.0636	0.1213	84.2637
10	0.1446	0.1394	0.0052	0.0085	0.2927	0.3012	209.1730
11	0.0036	0	0.0036	0.0059	0.0000	0.0059	4.1169
12	0	0	0.0000	0.0000	0.0000	0.0000	0.0000
13	0	0	0.0000	0.0000	0.0000	0.0000	0.0000

(1) & (2) Data source is InfraStrategy Analysis spreadsheet for 1997 Utilization prepared by Reimers associates.
(6) Computed Peak Flow per instructions from Bill Schuneman, Reimers Associates.

MARE ISLAND INFRASTRUCTURE STUDY - OCAMP-ESTA CORPORATION

STORM WATER FLOW AT EACH PUMP STATION
FOR ULTIMATE BUILDOUT (2017)

Station	ReUse Area	Drainage Basin (8)	Basin Total Discharge (8) (cfs)	(gpm)	Tributary Portions of ReUse Areas and Pump Stations	Demand Tributary Instantaneous Flow (4) (gpm)	Capacity Number of Pumps	Capacity Flow, each (gpm)	Capacity Other	URL without Repair (end year)	URL with Repair (end year)	Sufficient Capacity (Y/N)
SDPS-13	9	9L	8.4	3770	1/5 9L	754	1	90-252 (5)	1.5 HP (7)	20	20	N
SDPS-14	1	1B	37.4	16,788	9/16 1B	9443	2	300 (7)	-	0	20	N
SDPS-15	1	1A	34	15,261	5/12 1A	6359	2	4200 (6)	25 hp (7)	0	20	N

STORM WATER FLOW AT EACH PUMP STATION
FOR LONG TERM BUILDOUT (2007)

Station	(9) 2017 Ave "C" Value (1)	(9) 2007 Ave "C" Value (2)	2007/2017 Ave "C" Value Ratio (2)/(1)=(3)	Demand Tributary Instant' Flow (gpm) (3)x(4)	Sufficient Capacity (Y/N)
SDPS-13	0.37	0.31	0.83783784	632	N
SDPS-14	0.56	0.56	1	9443	N
SDPS-15	0.56	0.56	1	6359	N

STORM WATER FLOW AT EACH PUMP STATION
FOR 1997 UTILIZATION

Station	(9) 2017 Ave "C" Value (1)	(9) 1997 Ave "C" Value (2)	1997/2017 Ave "C" Value Ratio (2)/(1)=(3)	Demand Tributary Instant' Flow (gpm) (3)x(4)	Sufficient Capacity (Y/N)
SDPS-13	0.37	0.32	0.86486486	652	N
SDPS-14	0.56	0.42	0.75	7082	N
SDPS-15	0.56	0.42	0.75	4769	N

Information Sources
(5) Estimated. See sheets titled "estimating Flow Capacity (gpm) of Pumps From Power and Head.
(6) Per phonecon with Bob Gard, Vallejo Sanitation and flood Control District.
(7) Per typewritten sheet provided by Bill Schuneman, Reimers Associates.
(8) "Ultimate - Storm Water Discharge" spreadsheet and map showing drainage basins provided by Bill Schuneman, Reimers Associates
(9) "InfraStrategy Analysis" spreadsheets provided by Bill Schuneman, Reimers Associates.

ESTIMATING FLOW CAPACITY (GPM) OF PUMPS FROM POWER AND HEAD

Ave Power = Work / Time

Since time will be the same while comparing pumps, pumps will be compared on the basis of the work performed over the same time.

Work in a pipe is proportional to the Vertical Distance moved Times Mass / Density

Since density is constant for comparing water pumps, the pumps will be compared on the basis of the Vertical Distance (or Head) Times Mass moved.
i.e. Power is proportional to Head x Flow OR Flow is proportional to
Power / Lift

Power will be the rated horsepower of the pump's motor.
Flow is in terms of gpm.
Head is in terms of feet. This will be assumed to be the approximate depth of the pit in which pumps are located plus depth to pump if it is in a sump plus five feet to move water once it is at ground level. If head is known from label plate, that value is used.

Flow(1) / Flow(2) = (Power (1) / Head (1)) / (Power (2) / Head (2))

Flow (1) = Flow (2) * (Power (1) / Head (1)) / (Power (2) / Head (2))

Flow (1) = Flow (2) * (C (1) / C (2)) Formula

Where: C(1) = Power (1) / Head (1)
C(2) = Power (2) / Head (2)

Compute "C" factors:

	H	L	C	F
Station	Horsepower	Lift (feet)	H/L	Flow (gpm)
STS-A	15	30	0.5	1000
SPS-NAD	5	15	0.333	400
SDPS-15	25	20	1.25	4200
FW BLDG 880	125	286	0.437	1000

ESTIMATING FLOW CAPACITY (GPM) OF PUMPS FROM POWER AND HEAD (Continued)

Test formula

Use STS-A as reference (2)

Station	C	C ref	F ref	Flow
SPS-NAD	0.333	0.500	1000	667
SDPS-15	1.25	0.500	1000	2500
FW 880	0.437	0.500	1000	874

Use SPS-NAD as reference (2)

STS-A	0.5	0.333	400	600
SDPS-15	1.25	0.333	400	1500
FW 880	0.437	0.333	400	524

Use SDPS-15 as reference (2)

STS=A	0.5	1.25	4200	1680
SPS-NAD	0.333	1.25	4200	1120
FW 880	0.437	1.25	4200	1469

Use FW 880 as reference (2)

STS-A	0.5	0.437	1000	1144
SPS-NAD	0.333	0.437	1000	763
SDPS-15	1.25	0.437	1000	2860

Lowest values for flow were obtained while using SPS-NAD ad the reference.
Highest values for flow were obtained while using SDPS-15 as the reference.

Use SPS-NAD and SDPS-15 for computing the estimated range of values for flow for pumps with unknown flows.

Pumps for which flow must be estimated:

	Station	Horsepower	Head (ft)	C	Ref C	Ref F	Flow
Minimum	DOM-3 & -17	3	20	0.15	0.333	400	180
Maximum	DOM-3 & -17	3	20	0.15	1.25	4200	504
Range	180 - 504 gpm						

	Station	Horsepower	Head (ft)	C	Ref C	Ref F	Flow
Minimum	DOM-10	0.5	20	0.025	0.333	400	30
Maximum	DOM-10	0.5	20	0.025	1.25	4200	84
Range	30 - 84 gpm						

	Station	Horsepower	Head (ft)	C	Ref C	Ref F	Flow
Minimum	DOM-18 & SDPS-13	1.5	20	0.075	0.333	400	90
Maximum	DOM-18 & SDPS-13	1.5	20	0.075	1.25	4200	252
Range	90 - 252 gpm						

	Station
	STS-C (same as STS-A)
Range	1000 gpm

APPENDIX B3

LIFE CYCLE ANALYSIS
OF
PUMP STATIONS

USEFUL REMAINING LIFE

Station	Age (yrs)	Meter (hrs)	High Maint'	Useful Remain' Life (yrs) W/O Repair & Cap Improv	W/ Repair & Cap Improv
FRESH WATER					
Causeway					
Pumps	55	-	Y	10	10
Valves	54 - 65	-	Y	0	10
Piping	54 - 65	-	Y	20	20
Bldg. 774					
Pump #3	15	-	Y	15	15
Pumps #1 & #2	15	-	Y	0	15
4" & 8" Gate Valves	55	-	Y	15	20
All other Valves	55	-	Y	20	20
Piping	55	-	Y	20	20
Bldg. 645					
Pump	68	-	-	12	15
Valves	68	-	-	15	15
Piping	68	-	-	20	20
Bldg. 880					
Pump	10	-	-	20	20
Valves	10	-	-	20	20
Piping	10	-	-	20	20

Station	Age (yrs)	Meter (hrs)	High Maint'	Useful Remain' Life (yrs) W/O Repair & Cap Improv	W/ Repair & Cap Improv
DOMESTIC SEWAGE					
DOM-1					
Pump #1	52	-	-	1	20
Pump #2	52	-	-	20	20
Valves	52	-	-	20	20
Piping	52	-	-	20	20
DOM-2					
Pumps #1 & #3	52	-	Y	5	10
Pump #2	52	-	Y	0	10
Valves	52	-	Y	20	20
Piping	52	-	Y	20	20
Ventilation System	52	-	Y	10	10
Sump Pump	52	-	Y	0	15
DOM-3					
Pump #1	52	-	Y	10	10
Pump #2	52	-	Y	0	10
8" & 4" Valves	52	-	Y	10	20
Other Valves	52	-	Y	20	20
Piping	52	-	Y	20	20
Ventilation System	52	-	Y	10	10
DOM-4					
Pump #1	20	-	Y	1	15
Pump #2	52	-	Y	1	10
Pump #3	52	-	Y	0	10

Station	Age (yrs)	Meter (hrs)	High Maint'	Useful Remain' Life (yrs) W/O Repair & Cap Improv	W/ Repair & Cap Improv
DOM-4 (Cont.)					
Pump #4	52	-	Y	1	10
Valves	52	-	Y	5	10
Piping	52	-	Y	10	15
Air Compressor	52	-	Y	6	10
Sump Pump	52	-	Y	15	15
DOM-4W					
Pumps #1, 2 & 3	52	-	-	20	20
Valves & Piping	52	-	-	20	20
Ventilation System	52	-	-	20	20
Air Compressor	52	-	-	20	20
DOM-5					
Pump #1	52	2946	Y	0	15
Pump #2	52	4415	Y	0	15
Valves	52	-	Y	15	15
Piping	52	-	Y	12	15
Ventilation Blower	52	-	Y	15	15
Sump Pump	52	-	Y	15	15
DOM-6					
Pumps #1 & #2	65	-	Y	1	10
Valves & Piping	65	-	Y	10	10
Air Compressor	65	-	Y	5	10
Sump Pump	65	-	Y	5	10

Station	Age (yrs)	Meter (hrs)	High Maint'	Useful Remain' Life (yrs) W/O Repair & Cap Improv	W/ Repair & Cap Improv
DOM-7					
Pump #1	65	-	-	1	15
Pump #2	65	-	-	0	15
Pump #3	65	-	-	15	15
Valves & Piping	65	-	-	15	15
Ventilation System	65	-	-	10	15
Air Compressor	65	-	-	15	15
Air Dryer	65	-	-	2	15
DOM-8					
Pumps #1 & #2	65	-	-	2	15
Valves & Piping	65	-	-	15	15
Ventilation System	65	-	-	5	15
Air Compressor	65	-	-	5	15
DOM-9					
Pump #1	65	-	-	10	15
Pump #2	65	-	-	1	15
Valves & Piping	65	-	-	15	15
Compressor	65	-	-	10	15
Blower	65	-	-	10	15
Sump Pump	65	-	-	10	15
DOM-10					
Pumps #1 & #2	52	#1-506 #2-233	-	20	20
Valves & Piping	52	-	-	20	20

Station	Age (yrs)	Meter (hrs)	High Maint'	Useful Remain' Life (yrs) W/O Repair & Cap Improv	W/ Repair & Cap Improv
DOM-12					
Pumps #1 & #2	52	-	-	0	20
Valves & Piping	52	-	-	20	20
DOM-16					
Pumps #1 & #2	52	-	-	20	20
#1 Check Valve	52	-	-	0	20
Other Valves & Piping	52	-	-	20	20
DOM-17					
Pump	52	-	-	20	20
Valves & Piping	52	-	-	20	20
DOM-18					
Pumps #1, #2 & #3	20	-	-	0	20
#2 Pump Discharge Check Valve	20	-	-	0	20
Other Valves & Piping	20	-	-	20	20

Station	Age (yrs)	Meter (hrs)	High Maint'	Useful Remain' Life (yrs) W/O Repair & Cap Improv	W/ Repair & Cap Improv
SEWAGE					
SPS-1					
Pumps #1 & #2	10	-	Y	0	15
Valves & Piping	10	-	Y	20	20
Fans	10	-	Y	0	15
SPS-2					
Pumps #1 & #2	10	-	Y	0	15
Valves & Piping	10	-	Y	20	20
Fans	10	-	Y	0	15
SPS-3					
Pumps #1 & #2	10	-	Y	0	15
Valves & Piping	10	-	Y	20	20
Fans	10	-	Y	0	15
SPS-4	10				
Pumps #1 & #2	10	#1-3774 #2-5030	-	5	20
Valves & Piping	10	-	-	20	20
Fans	10	-	-	20	20
SPS-NAD-1					
Pumps #1 & #2	10	-	-	20	20
SPS-NAD-2					
Pumps #1 & #2	10	-	-	0	20
SPS-NAD-3					
Pumps #1 & #2	10	-	-	0	20

Station	Age (yrs)	Meter (hrs)	High Maint'	Useful Remain' Life (yrs) W/O Repair & Cap Improv	W/ Repair & Cap Improv
SHIP TO SHORE SEWAGE					
STS-H					
Pumps #1 & #2	10	-	Y	0	15
Oilers	10	-	Y	10	15
STS-R					
Pumps #1 & #2	35	-	Y	0	20
STS-S					
Pumps #1 & #2	35	-	Y	0	20
STS-T					
Pumps #1 & #2	35	-	Y	0	20
STS-A, -C, -J, -K, -N, -O, -V	(Assumes same configuration and condition as STS-A & -C. STS-A & STS-C were the only stations observed.)				
Pumps #1 & #2 at each Station	10	-	-	0	20
STS-L, -M	(STS-L & STS-M were not found nor observed. It is assumed they are in the same condition as STS-A & STS-C which were observed.)				
Pumps #1 & #2 at each Station	10	-	-	0	20
STS-I					
Pumps #1, #2 & #3	10	-	Y	0	20

Station	Age (yrs)	Meter (hrs)	High Maint'	Useful Remain' Life (yrs) W/O Repair & Cap Improv	W/ Repair & Cap Improv
STORM DRAIN WATER					
SDPS-13					
Pump	15	-	-	20	20
Valves & Piping	15	-	-	20	20
Ventilation System	15	-	-	20	20
SDPS-14					
Pump #1	52	-	-	0	20
Pump #2	52	-	-	1	20
SDPS-14 (Cont.)					
Valves & Piping	52	-	-	20	20
SDPS-15					
Pump #1	52	-	-	2	20
Pump #2	52	-	-	0	20
Valves & Piping	52	-	-	15	20

APPENDIX B4

REPORT OF FINDINGS FOR PUMP STATIONS

DOMESTIC SEWAGE PUMP STATIONS

DOM-1 Domestic Sewage Pump Station
Building 653, West of Building 755 and Walnut Street.

Data/Configuration

Pump #1: Pump is submerged in sump. Nameplate located outside of sump at motor. Discharge piping and motor are above the sump.
Year Installed: Not indicated
Manufacturer: Pacific Pumping Co., Oakland, Seattle, Portland, Dallas, Los Angeles
Serial: 1 OP F34950 Model: 4-BW-NC Capacity: 400 GPM
Head: 20 Total Head: Not indicated Suction: Not indicated
Type: Centrifugal Orientation: Vertical Coupling: Flex
Lubrication: Three grease fittings at deck. Service unknown (but not motor -probably bearings and pump)
Pipe size -inlet: not visible (in sump) -outlet: 4 in.
Valves: Check valve then globe valve on discharge.
Instrumentation: No gauges.
Guard on rotating parts: Yes

Pump #2: Motor and pump are submerged in sump. Discharge piping is above the sump.
Year Installed: Not indicated
Manufacturer: (nameplate not visible)
Pipe size -inlet: (not visible) -outlet: 4 in.
Valves: Check valve then globe valve on discharge.
Instrumentation: No gauges.
Guard on rotating parts: (not visible)

Pumphouse:
Description: Pump house is wood frame. Concrete floor has metal plates over sump access underneath.
Sump Exhaust Fan: Removed. Eight inch white PVC piping for exhaust fan remains.
Pump House Ventilation: Vents of 4 square feet on the West side and 1/2 square feet on the East side.
Switch near door: Yes, located on Controller panel.

Sump:
Sump Ladder: No
Ventilation: This is a confined space requiring ventilation with a blower and gas testing prior to entry.

DOM-1 Domestic Sewage Pump Station (continued)

Transformers: Pad mounted inside a fence enclosure outside the pumphouse. Connected in delta-wye. Secondary voltage is 120/208V, 3 phase, 4 wires.

Liquid Controller: Manufactured by Tesco.

DOM-1 Domestic Sewage Pump Station (continued)	
Equipment	*Condition/Deficiency*
Pump #1	Spins freely by hand. Runs with a rattling sound. Source of rattle is loose coupling. Coupling slides upward and downward. Set screws on coupling need tightening. No rust on pump, motor, valves and piping.
Pump #2	Runs smoothly. No rust on valves and piping.
Pumphouse	Good condition except need paint on door frame and door. Adequate cross ventilation.
Sump	Exhaust fan is missing. This is a confined space requiring ventilation with a blower and gas testing prior to entry.
Transformer	High voltage bushings have slight trace of insulating oil leak. Secondary terminals are not taped and transformer tanks are not grounded (NEC 450-10). Danger signs were found detached from the fence (NEC 450-8).
Liquid Controller	Good condition.
Switchboard	Good condition. Nameplate in incorrect. It should read 120/208V, 3 phase, 4 wires to match the supply voltage from the transformer.

DOM-2 Domestic Sewage Pump Station
Building 857, I St. & Railroad St.

Data/Configuration

Pumps #1, 2 & 3:
Year Installed: Not indicated
Manufacturer: Chicago Pump Co.
Serial: #1 B-4091-1, #2 B-4092-2, #3 B-4091-3
Model: B-40
Type: Centrifugal Orientation: Vertical in line mounted End suction
Valves: Mfr. Dresser (OS&Y) and Dezuriz (plug type)

Pumphouse:
Description: Above ground concrete structure with Pump Room approximately 15 feet below. Ventilation system installed using an air compressor. Sump pump installed.

Equipment	*Condition/Deficiency*
Pump #1	Significant corrosion. Runs smoothly. Leaks at seal/packing.
Pump #2	Significant corrosion. Pump out of service or could not start.
Pump *3	Mild corrosion. Pump runs with slight vibration. Leaks at seal/packing.
Piping	Minor external corrosion for most pipes. One pipe area with significant corrosion.
Valves	Minor corrosion at bolted connections and threads.
Pumphouse	Ventilation system operates and is in fair condition. Air compressor is in fair condition. Water supply line to building is leaking. Sump pump is broken and a temporary plug-in type is in place. Area is clean and well kept.
Electrical Equipment	Distribution panels, transformers, pump motors, blowers, sump pump, and motor controllers are all in good condition. Motors were started and found no visible or detectable deficiencies.

DOM-3 Domestic Sewage Pump Station
Building 859, E St.

Data/Configuration

Pumps #1 &2:
Year Installed: Not indicated
Manufacturer: Cornell Manufacturing
Serial: #1 21962, #2 21963
Model: 4NM TVC3-6
Type: #1 Horizontal split case. #2 Vertical End Suction

Pumphouse:
Description: Above ground concrete structure with Pump Room approximately 15 feet below. Ventilation system installed. Sump pump installed.

Equipment	*Condition/Deficiency*
Pump #1	Good condition with slight corrosion on base mount.
Pump #2	Severely corroded. Pump was not started during site visit.
Pumphouse	Ventilation system operates and is in fair conditon. Water supply line to building is broken and a temporary hose is in place. Area is clean and well kept.
Piping	Some external corrosion.
Valves	Severely corroded 8 and 4 inch valves. Other valves have minor corrosion.
Electrical Equipment	Distribution panels, transformers, pump motors, blowers, sump pump, and motor controllers are all in good condition. Equipment enclosures are for hazardous location application.

DOM-4 Sanitary Waste Water Pump Station
Building 861, A St. & Railroad

Data/Configuration

Pumps #1, 2, 3 & 4:
Year Installed: Not indicated. (Pump #1 manufactured 5/77)
Manufacturer: Paco
Serial: #1 93CO8445 #2 HWT044755B, #3 HWT044755B, #4 HWT044755B,
Pump #1 Catalog No. 52-64211-358BD15 5/77
Pumps #2 - 4 Model No. 81815-389415-11
Type: Centrifugal Oriented vertically.

Pumphouse:
Description: Above ground concrete structure with Pump Room approximately 20 feet below. Ventilation system installed. Sump pump, emergency generator and air compressor installed. Emergency Generator is served by a new "Supervault" above ground tank and a leak detection system.

Power Supply: Both the DOM-4 and DOM-4W stations are served by a common power distribution switchboard. The electrical system has an emergency generator.

DOM-4 Sanitary Waste Water Pump Station (continued)

Equipment	*Condition/Deficiency*
Pump #1	Pump runs with noisy bearings. Slight corrosion. Approximately 20 years old. Significant corrosion on pipe fittings.
Pump #2	Pump runs with loud mechanical noise. Severely corroded base and coupling.
Pump #3	Pump is taken our of service (disconnected)
Pump #4	Pump runs with significant vibration. Pump tagged 103E was observed to be vibrating when started and has a cracked motor housing.
Valves	Fair condition.
Pumphouse	Air compressor is in fair condition. Water supply line backflow preventer is leaking. Sump pump is new. The area is clean and well kept.
Motors	Motor for pump tagged as 103E and vibrating when started has a cracked housing.
Pump Controllers	Good condition.
Generator Controls	The automatic transfer switch failed to operate when the engine generator was tested.
	The 200 kw Katolight generator unit lacks the required emergency shutdown push button at the exterior wall, the coolant sensor was broken, and the engine water jacket heater was not functioning. The Nife nickel cadmium starting battery is dusty and terminals are corroded.

DOM-4W Domestic Sewage Pump Station
Building 833, A St. & Railroad

Data/Configuration

Pumps #1, 2 & 3:
Year Installed: Not indicated.
Manufacturer: Pacific Pumping Co.
Serial: #1 CN-507523-A, #2 CN-507523-B, #3 CN-507523-C
Catalog No. 5261512-358B0007
Type: Centrifugal Oriented vertically

Pumphouse:
Description: Above ground concrete structure with Pump Room approximately 20 feet below. Ventilation system with in-line axial type fan installed. Air compressor installed.

Power Supply: Both the DOM-4 and DOM-4W stations are served by a common power distribution switchboard. The electrical system has an emergency generator.

Equipment	*Condition/Deficiency*
Pumps #1, 2 & 3	Pumps run smoothly. Pumps appear to be in good condition.
Piping &Valves	Only slight and minor corrosion. Piping and valve appear to be in good condition.
Pumphouse	Ventilation system operates and is in good condition. Air compressor is in good condition.
Controller & Generator	See DOM-4 for information.

DOM-5 Domestic Sewage Pump Station
North of Building 91, West of Waterfront Ave.

Data/Configuration

Pumps #1 & 2
Year Installed: Not indicated
Manufacturer: Cornell
Serial: #1 22683, #2 22682
Model: 4NNT VC Capacity: Not indicated Impeller size: 9 1/8 in.
Head: Not indicated Total Head: Not indicated Suction: Not indicated
Type: Centrifugal Orientation: Vertical Coupling: Flex
Pipe size -inlet: 6 in. -outlet: 4 in.
Valves: 4 in. check valve then 6 in. globe valve on discharge. 8 in gate valves on suction.
Suction gate valve bonnet: MH V & F Company of Armiston, ALA., model UA 175 FM
Suction gate valve body: MH Company. Markings: 125S, 200, OWC, 56, DD.
Discharge check valve: Dressler of Anniston, ALA.; 404100. Valves have counter weights.
Discharge globe valve: Desurk, Fig 14901-1.
Instrumentation: Pressure and suction gauges on suction and discharges.
Guard on rotating parts: No. Motor case provides adequate protection.

Pumphouse:
Pumphouse is concrete with a ground level and a level about 18 feet down. System pumps and a sump pump are in the lower level. Controllers and the blower are in the ground level. A stairway in two flights with railing goes between the two levels.
Blower evacuates the lower level. No ventilation required in the upper level.

DOM-5 Domestic Sewage Pump Station

Equipment	*Condition/Deficiency*
Pumps #1 & 2	No electrical power to operate pumps consequently they were not operated. Log entry 12/95 indicates #1 Pump is inoperable and #2 Pump is operable after removal of a piece of wood. Station secured 1/96. First log entry 10/91. Heavy corrosion: pump upper portion of cases, stuffing and bearing areas, shaft, suction gauges, inlet piping, pump hold-down bolts. Gauge indicates operating hours as 2946 hours for #1 Pump and 4415 hours for #2 Pump.
Pumphouse	Good condition. Sump pump operates smoothly as does the blower. Light fixtures and lighting are adequate. There are two new 7.5 hp electric motors stored in this building.
Switchboard	Distribution switchboard and panelboard in the building are in good condition.
Controllers	The pump station was secured on 1/30/96 and power to pump motors were turned off. The front of blower motor and sump pump controller does not have the 36 inch clearance required by code (NEC 110-34).

DOM-6 Domestic Sewage Pump Station
Building 833, A St. & Railroad

Data/Configuration

Pumps #1 & 2:
Year Installed: Not indicated.
Manufacturer: Cornell Manufacturing Co.
Serial: #1 222723, #2 22722
Model: 4NHTR HVC10-6
Type: Centrifugal end suction. Oriented vertically

Pumphouse:
Description: Above ground concrete structure with Pump Room approximately 20 feet below. Ventilation system installed. Air compressor installed.

Equipment	*Condition/Deficiency*
Pumps #1 & 2	Pumps are corroded especially at the coupling. Mechanical seals leak.
Piping &Valves	Significant corrosion on valves and piping adjacent to pump. Only slight and minor corrosion of piping away from pumps.
Pumphouse	Ventilation system operates and is in fair condition. Air compressor is in fair condition. Sump pump is in fair condition.
Motors	#1 Motor has a bearing problem. It was running noisily when started.
Electrical Service	Good condition. Distribution switchboard, motor controllers and speed controls are in good condition.

DOM-7 Domestic Sewage Pump Station
Building 914, 9th St. & Railroad

Data/Configuration

Pumps #1, 2 & 3:
Year Installed: Not indicated.
Manufacturer: Cornell Manufacturing Co.
Serial: #1 22714, #2 22713, #3 2271?
Model: 6NHTLHV020-8
Type: Centrifugal Oriented vertically

Pumphouse:
Description: Above ground concrete structure with Pump Room approximately 20 feet below. Ventilation system, air compressor and air dryer installed.

Equipment	*Condition/Deficiency*
Pumps #1, 2 & 3	Loud noise when Pump #1 starts and stops. Pump #2 does not work. Pumps are corroded especially at the coupling. Mechanical seals leak.
Piping &Valves	Slight corrosion on valves and piping adjacent to pumps.
Pumphouse	Ventilation system operates and is in fair condition. Air compressor is in good condition. Air dryer is in poor condition. Exhaust blower is noisy when started. Impeller may be touching the housing.
Motors	Good condition.
Electrical Service & Controls	Condition of electrical switchboard, transformer, variable speed pump controllers (except for #2 Pump), and switches appear to be in good condition. Controller for #2 Pump motor has a problem with the speed indicator.

DOM-8 Domestic Sewage Pump Station
Building 916, E. 15th St.

Data/Configuration

Pumps #1 &2:
Year Installed: Not indicated.
Manufacturer: Chicago Pump Co.
Serial: #1 B4086-1, #2 ?
Model: 3061-07087 Type: VPMLL-4 850 GPM @ 28 feet TDH
Type: Centrifugal Oriented horizontally

Pumphouse:
Description: Above ground concrete structure with Pump Room approximately 20 feet below. Ventilation system and air compressor installed.

Equipment	*Condition/Deficiency*
Pumps #1 & 2	Pumps run. Pumps are corroded at the coupling. Mechanical seals have a major leak.
Piping &Valves	Slight corrosion on valves and piping.
Pumphouse	Ventilation system operates but is loud and noisy. Air compressor is in fair condition. Water supply line to building is leaking.
Electrical	Electrical service, motor controllers, and switches are in good condition.
Motors	Motors were started and ran smoothly.

DOM 9 Domestic Sewage Pump Station Building 918	
Data/Configuration	
Pumps #1 &2: Year Installed: Not indicated. Type: Centrifugal Oriented horizontally	
Pumphouse: Description: Above ground concrete structure with Pump Room approximately 20 feet below. Ventilation system and sump pump installed.	
Equipment	*Condition/Deficiency*
Pumps #1 & 2	Pumps run. Pump #2 generates a motor bearing noise when started. Pumps are corroded at the couplings. Mechanical seals leak for Pump #2.
Piping &Valves	Minor corrosion on valves and piping. Piping and valves appear to be in good condition.
Pumphouse	Ventilation system operates and is in fair condition. Sump pump is in fair condition.
Electrical	Electrical service, motor controllers, and switches are in good condition.
Motors	Motors were started and ran smoothly.

DOM 10 Domestic Sewage Pump Station Building M37 basement.
Data/Configuration
Pumps #1 &2: Access could not be obtained to the pump room for inspection.

DOM-12 Domestic Sewage Pump Station
Between Building Ways 1 & 2 and Buildings 1304A & 624 and Columns 6 & 7 of overhead crane.

Data/Configuration

Pumps #1 & #2: Pumps are submerged in sump. Discharge piping and motors are above sump..
Year Installed: Not indicated
Manufacturer: Chicago Pump Co. RPM: 1150
Serial: #1 PA 1299 #2 PA 1299 (Same serial number on both pumps).
Model: VCSOM-4 Capacity: 240 GPM
Total Head: 32 ft.
Type: Centrifugal Orientation: Vertical Coupling: Flex
Lubrication: Grease
Pipe size -inlet: (not visible - in sump) -outlet: 4 in.
Valves: Check valve then globe valve on discharge.
Instrumentation: No gauges.
Guard on rotating parts: No. Motor case provides adequate protection. Railing around area.

Pumphouse: None. Motors, discharge piping and valves are exposed to the weather.

Sump: Could not obtain access due to bolted plates. Ventilation: This is a confined space requiring ventilation with a portable blower and gas testing prior to entry.

Equipment	*Condition/Deficiency*
Pump #1	Turns freely by hand. No electrical power available to test pump/motor.
Pump #2	Turns freely by hand. No electrical power available to test pump/motor.
Valves	Minor rust on flanges.
Controllers	Magnetic starters are fusible type and obsolete. Overload heaters are only provided on the two phases (NEC 430-37).
Motors	Good condition.
Level Switches	Good condition.

DOM-16 Domestic Sewage Pump Station
9th St. & Klein

Data/Configuration

Pumps #1 & #2:
Year Installed: Not indicated
Manufacturer: Smith and Loveless
Serial: #1 6473146 #2 6473147
Size: 4B2 Capacity: 315 GPM @ 34 feet head
Type: Centrifugal end suction Orientation: Vertical

Pumphouse: Above ground concrete structure with Pump Room approximately 10 feet below.

Equipment	*Condition/Deficiency*
Pumps #1 & 2	Pumps run and appear to be in good condition.
Piping & Valves	Little or no corrosion on valves and piping and appear to be in good condition except that the check valve for #1 Pump is broken.
Electrical	Electrical service, motor controllers, and switches are in good condition.
Motors	Motors were started and ran smoothly.

DOM-17 Domestic Sewage Pump Station
South side of Building 658

Data/Configuration

Pump:
Year Installed: Not indicated
Manufacturer: Gorman Rupp
Serial: 642453 Model: 14C-2-B
Type: Positive Displacement Orientation: Horizontal

Pumphouse: Approximately ground level. Embanked to three sides and open (chainlink) to one side.

Equipment	*Condition/Deficiency*
Pump	Pump runs and appears to be in fair condition.
Piping & Valves	Slight corrosion on valves and piping. Piping and valves appear to be in good condition.
Electrical	Electrical service, motor controllers, and switches are in good condition.
Motors	Motors were started and ran smoothly.

DOM-18 Domestic Sewage Pump Station
South of Building H-79 in the Combat Systems Training Center complex.

Data/Configuration

Pumps #1, 2 & 3: Motors, pumps, valves and piping are accessible for inspection.
Year Installed: Not indicated
Manufacturer: Not indicated - no nameplate on pumps.
Type: Centrifugal Orientation: Vertical Coupling: Yes
Lubrication: One grease fitting at pump upper end.
Pipe size -inlet: 4 in. -outlet: 4 in.
Valves: Check valve then globe valve on discharge of each pump. Counterbalance installed on check valve from #1 & 3 pumps.
Instrumentation: No gauges.
Guard on rotating parts: No. Motor case provides adequate protection.

Motors #1, 2 & 3:
Year Installed: Not indicated
Manufacturer: ALDO Electric Co., Smith, Arkansas.
Serial: #1 not readable, #2 N333327, #3 N843531
Frame: 560 52BM Horsepower: 1.5 RPM: 1140
Volts: 208/220/480 Amps: 4.8/4.6/2.3

Pumphouse:
Description: Pumphouse is a pit having concrete walls and floor with metal doors at top. It is approximately 15 feet deep. There is no sump. Pumps #2 and #3 are in one pit and the #1 Pump is in another adjacent pit having similar construction, exhaust fan and ladder.
Exhaust Fan: One installed at top of each pit by ladders with power switch handy.
Ladder: Yes

Electrical Panel: Manufactured by Tesco.

DOM-18 Domestic Sewage Pump Station (continued)

Equipment	*Condition/Deficiency*
Pumps #1, 2, & 3	Spin freely by hand. Test ran #1 and #2 - no problems indicated. No rust on pump, motor, valves and piping. Pumps #1 & #2 are in fair condition.
Valves	Counterbalance is missing on #2 pump discharge check valve.
Pumphouses	Good condition. Ventilation blowers operated and sound good. Adequate ventilation, ladders, and lighting.
Switchboard	Good condition.
Motors	Motor #3 is grounded and could not test run. Motors #1 & #2 are in good condition.
Electrical Panel	Good condition.

SEWAGE PUMP STATIONS

SPS-1, SPS-2 & SPS-3 Sewage Pump Stations
SPS-1: West side of Pier 53
SPS-2: West side of Pier 55
SPS-3: North West corner of Pier 56

Data/Configuration

Pumps #1 & 2 at each station: Pumps, motors, valves and piping are above the sump.
Year Installed: Not indicated, however, the log at stations SPS-3 & SPS-4 first entry is 2/26/96. All stations are similar and were probably installed at the same time.
Operating hour meters show: SPS-1 (not recorded), SPS-2 (not recorded), SPS-3 45 & 50 hours. Logs show no power to units since 4/93 for SPS-1, SPS-2 & SPS-3.
Manufacturer: Hydr-O-Matic Pump Co. Self Priming Sewage & Trash Pumps -Hayesville, OH
No nameplates on pumps - info obtained from the one nameplate found at SPS-4.
Model No.: 40 MPVR Impeller Diameter: 9 5/32 in
Pressures not indicated.
Type: Centrifugal Orientation: Horiz. Motor drives belt, drives pump shaft. Separate bearing located at pulley end of pump shaft.
Lubrication: No fittings for pumps. One grease fitting at top of each separate bearing..
Pipe size -inlet: 4 in -outlet: 6 in.
Valves: Spring loaded check valve then ball valve on each discharge. Valve sizes are 6 in.
Check valve manufactured by Dresser. Ball valve manufactured by Hamstead.
Instrumentation: No gauges.
Guard on rotating parts: Yes (covering pulleys and belt)

Pumphouse: All are fiber glass huts mounted to pier decks. Floors are fiberglass also.
Wall mounted Hut Exhaust Fan: Dayton 10 in, 1/40 HP, 1500 RPM, Model 2C819A, 115 V
Lighting is provided by 2-single lamp fluorescent fixtures.

Sumps: One sump at each station. Sumps are located under piers. They were not accessible for inspection.

Power Supply: Power supply is metered and the disconnect switch is located outside.

Controller: Manufacturer is Murphymatic Control System.

SPS-1, SPS-2 & SPS-3 Sewage Pump Stations (continued)

Equipment	*Condition/Deficiency*
Pumps #1 & #2	No power to pumps at SPS-1, SPS-2 & SPS-3. Minor rust on all pumps and valves.
Pumphouses	Minor rust on overhead beams. Weatherstripping deteriorated. Exhaust fans are rusted. Fans and lighting could not be operated because of lack of power.
Power Supply	Power to pump stations has been turned off. The disconnect switches for these stations are non-fused types and are slightly rusted.
Controller	SPS-1 and SPS-2 controllers are in bad repair with some control components rusted and dusty. SPS-3 controller is in fair condition. SPS-1, -2 & -3 bubbler pumps are missing and tubing is disconnected.

SPS-4 Sewage Pump Station
West of Pier 56 and Building 793.

Data/Configuration

Pumps #1 & 2: Pumps, motors, valves and piping are above the sump.
Year Installed: Not indicated, however, the log at stations SPS-3 & SPS-4 first entry is 2/26/96. All stations are similar and were probably installed at the same time.
Pump #1= 3774 hours, SPS-4 Pump #2 = 5030 hours.
Manufacturer: Hydr-O-Matic Pump Co. Self Priming Sewage & Trash Pumps -Hayesville, OH
Pump #2 Serial: 8514 8/74. No nameplates on #1 Pump.
Model No.: 40 MPVR Impeller Diameter: 9 5/32 in
Pressures not indicated.
Type: Centrifugal Orientation: Horiz. Motor drives belt, drives pump shaft. Separate bearing located at pulley end of pump shaft.
Lubrication: No fittings for pumps. One grease fitting at top of each separate bearing..
Pipe size -inlet: 4 in -outlet: 6 in.
Valves: Spring loaded check valve then ball valve on each discharge. Valve sizes are 6 in. Check valve manufactured by Dresser. Ball valve manufactured by Hamstead.
Instrumentation: No gauges.
Guard on rotating parts: Yes (covering pulleys and belt)

Pumphouse:
Above ground fiber glass hut similar to Stations SPS-1, -2 and -3. Floor is fiberglass also.
Wall mounted Hut Exhaust Fan: Dayton 10 in, 1/40 HP, 1500 RPM, Model 2C819A, 115 V
Lighting is provided by 2-single lamp fluorescent fixtures.

Sumps: One sump Sump is located in the ground. Not accessible for inspection.

Power Supply: Pad mounted transformers inside the fence enclosure feeding the pump station are connected in delta -wye. Secondary voltage is 120/208V, 3 phase, 4 wires.

Controller: Manufacturer is Murphymatic Control System.

SPS-4 Sewage Pump Station (continued)

Equipment	*Condition/Deficiency*
Pumps #1 & #2	Pumps at SPS-4 operated smoothly. Fan operates automatically when SPS-4 pumps are operated. Minor rust on all pumps and valves.
Pumphouse	Minor rust on overhead beams. Weatherstripping deteriorated. Sand bags have been placed around the hut to protect against ground water intrusion to the system and shorting the pump motors which are about 6 inches above grade. There are no signs that flooding has occurred. Exhaust fan operates. Lighting is adequate.
Power Supply	Transformers on a concrete slab are only 2 inches above grade and have no sandbags. No damage from past flooding is apparent. Weeds are growing around the pad and are in contact with the transformer bushings. Transformer nameplates are mission (NEC 450-11). The high voltage potheads are slightly rusted. All danger signs are heavily rusted and illegible (NEC 450-8).

SPS-4 Sewage Pump Station (continued)	
Switchboard and Controller	Switchboard and pump controller appear to be in good condition. Log indicates for SPS-4 that bubbler was replaced 9/94 and repaired 5/96.
Motors	Motors are in good condition and run good.

SPS-5 Sewage Pump Station By Pier 35	
Data/Configuration	
Pumps #1 & 2: Year Installed: Not indicated, Manufacturer: Cornell Co. Type: Centrifugal Orientation: Horiz. Ventilation system installed.	
Pumphouse: Below ground concrete pit approximately 12 feet below.	
Equipment	*Condition/Deficiency*
Pumps #1 & #2	Pumps are not working. Pumps are slightly corroded. Pump #1 failed to start and it appears to be frozen. Pump #2 did respond when when started.
Piping & Valves	Minor corrosion on valves and piping. Piping and valves appear to be in fair condition.
Pumphouses	Ventilation system operates. Pump room is clean.

SPS-NAD-1 Sewage Pump Station
Between Buildings A-224 and A-225 near river.

Data/Configuration

Pumps #1 & #2: Pumps, motors and piping are submerged in sump.
Year Installed: Not indicated
Manufacturer: (Nameplates not visible)
Type: Centrifugal Orientation: Vertical Coupling: (not visible)
Pipe size -inlet: (not visible - in sump) -outlet: 4 in.
Valves: (not visible)
Instrumentation: No gauges.
Guard on rotating parts: (not visible)

Sump: Located in a field below ground with a 24 inch diameter access opening having a manhole cover. The sump walls, bottom and top are constructed of concrete.
Ladder: Yes. Adequate.
Ventilation: This is a confined space requiring ventilation with a portable blower and gas testing prior to entry.
Exhaust fan: None

Equipment	*Condition/Deficiency*
Pumps #1 & 2	Manually started pumps. Pumps operate smoothly. Log in controller cabinet indicates no problems.
Sump	Power and float switch cables are draped through rungs of ladder presenting a tripping and electrical hazard.
Controls	Appear to be new and recently installed.

SPS-NAD-2 Sewage Pump Station
Between Buildings A75, A76 and A131 in center of Garino Lane. Controller to South side of street.

Data/Configuration

Pumps #1 & #2: Pumps, motors and piping are submerged in sump under a manhole. Could not lift manhole for inspection.
Year Installed: Not indicated

Sump: Located under manhole in street. Could not lift manhole cover.
Ventilation: This is a confined space requiring ventilation with a portable blower and gas testing prior to entry.

Equipment	*Condition/Deficiency*
Pump #1	Pump started manually and operates smoothly. Log in controller cabinet says that Float Switch circuit is not working.
Pump #2	Pump started manually and operates smoothly. Log in controller cabinet says that pump is not pumping.
Controls	Appear to be new and recently installed.

SPS-NAD-3 Sewage Pump Station
Under manhole cover at South-East corner of Building A266. Controller mounted to same corner of Building A266.

Data/Configuration

Pumps #1 & #2: Pumps, motors and piping are submerged in sump under a manhole.
Year Installed: Not indicated
Manufacturer: (Nameplates not visible)
Type: Centrifugal Orientation: Vertical Coupling: (not visible)
Pipe size -inlet: (not visible - in sump) -outlet: (not visible)
Valves: (not visible)
Instrumentation: No gauges.
Guard on rotating parts: (not visible)

Sump: Located under manhole in street.
Ladder: None
Ventilation: This is a confined space requiring ventilation with a portable blower and gas testing prior to entry.
Exhaust fan: None

Equipment	*Condition/Deficiency*
Pumps #1 & 2	Manually started pumps which operate smoothly. Log in controller cabinet indicates no problems.
Controls	Appears to be new and recently installed.

SHIP TO SHORE SEWAGE PUMP STATIONS

STS-H Ship To Shore Sewage Pump Station Located on top of sewage tanks in bottom South end to Dry Dock 1. Oilers for Tool Air to pumps are located at the upper South end of the Dry Dock.	
Data/Configuration	
Pumps #1 & #2: . Year Installed: Not indicated Manufacturer: No nameplates. Type: Air driven ejectors. Orientation: Horizontal Pipe size -inlet: 2 in. -outlet: 2 in. Guard: None. No rotating parts	
Oilers: (provide oil to Tool Air which supplies the ejectors)	
Equipment	*Condition/Deficiency*
Pumps #1 & #2	Heavy rust on Pneumatic Controls, inlet and outlet gate valves and air lines. Some pneumatic lines are disconnected.
Oilers #1 & #2	Four oil bowls have black caked oil in them. Oil valves operate freely. Oil leakage at one fitting. Minor rust over all components. Heavy rust on bonnet of spring loaded diaphragm valve.

STS-R, STS-S, STS-T Ship To Shore Sewage Pump Stations
STS-R: Center of Pier 21
STS-S: Center of Pier 22
STS-T: Center of Pier 23

Data/Configuration

Pumps #1 & #2 at each station: Pumps are submerged in a sump. Discharge piping, motor and coupling are above the sump. Nameplate located outside of sump at motor.
Year Installed: Not indicated
Manufacturer: Pacific Pumping Company
STS-R Serials: #1 (not recorded) #2 ENS148460
STS-S Serials: #1 ENS14846A #2 ENS14846F
STS-T Serials: #1 ENS14846E #2 ENS14846D
Catalog No.: 4520110-14XXX-1742 Capacity: 100 GPM
Head: Not indicated Total Head: 40 Suction: Not indicated
Type: Centrifugal Orientation: Vertical Coupling: Flex
Lubrication: No fittings for pumps. One grease fitting each at top and bottom of motors.
Pipe size -inlet not visible (in sump) -outlet: 2 in. -expands to 4 in. before the valves.
Valves: Check valve, globe valve then butterfly valve on each discharge. Valve size is 4 in.
STS-S check valve nameplate indicates: Mfr TRW, Size 4 in., Figure K25HNF, Model A, CWP-psi 500, Mfr Ser D4618, ASA Ser 250.
Instrumentation: No gauges.
Guard on rotating parts: No. Motor case provides adequate protection. Railing around area provides additional protection.

Pumphouse: None. Equipment is in the open and has no shelter.

Sumps: One sump at each station. Not accessible due to bolted access plate at each.

STS-R, STS-S, STS-T Ship To Shore Sewage Pump Stations (continued)	
Equipment	*Condition/Deficiency*
Pumps #1 & #2	Cannot turn any of the pumps by hand. STS-R Pump #1 won't turn when power turned on - it is seized. STS-R Pump #2 rotates when power turned on, but noisily- probably a bearing. No electrical power was available for test of pumps at STS-S and STS-T stations. Heavy rust on sump covers. Heavy rust on STS-S & STS-T tank level switch linkages and rods causing binding. Medium rust on motor, valves, electrical conduit and electrical equipment supports. STS-T tank level seems high per level switch operating arm position on Pump #2.
Control Panels	Could not be opened. Exterior of enclosures at Stations R & S are heavily rusted. Exterior of enclosure at Station T is slightly rusted.

STS-A, STS-C, STS-J, STS-K, STS-N, STS-O & STS-V Ship To Shore Sewage Pump Stations STS-A: Waterfront Ave. at Berth 4, West of Building 851 STS-C: Waterfront Ave. at Berth 8, opposite Building 153 STS-J: West of corner between Berths 12 and 13 STS-K: South West side of Dry Dock #3 STS-N: Waterfront Ave. at Berth 16, opposite Building 672 STS-O: Waterfront Ave. at Berth 18 near fence STS-V: South West of Berth 24, South East of Building 724	
Data/Configuration	
Pumps #1 & #2 at each station: (Doors opened at Stations A & C. Doors not opened at remaining stations. Stations not inspected due to inaccessibility - deep pits with no caged ladder, no exhaust fan and no lights. Air needs testing)	
Pumphouses: Deep concrete lined pits.	
Equipment	*Condition/Deficiency*
Pumphouses:	Presume all installations similar. Stations STS-A & STS-C have no lights or blowers and appear relatively new and clean.. Ladders have no cage (requires emergency rescure tripod, winch and harness to enter).

STS-E & STS-F Ship To Shore Sewage Pump Stations STS-E: South side of Building Ways #1 STS-F: North side of Building Ways #2.
Data/Configuration
Pumps #1 & #2 at each location: .Not found. These air driven ejectors have been removed. (Source: Mr. Dave Elder of Public Works Center - Mare Island.)

STS-L & STS-M Ship To Shore Sewage Pump Stations STS-L: North West of Berth 15 STS-M: North side of Dry Dock #4	
Data/Configuration	
Pumps #1 & #2 at each location: Stations not found.	
Equipment	*Condition/Deficiency*
Stations STS-L & STS-M	Not inspected or tested.

STS-I Ship To Shore Sewage Pump Station
At head of Dry Dock #2

Data/Configuration

Pumps #1, 2 & 3: Pumps and motors are submersible types located inside three tanks at bottom of dry dock. Controls are located at top of dry dock. Pumps could not be inspected.
Year Installed: Not indicated
Manufacturer: (Nameplates not visible)
Pipe size -inlet: (not visible - in sump) -outlet: Not recorded.
Instrumentation: Not recorded.

Starters: Manufactured by Allis-Chalmer

Equipment	*Condition/Deficiency*
Sump pump at top of dry dock near controls	Heavily corroded. Power not available for testing.
Starters	Minor rusting and appear to have not been operational. Inside terminal blocks are slightly rusted.
Pneumatic controls	Lines are disconnected. The compressor unit is in good condition except for slight rust on the base.

STORM DRAIN WATER PUMP STATIONS

SDPS-13 Storm Drain Water Pump Station South side of Building H-79	
Data/Configuration	
Pump: Year Installed: Not indicated Vertical type sump pump. **Pumphouse:** Below ground concrete pit approximately 10 feet below. Has ventilation system installed.	
Equipment	*Condition/Deficiency*
Pump	Pump runs and appears to be in good condition.
Piping & Valves	Minor or no corrosion on valves and piping. Piping and val ves appear to be in good condion.
Pumphouse	Ventilation system operates but is noisy.

SDPS-14 Storm Drain Water Pump Station Building 878 on L. St. , North West of Building 601	
Data/Configuration	
Pumps #1 & 2: Year Installed: Not indicated Pumps are submersible pump type. Manufacturer: #1 Pump -Pacific Pumping Co. #2 Pump -Paco **Pumphouse:** Below ground concrete pit approximately 10 feet below. **Electrical Panel:** Manufactured by Tesco.	
Equipment	*Condition/Deficiency*
Pump	Pump #1 is not working and appears to be in poor condition. Pedestal bearing is in bad condition; coupling is unstable. Pump #2 runs with a loud knocking sound indicating a worn-out bearing.
Piping & Valves	Minor or no corrosion on valves and piping. Piping and valves appear to be in good condition.
Motors	Good condition.
Electrical Panel	Good condition.

SDPS-15 Storm Drain Water Pump Station Building 547 West of North Gate	
Data/Configuration	
Pumps #1 & 2: Year Installed: Not indicated Pumps oriented vertically Manufacturer: Byron Jackson **Pumphouse:** Below ground concrete pit approximately 15 feet below. Cover is made out of metal grating. **Electrical Service:** Service is dropped from the transformer on the adjacent power pole.	
Equipment	*Condition/Deficiency*
Pumps #1 & 2	Pump #1 runs with leaking seals. Pump #2 is not working. Pump #1 has significant corrosion.
Piping & Valves	Significant corrosion on valves and piping. Plates and hangers are severely corroded.
Motors	Motors were started and ran smoothly without problems.
Electric Panels & Controllers	Good condition.

FRESH WATER PUMP STATION

Causeway Water Pump Station
Building 653, West of Building 755 and Walnut Street.

Data/Configuration

Pumps #1 & 2:
Year Installed: Not indicated. (Records search indicates pumps were installed about 1942.)
Manufacturer: Fairbanks Morse
Pump #2 Serial: 262400 Model: 5800 WF
Type: Each is a horizontal split case centrifugal pump with common motor. #1 Pump has multi-stages.

Valves: Manufacturers are Kennedy and Crane. Valves were manufactured around 1931-1942. (Records indicate valves repaired or replaced in 1976.)

Pumphouse:
Description: Under causeway bridge enclosed by chain link type fencing on two sides and concrete bridge structure on the other two sides and above.

Power Supply: Electrical service is 2300 volts, 3 phase. It consists of wall mounted fuse cutouts, distribution type transformers, motor controllers (480 volts and 2300 volts), enclosed circuit breakers, and safety switches.

Causeway Water Pump Station (continued)

Equipment	*Condition/Deficiency*
Pump #1	Significant corrosion, severely corroded Base Mount, was out of service or could not start.
Pump #2	Severely corroded. Standing water at Base Mount. Pump and motor is in operating condition. Large leak on mechanical seals.
Piping	Minor external corrosion.
Valves	Mild corrosion at bolted connections and threads. Valves are 54 - 65 years old. Valve internals are probably corroded. Valves have exceeded their life expectancy.
Power Supply	The fused cutouts mounting heights are less than 8 feet above ground and not readily accessible. Transformer terminal connections are exposed and not insulated. The electrical equipment installation is not provided with safety enclosure and warning signs (NEC 110-7, 110-31, 110-34 (a)). Conductor lengths of the transformer secondary taps exceed the code limits (NEC 240-21). Motor and transformer grounding is inadequate (NEC 250-42). The bottom part of the two transformers and the high voltage motor controller that are in direct contact with the concrete pad are severely corroded.

Causeway Water Pump Station (continued)	
Controllers	The controller for the 400 hp motor is inaccessible and was unable to start the motor. Condition could not be determined. Motor starter for the 50 hp pump motor is old and obsolete but operational. The starter has only 2 overload heaters.
Lighting	Lighting around electrical equipment appears to be insufficient. Lighting fixtures have missing or broken lens, missing lamps, or not operating. Type of fixtures installed in this area is not suitable for the service.

Building 774 Water Pump Station
Pampano Ave. & Wasmuth St.

Data/Configuration

Pumps #1, 2 & 3:
Year Installed: Not indicated. (Drawing 774M6 indicates pumps replaced 1982.)
Serial Nos.: #1 J8H2A #2 125097
Manufacturer: #2 Dean Bra(??)ter Pumps, Inc.
Type: #1 Horizontal split case, Emergency Booster, rated at 3000 Gpm @ 70 psi.
#2 Vertical end suction, Tank Fill, rated at 350 gpm @ 70 psi.
#3 Horizontal base mounted end suction, Tank Fill, rated at 350 gpm @ 100 feet head.

Valves: Gate valves are 4 & 8 inch sizes. (Records indicate valves repaired or replaced in 1976.)

Pumphouse: Enclosed embankment type ground level.

Equipment	*Condition/Deficiency*
Pump #1	Good condition with slight corrosion on base mount. Pump and motor were not started during site visit.
Pump #2	Severely corroded. Pump and motor were not started during site visit.
Pump #3	Good condition. Pump and motor were not started during site visit.
Piping	Some external corrosion.
Valves	Severely corroded 4 & 8 inch gate valves. Other valves have minor corrosion.
Controllers	Electrical installation is in good condition except for the enclosed circuit breaker for Pump #3 which is tagged "not working". slight corrosion on equipment enclosures was observed.

Building 645 Water Pump Station
6 th St. & Walnut St.

Data/Configuration

Pump:
Year Installed: Installed pump manufactured 1-13-29. (Drawing indicates original pump installed 1929. Per records, pump replaced in 1950 with pump of same capacity and motor having 75 hp. Pump curves available.)
Manufacturer: Byron Jackson
Type: Horizontal centrifugal. Capacity: 1750 gpm @ 250 feet head.

Valves: (Records indicate valves replaced or repaired in 1976.)

Pumphouse: The pump room is approximately 25 feet below the entrance. Access is by metal ladder. Space is considered to be a confined space. Safety equipment (gas tester, harness w/safety line, and blower) is needed for access.

Equipment	*Condition/Deficiency*
Pump	Pump is tagged "could not run" but pump runs. Pump is corroded at coupling. Pump has exceeded life expectancy.
Valves	Mild corrosion. Same age as pump.
Pumphouse	There is no ventilation switch by the entrance. No ventilation system seen. But, there is a breaker on the electrical panel labeled "exhaust fan". Light is poor. Tank level indicator is broken.
Motors Controllers & Electrical Equipment	The electrical equipment is installed on the mezzanine floor. The high voltage fuse cutouts are mounted on the wall and enclosed with a "home made" structure made of plywood sheets (NEC 110-17, 110-31). Enclosures are made for indoor installations, but they are now exposed to rain water because the roof above is badly worn out and leaking. Some enclosures were found draped with plastic material to protect equipment. Equipment is showing corrosion. Motors and controllers are in good condition. There was no detectable problem when motors were started.

Building 880 Water Pump Station
Club Dr. & Sargo Ave.

Data/Configuration

Pump:
Year Installed: Not indicated
Manufacturer: Patterson (Subsidiary of Danner Industries, Toccoa, GA)
Serial: (not readable) Size: 6 x 5 MAA Capacity: 1000 gpm
Max psig: 17 Max psig: 143 CAP psig: 1.55
Max BHP: 114 Rated BHP: 125 RPM: 3525
Type: Centrifugal split case Orientation: Horizontal Coupling: Flex
Guard on rotating parts: Yes -satisfactory

Valves: Check, gate then diaphram type pressure control valve.
Instrumentation: Inlet pressure gauge having positive range of 0-300 psi in 5psi increments and suction range of 0-30 inches of Hg. Outlet pressure gauge having positive range of 0-300 psi and no suction indication. Control valve gauge reads 0-200 psig in 2 psi increments. (Records indicate valves repaired or replaced in 1976.)

Pumphouse: Sheet metal building on concrete slab. Insulation bats installed on interior surfaces. No fan - none required.

Power Supply: Power is fed from a high voltage overhead line through a bank of pole mounted 3-50 kVA transformers.

Fire Pump Controller: Controller is a reduced voltage type.

Building 880 Water Pump Station (continued)

Equipment	*Condition/Deficiency*
Pump	Pump ran smoothly. Corrosion on top of fasteners and flange. Corrosion on bedplate and mounting bosses and coupling guard supports.
Valves and piping	Excellent condition - no corrosion.
Pumphouse	Minor corrosion on exterior. Entire installation looks relatively new. Lighting is adequate. Ground around around discharge pipe that goes underground appears to have caved-in.
Controller	Good condition. Working space infront of the controller is less than 36 inches (NEC 110-34).

Building 188B Water Pump Station In golf course (Quad D3)
Data/Configuration
Pump: (Records indicate pump installed 1952.)
Valves: (Records indicate valves repaired or replaced in 1976.)
Pumphouse: This item services only the golf course and was deleted from the survey.

Building 252 Water Pump Station South of the golf course in Quad B3
Data/Configuration
Pumphouse: This item was reported as abandoned and was not included in the survey.

DOM-10 Domestic Sewage Pump Station Building M37 North end basement next to showers and wash basins.	
Data/Configuration	
Pumps & Motors #1 &2: Submersible pump/motors are located in sump below concrete floor. Nameplate information not available. Gauges indicate total operating times of 506 hrs for #1 Pump and 233 hrs for #2 Pump. First and last entry in a log found in controller are: 10/17/80 and 5/2/95.	
Pipes: 3-3 1/2 inches in diameter.	
Valves: One check valve on each discharge pipe.	
Equipment	*Condition/Deficiency*
Pump	Both pumps run smoothly. No maintenance problems indicated in station log.
Valves & Piping	No corrosion. Appear to be in good condition.
Pumphouse	Light switch is just inside the door. However, power to lighting system was secured. So, lighting could not be tested. Ventilation is not required in the pump control area and none is installed. The sump is a confined area without lighting or ventilation.
Controller & Electrical Equipment	Controller functions satisfactorily and has no corrosion. Power cabling between the pump motors and the controller is draped over the piping and secured at one point with electrician's tape. This cabling should be better protected and it is a possible personnel hazard.

ADDENDUM TO INSPECTION RESULTS

DOM-18 Domestic Sewage Pump Station
South of Building H-79 in the Combat Systems Training Center complex.

Data/Configuration

Pumps #2 & 3: Motors, pumps, valves and piping are accessible for inspection. (Pump #1 is the SDPS-13 station pump)
Year Installed: Not indicated
Manufacturer: Not indicated - no nameplate on pumps.
Type: Centrifugal Orientation: Vertical Coupling: Yes
Lubrication: One grease fitting at pump upper end.
Pipe size -inlet: 4 in. -outlet: 4 in.
Valves: Check valve then globe valve on discharge of each pump. Counterbalance installed on check valve from #3 pump.
Instrumentation: No gauges.
Guard on rotating parts: No. Motor case provides adequate protection.

Motors #2 & 3:
Year Installed: Not indicated
Manufacturer: ALDO Electric Co., Smith, Arkansas.
Serial: #2 N333327, #3 N843531
Frame: 560 52BM Horsepower: 1.5 RPM: 1140
Volts: 208/220/480 Amps: 4.8/4.6/2.3

Pumphouse:
Description: Pumphouse is a pit having concrete walls and floor with metal doors at top. It is approximately 15 feet deep. There is no sump.
Exhaust Fan: One installed at top of each pit by ladders with power switch handy.
Ladder: Yes

Electrical Panel: Manufactured by Tesco.

DOM-18 Domestic Sewage Pump Station (continued)

Equipment	*Condition/Deficiency*
Pumps #2, & 3	Spin freely by hand. Test ran #2 - no problems indicated. No rust on pump, motor, valves and piping. Pump #2 is in fair condition.
Valves	Counterbalance is missing on #2 pump discharge check valve.
Pumphouses	Good condition. Ventilation blowers operated and sound good. Adequate ventilation, ladders, and lighting.
Switchboard	Good condition.
Motors	Motor #3 is grounded and could not test run. Motor#2 is in good condition.

Electrical Panel	Good condition.

SDPS-13 Storm Drain Water Pump Station
South side of Building H-79

Data/Configuration

Pump #1: Motor, pump, valves and piping are accessible for inspection.
Year Installed: Not indicated
Manufacturer: Not indicated - no nameplate on pumps.
Type: Centrifugal Orientation: Vertical Coupling: Yes
Lubrication: One grease fitting at pump upper end.
Pipe size -inlet: 4 in. -outlet: 4 in.
Valves: Check valve then globe valve on discharge of each pump.
Instrumentation: No gauges.
Guard on rotating parts: No. Motor case provides adequate protection.

Motor #1:
Year Installed: Not indicated
Manufacturer: ALDO Electric Co., Smith, Arkansas.
Serial: #1 not readable, Frame: 560 52BM, Horsepower: 1.5, RPM: 1140
Volts: 208/220/480 Amps: 4.8/4.6/2.3

Pumphouse:
Description: Pumphouse is a pit having concrete walls and floor with metal doors at top. It is approximately 10 feet deep. There is no sump.
Exhaust Fan: One installed at top of each pit by ladders with power switch handy.
Ladder: Yes

Electrical Panel: Manufactured by Tesco.

Equipment	*Condition/Deficiency*
Pump	Pump spins freely by hand, runs and appears to be in good condition.
Piping & Valves	No corrosion on valves and piping. Piping and valves appear to be in good condition.
Pumphouse	Good condition. Ventilation system operates but is noisy. Adequate ventilation, ladders, and lighting.
Switchboard & Electrical Panel	Good condition.
Motor	Good condition.

DOM-10 Domestic Sewage Pump Station
Building M37 North end basement next to showers and wash basins.

Data/Configuration

Pumps & Motors #1 &2: Submersible pump/motors are located in sump below concrete floor. Nameplate information not available. Gauges indicate total operating times of 506 hrs for #1 Pump and 233 hrs for #2 Pump. First and last entry in a log found in controller are: 10/17/80 and 5/2/95.

Pipes: 3-3 1/2 inches in diameter.

Valves: One check valve on each discharge pipe.

Equipment	*Condition/Deficiency*
Pump	Both pumps run smoothly. No maintenance problems indicated in station log.
Valves & Piping	No corrosion. Appear to be in good condition.
Pumphouse	Light switch is just inside the door. However, power to lighting system was secured. So, lighting could not be tested. Ventilation is not required in the pump control area and none is installed. The sump is a confined area without lighting or ventilation.
Controller & Electrical Equipment	Controller functions satisfactorily and has no corrosion. Power cabling between the pump motors and the controller is drapped over the piping and secured at one point with electrician's tape. This cabling should be better protected and it is a possible personnel hazzard.

APPENDIX B5

PUMP STATION IMPROVEMENT AND MAINTENANCE COSTS

Note: Estimates are for planning purposes only. Detailed estimates should be performed prior to actually performing any proposed action.

REPAIR COSTS

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

Building 653

Causeway Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

FRESH WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
1. Test power line and energize	1	LS	$200	4		4	$65.00	$200	$260		$460
2. Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
PUMP #2											
1. Drain and sump pump	1	LS	$2,100	40		40	$65.00	$2,100	$2,600		$4,700
2, Repair mechanical seal	1	LS	$800	12		12	$65.00	$800	$780		$1,580
3. Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
PIPING											
1.. Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
VALVES											
1. Replace valves											
14"	2	ea	$1,000	12.00		24	$65.00	$2,000	$1,560		$3,560
12"	4	ea	$1,500	15.00		60	$65.00	$6,000	$3,900		$9,900
ADD PUMPHOUSE	1	LS	$18,000	100.00		100	$65.00	$18,000	$6,500		$24,500
TOTAL THIS PAGE											$45,630.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

Building 774

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB Date:3/31/97

FRESH WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	ub-Contra $	Total Cost
PUMP #1											
1. Test power line and energize	1	LS	$200	4		4	$65.00	$200	$260		$460
2. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
PUMP #2											
1. Test power line and energize	1	LS	$200	4		4	$65.00	$200	$260		$460
2. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
PUMP #3											
No action											
PIPING											
1.. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
VALVES											
1.. Clean and preserve	6	LS	$100	4		24	$65.00	$600	$1,560		$2,160
TOTAL THIS PAGE						44		$1,300			$4,160.00
ACCOUNT TO											

:STIMATE WORKSHEET
OUGH ORDER OF MAGNITUDE
Building 645
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

OCAMPO-ESTA CORP

ARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

M.T.O. Est. by: EP
Ckd. BB

RESH WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
UMP											
Replace pump											
ALVES											
Replace valves											
UMPHOUSE											
Replce ventilation system	1	LS	$2,400	80.00		80	$65.00	$2,400	$5,200		$7,600
Install sump safeties	1	LS	$4,000	60.00		60	$65.00	$4,000	$3,900		$7,900
Repair leaking roof	1	LS	$1,200	4.00		4	$65.00	$1,200	$260		$1,460
OTAL THIS PAGE											$16,960.00
CCOUNT TOTAL											

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

Building 880

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

ARE ISLAND REUSE INFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

FRESH WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP											
1. Energize and test	1	LS	$200	4		4	$65.00	$200	$260		$460
2. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
VALVES and PIPING											
Good condition											
PUMPHOUSE											
1. Clean and paint	1	LS	$400	40.00		40	$65.00	$400	$2,600		$3,000
TOTAL THIS PA											$3,820.00
ACCOUNT TOTAL											

STIMATE WORKSHEET

UGH ORDER OF MAGNITUDE

Building 653, DOM-1
Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O.
Ckd. BB

Est. by: EP

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
UMP#1											
Tighten set screws	1	LS	$0	4		4	$65.00	$0	$260		$260
UMP #2											
unning. No work required.											
UMPHOUSE											
aint door	1	LS	$50	4.00		4	$65.00	$50	$260		$310
TOTAL THIS PAGE											$570.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

Building 857, DOM-2
Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

DOMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
1. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
2. Adjust packing	1	LS	$50	18		18	$65.00	$50	$1,170		$1,220
PUMP #2											
1. Energize and test	1	LS	$200	4		4	$45.00	$200	$180		$380
2. Clean and preserve	1	LS	$100	4		4	$45.00	$100	$180		$280
PUMP #3											
1 Energize and test	1	LS	$200	4		4	$65.00	$200	$260		$460
2 Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
3 Adjust packing	1	LS	$50	2		2	$65.00	$50	$130		$180
PIPING											
1. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
VALVES											
1. Clean and preserve	6	LS	$100	4		24	$65.00	$600	$1,560		$2,160
PUMPHOUSE											
1. Repair water leak	1	LS	$120	4		4	$65.00	$120	$260		$380
2. Replace sump pump	1	LS	~~$15,000~~	~~50~~ 16		16 ~~50~~	$65.00	~~$15,000~~	~~$3,250~~		2500 ~~$18,250~~
3 Install sump safeties	1	LS	$4,000	60.00		60	$65.00	$4,000	$3,900		$7,900
				1460				1460	1040		
											16540 → ~~$32,290.00~~
TOTAL THIS PAGE											
ACCOUNT TOTAL											

OECES

STIMATE WORKSHEET
)UGH ORDER OF MAGNITUDE
Building 859, DOM-3
Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
UMP #1											
Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
UMP #2											
. Energize and test	1	LS	$200	4		4	$65.00	$200	$260		$460
. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
IPING											
.. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
/ALVES											
.. Clean and preserve	4	LS	$100	4		16	$65.00	$400	$1,040		$1,440
PUMPHOUSE											
1. Repair water line.	1	LS	$180	8		8	$65.00	$180	$520		$700
2. Install sump safeties	1	LS	$4,000	60.00		60	$65.00	$4,000	$3,900		$7,900
TOTAL THIS PAGE						100		$5,080			$11,580.00
ACCOUNT TOTAL											

OECEST WK

STIMATE WORKSHEET

)UGH ORDER OF MAGNITUDE

Building 861, DOM-4
Sanitary Waste Water
Pump Station

(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

ANITARY WASTE WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
UMP #1											
Overhaul	1	LS	$8,000	200		200	$65.00	$8,000	$13,000		$21,000
UMP #2											
Overhaul	1	LS	$8,000	200		200	$65.00	$8,000	$13,000		$21,000
UMP #3											
Overhaul	1	LS	$8,000	200		200	$65.00	$8,000	$13,000		$21,000
UMP#4											
Overhaul	1	LS	$8,000	200		200	$65.00	$8,000	$13,000		$21,000
ALVES											
. Clean and preserve	8	LS	$100	8		64	$65.00	$800	$4,160		$4,960
'UMPHOUSE											
. Repair water leak	1	LS	$120	4		4	$65.00	$120	$260		$380
. Install sump safeties	1	LS	$6,000	60		80	$65.00	$6,000	$5,200		$11,200
. Refurbish compressor	1	LS	$3,000	20		80	$65.00	$3,000	$5,200		$8,200
MISSING DOM-4W SHEET (USED DOM-4 for DOM-4W)											
TOTAL THIS PA											$108,740.00
ACCOUNT TOTAL											

STIMATE WORKSHEET

UGH ORDER OF MAGNITUDE

Building 91 (North), DOM-5

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

M.T.O. Est. by: EP

Ckd. BB

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
JMP #1											
Replace VFD	1	ea	$8,000	30		30	$65.00	$8,000	$1,950		$9,950
Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
Energize and test	1	LS	$200	4		4	$45.00	$200	$180		$380
JMP #2											
Replace VFD	1	ea	$8,000	30		30	$65.00	$8,000	$1,950		$9,950
Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
JMPHOUSE											
Good condition											
Install sump safeties	1	LS	$3,000	40		80	$65.00	$3,000	$5,200		$8,200
OTAL THIS PAGE						152		$19,400			$29,200.00
CCOUNT TOTAL											

STIMATE WORKSHEET

)UGH ORDER OF MAGNITUDE

Building 833, DOM-6

Sewage Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	ub-Contra $	Total Cost
UMP #1											
Replace bearings,coupling,	1	LS	$4,200	60		60	$65.00	$4,200	$3,900		$8,100
and seals											
Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
UMP #2											
Replace bearings,coupling,	1	LS	$4,200	60		60	$65.00	$4,200	$3,900		$8,100
and seals											
Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
IPING											
Clean and preserve	1	ILS	$50	4		4	$65.00	$50	$260		$310
ALVES											
Clean and preserve	1	ILS	$50	4		4	$65.00	$50	$260		$310
UMPHOUSE											
Clean and preserve	1	LS	$300	4		18	$65.00	$300	$1,170		$1,470
Air comp.,ventillation fan,											
sump pump											
3. Install Sump Safeties											$11,200
OTAL THIS PAGE											~~$18,910.00~~
ACCOUNT TOTA											[illegible]210.00

STIMATE WORKSHEET
UGH ORDER OF MAGNITUDE
Building 914, DOM-7
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
JMP #1											
Overhaul	1	LS	$1,600	40		40	$65.00	$1,600	$2,600		$4,200
Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
UMP #2											
Overhaul	1	LS	$1,600	40		40	$65.00	$1,600	$2,600		$4,200
Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
Provide Pwr & Test Operate	1										460
UMP #3											
Overhaul	1	LS	$1,600	40		40	$65.00	$1,600	$2,600		$4,200
Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
Replace mech. seal	1	LS	$500	12.00		12	$65.00	$500	$780		$1,280
IPING											
. Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
ALVES											
. Clean and preserve	6	LS	$50	4		24	$65.00	$300	$1,560		$1,860
UMPHOUSE											
. Repair water leak	1	LS	$60	4		4	$65.00	$60	$260		$320
. Repair ventilation system	1	LS	$800	30		30	$65.00	$800	$1,950		$2,750
. Install sump safeties	1	LS	$3,000	40		80	$65.00	$3,000	$5,200		$8,200
. Add Pump, Piping, Valves & Elect. Equip											25000
TOTAL THIS PAGE						286		$9,660		53710	~~$28,250.00~~
ACCOUNT TOTAL											

STIMATE WORKSHEET
UGH ORDER OF MAGNITUDE
Building 916, DOM-8
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
JMP #1											
Replace seal , clean coupling	1	LS	$800	24		24	$65.00	$800	$1,560		$2,360
Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
UMP #2											
Replace seal , clean coupling	1	LS	$800	24		24	$65.00	$800	$1,560		$2,360
Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
IPING											
Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
ALVES											
Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
UMPHOUSE											
. Repair water leak	1	LS	$120	4		4	$65.00	$120	$260		$380
. Repair ventilation system	1	LS	$800	30		30	$65.00	$800	$1,950		$2,750
. Groom compressor	1	LS	$200	4		4	$65.00	$200	$260		$460
. Install sump safeties	1	LS	$3,000	40		80	$65.00	$3,000	$5,200		$8,200
OTAL THIS PAG											$17,750.00
ACCOUNT TOTAL											

OECEST WK

:STIMATE WORKSHEET

OUGH ORDER OF MAGNITUDE

Building 918, DOM-9

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

)OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
'UMP #1											
. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
'UMP #2											
. Replace motor bearings	1	LS	$1,500	40		40	$65.00	$1,500	$2,600		$4,100
. Replace seals	1	LS	$800	30		30	$65.00	$800	$1,950		$2,750
. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
'IPING											
. Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
'ALVES											
. Clean and preserve	4	LS	$50	4		16	$65.00	$200	$1,040		$1,240
'UMPHOUSE											
. Groom compressor	1	LS	$60	4		4	$65.00	$60	$260		$320
. Clean and adjust ventilation	1	LS	$800	30		30	$65.00	$800	$1,950		$2,750
. Install sump safeties	1	LS	$3,000	40		80	$65.00	$3,000	$5,200		$8,200
'OTAL THIS PAGE											$20,390.00
\CCOUNT TOTAL											

:STIMATE WORKSHEET

OUGH ORDER OF MAGNITUDE

Building M37, DOM-10

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
UMP #1											
;ood condition											
UMP #2											
;ood condition											
IPING											
;ood condition											
ALVES											
;ood condition											
UMPHOUSE											
.Safety raillings	1	LS	$2,000	80		80	$65.00	$2,000	$5,200		$7,200
. Electrical repairs	1	LS	$50	2		2	$65.00	$50	$130		$180
OTAL THIS PAG											$7,380.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
OUGH ORDER OF MAGNITUDE
DOM-16
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)
Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
UMP #1											
ood condition											
UMP #2											
ood condition											
IPING											
ood condition											
ALVES											
. Replace check valve for pump #1	1	LS	$100	4		4	$65.00	$100	$260		$360
. Install sump safeties	1	LS	$3,000	40		80	$65.00	$3,000	$5,200		$8,200
DOM-12 ~~Wastewater~~ Pump Station											
#1 & #2 Pumps: Provide power & test operate each @ 460 each									920		
Minor Rust on Valves: Clean & paint						310			310		
Install Pump House @ 12'x12'x' 50 $/ft² =						7200			7200		
									8430		
TOTAL THIS PAGE						84		$3,100			$8,560.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
DOM-17
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O.
Ckd. BB

Est. by: EP

DOMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
No work required											
PIPING											
1. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
VALVES											
1. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
Install additional pump incl addl house											~~29700~~ 45700
	Pump =		29700								
PPG & ULVS =			4000								
House pump =			12000								
			45700								
TOTAL THIS PAGE											46420 ~~$720.00~~
ACCOUNT TOTAL											

:STIMATE WORKSHEET
OUGH ORDER OF MAGNITUDE
Building H79,So, DOM-18
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
~~UMP #1~~											
. ~~Test~~	1	LS	$100	4		4	$65.00	$100	$260		~~$360~~
~~UMP #2~~											
. ~~Test~~	1	LS	$100	4		4	$65.00	$100	$260		~~300~~ ~~$360~~
UMP #3											
. Test	1	LS	$100	4		4	$65.00	$100	$260		$360
ALVES											
. Replace CV counterbalance	6	LS	$100	4		24	$65.00	$600	$1,560		$2,160
UMPHOUSE											
;ood condition											
:OTAL THIS PAGE											2520 ~~$3,240.00~~
ACCOUNT TOTAL											

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

SPS-1,2,3,4

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

DOMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMPS #1&2											
1. Clean and preserve	8	ea	$50	4		32	$65.00	$400	$2,080		$2,480
PUMPHOUSE											
1. Raise equipment #4 only	2	ea	$700	12		24	$65.00	$1,400	$1,560		$2,960
1. Clean and preserve	8	ea	$50	4		32	$65.00	$400	$2,080		$2,480
PUMPS 1,2 &3											
1. Energize and test	8	ea	$200	4		32	$45.00	$1,600	$1,440		$3,040
FANS											
1. Energize and test	4	ea	$100	2		8	$45.00	$400	$360		$760
PUMPHOUSE											
1.Install bubblers for 1,2 &3	4	ea	$500	4		16	$45.00	$2,000	$720		$2,720
2.Replace weather stripping	4	ea	$300	4		16	$45.00	$1,200	$720		$1,920
TOTAL THIS PAGE						160		$7,400			$16,360.00
ACCOUNT TO											

OECEST.WK

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

SPS-5

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

DOMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1&2											
1. Test and repair	2	ea	$400	12		24	$65.00	$800	$1,560		$2,360
2. Clean and preserve	2	ea	$100	4		8	$65.00	$200	$520		$720
PIPING											
1. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
VALVES											
1. Clean and preserve	4	LS	$100	4		16	$65.00	$400	$1,040		$1,440
PUMPHOUSE											
No work required											
TOTAL THIS PAGE											$4,880.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

SPS-NAD-1

Sewage Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
No work required											
PUMP #2											
No work required											
~~**SUMP PUMP**~~											
1. Fix cable	1	LS	$10	2.00		2	$65.00	$10	$130		$140
TOTAL THIS [illegible]GE											$140.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

SPS-NAD-2

Sewage Pump Station

(Area)

ITY OF VALLEJO

ustomer

MARE ISLAND REUSE INFRASTRU TUTE STUDY

(Project Title)

Mare Island, Vallejo, alifornia

(Location) (Job No.)

O AMPO-ESTA ORP

M.T.O. Est. by: EP

kd. BB

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit		Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
1. Test and repair float SW	1	LS	$250	8		8	$65.00	$250	$520		$770
PUMP #2											
1. Test and repair float SW	1	LS	$250	8		8	$65.00	$250	$520		$770
TOTAL THIS PAGE						16		$500			$1,540.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
SPS-NAD-3
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

DOMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
Good condition											
PUMP #2											
Good condition											
TOTAL THIS PAGE						0		$0			$0.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

STS-H

Shore Sewage Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, Califomia

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

SHORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1&2											
1. Energize and test	1	LS	$200	4		4	$65.00	$200	$260		$460
2. Clean and preserve	1	LS	$100	4		4	$65.00	$100	$260		$360
VALVES											
1. Fix pneumatic tubings	4	ea	$50	2		8	$65.00	$200	$520		$720
OILERS #1&2											
1. Fix and clean oilers	2	ea	$120	4		8	$65.00	$240	$520		$760
TOTAL THIS PAGE											$2,300.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
STS-I
Shore Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

SHORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
STS-I PUMP #1,2&3											
~~1. Inspect and test~~	3	ea	$1,600	40		120	$65.00	$4,800	$7,800		~~$12,600~~
2. Sump Pump Clean & Preserve											310
1. Test #1,2 & 3											1250
TOTAL THIS [illegible]E						120		$4,800			1560 ~~$12,600.00~~
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
STS-R,S,T
Shore Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)
Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

SHORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
STS-R PUMP #1&2											
1. Test and repair	2	ea	$4,000	120		240	$65.00	$8,000	$15,600		$23,600
2. Clean and preserve	2	LS	$50	4		8	$65.00	$100	$520		$620
STS-S PUMP #1&2											
1. Test and repair	2	LS	$4,000	120		240	$65.00	$8,000	$15,600		$23,600
2. Clean and preserve	2	LS	$50	4		8	$65.00	$100	$520		$620
STS- T PUMP #1&2											
1. Test and repair	2	LS	$4,000	120		240	$65.00	$8,000	$15,600		$23,600
2. Clean and preserve	2	LS	$50	4		8	$65.00	$100	$520		$620
LEVEL CONTROLS											
1. Replace level controls and accessories	6	ea	$1,200	40		240	$65.00	$7,200	$15,600		$22,800
ADD PUMPHOUSE	~~1~~ 3	LS	15000 ~~$5,000~~	120 ~~40~~		120 ~~40~~	65 ~~$65.00~~	15000 ~~$5,000~~	7800 ~~$2,600~~		22,800 ~~$7,600~~
TOTAL THIS PAGE											~~$103,060.00~~
ACCOUNT TOTAL											

OFCEST_WK

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

STS-A,C,J,K,N,O,V

Shore Sewage Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

SHORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
STS-A PUMP #1&2											
1. Inspect and test	2	LS	$1,600	40		80	$65.00	$3,200	$5,200		$8,400
STS-C PUMP #1&2											
1. Inspect and test	2	LS	$1,600	40		80	$65.00	$3,200	$5,200		$8,400
STS-J PUMP #1&2											
1. Inspect and test	2	LS	$1,600	40		80	$65.00	$3,200	$5,200		$8,400
STS-K PUMP #1&2											
1. Inspect and test	2	LS	$1,600	40		80	$65.00	$3,200	$5,200		$8,400
STS-N PUMP #1&2											
1. Inspect and test	2	LS	$1,600	40		80	$65.00	$3,200	$5,200		$8,400
STS-O PUMP #1&2											
1. Inspect and test	2	LS	$1,600	40		80	$65.00	$3,200	$5,200		$8,400
STS-V PUMP #1&2											
1. Inspect and test	2	LS	$1,600	40		80	$65.00	$3,200	$5,200		$8,400
MISC.											
1. Lighting	7	LS	$5,000	80		560	$65.00	$35,000	$36,400		$71,400
2. Ventilation	7	LS	$7,000	60		7	$65.00	$49,000	$455		$49,455
3. Gas Detection, local alarm	7	LS	$6,000	40		7	$65.00	$42,000	$455		$42,455
3. Ladder w/ cage	7	LS	$3,000	30		7	$65.00	$21,000	$455		$21,455
TOTAL THIS GE											$243,565.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
STS-L,M
Shore Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

SHORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
STS-L PUMP #1&2											
1. Inspect and test	2	LS	$1,600	40		80	$65.00	$3,200	$5,200		$8,400
STS-M PUMP #1&2											
1. Inspect and test	2	LS	$1,600	40		80	$65.00	$3,200	$5,200		$8,400
MISC.											
1. Lighting	2	LS	$5,000	80		160	$65.00	$10,000	$10,400		$20,400
2. Ventilation	2	LS	$7,000	60		7	$65.00	$14,000	$455		$14,455
3. Gas Detection, local alarm	2	LS	$6,000	40		7	$65.00	$12,000	$455		$12,455
3. Ladder w/ cage	2	LS	$3,000	30		7	$65.00	$6,000	$455		$6,455
TOTAL THIS PAGE						341		$48,400			$70,565.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
SDPS-13
Pump Station
(Area)

CITY OF VALLEJO
Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSEINFRASTRUCTURE STUDY
(Project Title)
Mare Island, Vallejo, California
(Location) (Job No.)

M.T.O. Est. by: EP
Ckd. BB

STORMDRAIN

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP											
No work required											
PIPING											
1. Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
VALVES											
1. Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
PUMPHOUSE											
1. Monitor noise	1	LS	$600	60		60	$65.00	$600	$3,900		$4,500
~~2. Install sump safeties~~	~~1~~	~~LS~~	~~$3,000~~	~~40~~		~~80~~	~~$65.00~~	~~$3,000~~	~~$5,200~~		~~$8,200~~
Similar to DOM-18 (ok)											
Add Pump Valves & PPG									33700		29700
no pumphouse											4000
(See DOM-17)											
Add two Pumps larger size (800 gpm)											
(See DOM-6 for reference)											
from DOM-6 * 800 GPM pump costs 47500											
One valve set 3950											
2 Pumps 95000 (includes electrical)											
2 valvesets 7900											
Piping 4000											
106900											
TOTAL THIS PAGE									112020	~~[illegible]~~	~~$13,320.00~~
ACCOUNT TOTAL											

OECEST WK

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
SDPS-14
Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSEINFRASTRUCTURE STUDY
(Project Title)
Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O.
Ckd. BB

Est. by: EP
Date:3/31/97

STORMDRAIN

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
1. Inspect and test	1	ea	$1,600	40		40	$65.00	$1,600	$2,600		$4,200
PUMP #2											
1. Repair pump	1	ea	$3,000	80		150	$65.00	$3,000	$9,750		$12,750
PIPING											
1 Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
VALVES											
1. Clean and preserve	4	LS	$50	4		16	$65.00	$200	$1,040		$1,240
2. Install sump safeties	1	LS	$3,000	40		80	$65.00	$3,000	$5,200		$8,200
INSTALL NEW PUMPHOUSE w/3-4600GPM Pumps and all equipment											780,000
TOTAL THIS PAGE										806700	~~$26,700~~ 00
ACCOUNT TOTAL											

SDPS-15
Pump Station
(Area)

MARE ISLAND REUSEINFRASTRUCTURE STUDY
(Project Title)
Mare Island, Vallejo, California
(Location) (Job No.)

M.T.O.
Ckd. BB

Est. by: EP
Date:3/31/97

STORMDRAIN

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
1. Fix seal	1	ea	$800	40		40	$65.00	$800	$2,600		$3,400
2. Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
PUMP #2											
1. Inspect and test	1	ea	$3,000	80		150	$65.00	$3,000	$9,750		$12,750
2. Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
PIPING											
1 Clean and preserve	1	LS	$50	4		4	$65.00	$50	$260		$310
VALVES											
1. Clean and preserve	4	LS	$50	4		16	$65.00	$200	$1,040		$1,240
2. Install sump safeties	1	LS	$3,000	40		80	$65.00	$3,000	$5,200		$8,200
Install Add'l 4200GPM Pump, equipment house											255000
TOTAL THIS PAGE										281520	~~$26,520.00~~
ACCOUNT TOTAL											

OECEST WK

REPLACEMENT COSTS

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

Building 653

Causeway Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

REPLACE EQUIPMENT

FRESH WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
1. Replace pump	1	ea	$9,000	120		120	$65.00	$9,000	$7,800		$16,800
PUMP #2											
1. Replace pump	1	ea	$9,000	120		120	$65.00	$9,000	$7,800		$16,800
PIPING											
VALVES											
1. Replace valves											
14"	2	ea	$1,000	12.00		24	$65.00	$2,000	$1,560		$3,560
12"	4	ea	$1,500	15.00		60	$65.00	$6,000	$3,900		$9,900
TOTAL THIS PAGE											$47,060.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

Building 774

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

REPLACE EQUIPMENT

FRESH WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	ub-Contra $	Total Cost
PUMP #1											
1. Replace pump	1	ea	$24,000	200		200	$65.00	$24,000	$13,000		$37,000
PUMP #2											
1. Replace pump	1	ea	$24,000	200		200	$65.00	$24,000	$13,000		$37,000
PUMP #3											
1. Replace pump	1	ea	$24,000	200		200	$65.00	$24,000	$13,000		$37,000
PIPING											
VALVES											
1. Replace valves	15	ea	$600	6		90	$65.00	$9,000	$5,850		$14,850
TOTAL THIS PAGE											$125,850.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
Building 645
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

ARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

REPLACE EQUIPMENT
FRESH WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP											
1. Replce pump	1	ea	$28,000	200		200	$65.00	$28,000	$13,000		$41,000
VALVES											
1. Replace valves	2	LS	$1,200	12		24	$65.00	$2,400	$1,560		$3,960
TOTAL THIS [illegible]GE											$44,960 00
ACCOUNT TO[illegible]AL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
Building 880
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

ARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

REPLACE EQUIPMENT
FRESH WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP											
Replace pump	1	ea	$26,000	200		200	$65.00	$26,000	$13,000		$39,000
VALVES and PIPING											
Good condition											
TOTAL THIS PAGE											$39,000.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET

ROUGH ORDER OF MAGNITUDE

Building 653, DOM-1

Sewage Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

REPLACE EQUIPMENT

DOMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP#1											
1. Replace pump	1	ea	$12,000	160		160	$65.00	$12,000	$10,400		$22,400
PUMP #2											
1. Replace pump	1	ea	$12,000	160		160	$65.00	$12,000	$10,400		$22,400
TOTAL THIS PAGE											$44,800.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
Building 857, DOM-2
Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)
Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

REPLACE EQUIPMENT
DOMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
1. Replace pump	1	ea	$26,000	200		200	$65.00	$26,000	$13,000		$39,000
PUMP #2											
1. Replace pump	1	ea	$26,000	200		200	$65.00	$26,000	$13,000		$39,000
PUMP #3											
1. Replace pump	1	ea	$26,000	200		200	$65.00	$26,000	$13,000		$39,000
PIPING											
VALVES											
1. Replace valves	6	ea	$1,000	12		72	$65.00	$6,000	$4,680		$10,680
PUMPHOUSE											
1. Replace sump pump	1	LS	$15,000	50		50	$65.00	$15,000	$3,250		$18,250
TOTAL THIS PAGE											$145,930.00
ACCOUNT TOTAL											

ESTIMATE WORKSHEET
ROUGH ORDER OF MAGNITUDE
Building 859, DOM-3
Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

M.T.O. Est. by: EP
Ckd. BB

REPLACE EQUIPMENT
DOMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
PUMP #1											
1. Replace pump	1	ea	$35,000	200		200	$65.00	$35,000	$13,000		$48,000
PUMP #2											
1. Replace pump	1	ea	$35,000	200		200	$65.00	$35,000	$13,000		$48,000
PUMP#3 &#4											
1. Replace pump	1	ea	$35,000	200		200	$65.00	$35,000	$13,000		$48,000
PIPING											
VALVES											
1. Replace valves	8	ea	$1,000	12		96	$65.00	$8,000	$6,240		$14,240
PUMPHOUSE											
TOTAL THIS P[illegible]E						696		$113,000			$158,240.00
ACCOUNT TO[illegible]AL											

;TIMATE WORKSHEET
JGH ORDER OF MAGNITUDE
Building 861, DOM-4
Sanitary Waste Water
Pump Station
(Area)

CITY OF VALLEJO
Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT
NITARY WASTE WATER

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
IMP #1											
Replace pump	1	ea	$45,000	400		400	$65.00	$45,000	$26,000		$71,000
IMP #2											
Replace pump	1	ea	$45,000	400		400	$65.00	$45,000	$26,000		$71,000
JMP #3											
Replace pump	1	ea	$45,000	400		400	$65.00	$45,000	$26,000		$71,000
JMP#4											
Replace pump	1	ea	$45,000	400		400	$65.00	$45,000	$26,000		$71,000
ALVES											
Replace valves	8	ea	$1,500	15		120	$65.00	$12,000	$7,800		$19,800
UMPHOUSE											
Replace exhauxt fan	1	ea	$3,000	60		60	$65.00	$3,000	$3,900		$6,900
Replace air compressor	1	ea	$8,000	40		40	$65.00	$8,000	$2,600		$10,600
OTAL THIS PAGE											$321,300.00
ACCOUNT TOTAL											

STIMATE WORKSHEET

)UGH ORDER OF MAGNITUDE

Building 833, DOM-4W
Domestic Sewage
Pump Station

(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

REPLACE EQUIPMENT

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
JMP #1											
Replace pump	1	ea	$45,000	400		400	$65.00	$45,000	$26,000		$71,000
JMP #2											
Replace pump	1	ea	$45,000	400		400	$65.00	$45,000	$26,000		$71,000
JMP #3											
Replace pump	1	ea	$45,000	400		400	$65.00	$45,000	$26,000		$71,000
PING											
Replace pump	1	ea	$45,000	400		400	$65.00	$45,000	$26,000		$71,000
ALVES											
Replace valves	6	ea	$1,500	15		90	$65.00	$9,000	$5,850		$14,850
UMPHOUSE											
Replace exhauxt fan	1	ea	$3,000	60		60	$65.00	$3,000	$3,900		$6,900
Replace air compressor	1	ea	$8,000	40		40	$65.00	$8,000	$2,600		$10,600
OTAL THIS PAGE											$316,350.00
CCOUNT TOTAL											

STIMATE WORKSHEET

)UGH ORDER OF MAGNITUDE

3uilding 91 (North), DOM-5 Water Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

REPLACE EQUIPMENT

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
UMP #1											
Replace pump	1	ea	$24,000	300		300	$65.00	$24,000	$19,500		$43,500
UMP #2											
Replace pump	1	ea	$24,000	300		300	$65.00	$24,000	$19,500		$43,500
UMPHOUSE											
. Replace sump pump	1	LS	$15,000	80.00		80	$65.00	$15,000	$5,200		$20,200
. Replace exhauxt fan	1	ea	$2,000	60		60	$65.00	$2,000	$3,900		$5,900
TOTAL THIS PAGE											$113,100.00
ACCOUNT TOTAL											

STIMATE WORKSHEET
UGH ORDER OF MAGNITUDE
Building 833, DOM-6
Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT
OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
IMP #1											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
IMP #2											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
PING											
LVES											
Replace valves	4	ea	$1,000	15		60	$65.00	$4,000	$3,900		$7,900
IMPHOUSE											
Replace sump pump	1	LS	$15,000	80.00		80	$65.00	$15,000	$5,200		$20,200
Replace exhauxt fan	1	LS	$2,000	60		60	$65.00	$2,000	$3,900		$5,900
OTAL THIS PAGE											$129,000.00
CCOUNT TOTAL											

STIMATE WORKSHEET
)UGH ORDER OF MAGNITUDE
Building 914, DOM-7
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTURE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

REPLACE EQUIPMENT
OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
UMP #1											
. Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
UMP #2											
. Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
IPING											
'ALVES											
. Replace valves	4	ea	$1,000	15		60	$65.00	$4,000	$3,900		$7,900
'UMPHOUSE											
. Replace sump pump	1	LS	$15,000	80.00		80	$65.00	$15,000	$5,200		$20,200
:. Replace exhauxt fan	1	LS	$2,000	60		60	$65.00	$2,000	$3,900		$5,900
TOTAL THIS PAGE											129000 ~~$0.00~~
ACCOUNT TOTAL											

ꟷSTIMATE WORKSHEET

UGH ORDER OF MAGNITUDE

Building 916, DOM-8

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

EPLACE EQUIPMENT

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
JMP #1											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
JMP #2											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
PING											
ALVES											
Replace valves	4	ea	$1,000	15		60	$65.00	$4,000	$3,900		$7,900
JMPHOUSE											
Replace sump pump	1	LS	$15,000	80.00		80	$65.00	$15,000	$5,200		$20,200
Replace exhauxt fan	1	LS	$2,000	60		60	$65.00	$2,000	$3,900		$5,900
OTAL THIS PAG											$129,000.00
CCOUNT TOTAL											

ƽTIMATE WORKSHEET

UGH ORDER OF MAGNITUDE

Building 918, DOM-9
Water Pump Station

(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT

OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
JMP #1											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
JMP #2											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
PING											
ALVES											
Replace valves	4	ea	$1,000	15		60	$65.00	$4,000	$3,900		$7,900
JMPHOUSE											
Replace sump pump	1	LS	$15,000	80		80	$65.00	$15,000	$5,200		$20,200
Replace exhauxt fan	1	LS	$2,000	60		60	$65.00	$2,000	$3,900		$5,900
OTAL THIS PAGE											$129,000.00
CCOUNT TOTAL											

ᴉTIMATE WORKSHEET

JGH ORDER OF MAGNITUDE

Building M37, DOM-10

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

EPLACE EQUIPMENT

ᴐMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
IMP #1											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
JMP #2											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
PING											
ɔod condition											
ALVES											
Replace valves	4	ea	$1,000	15		60	$65.00	$4,000	$3,900		$7,900
UMPHOUSE											
. Replace sump pump	1	LS	$15,000	80		80	$65.00	$15,000	$5,200		$20,200
. Replace exhauxt fan	1	LS	$2,000	60		60	$65.00	$2,000	$3,900		$5,900
TOTAL THIS PAC											$129,000.00
ACCOUNT TOTAL											

ͥTIMATE WORKSHEET

JGH ORDER OF MAGNITUDE

Building ____, DOM-12

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

M.T.O. Est. by: EP

Ckd. BB

EPLACE EQUIPMENT

MESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
MP #1											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
MP #2											
Replace pump	1	ea	$28,000	300		300	$65.00	$28,000	$19,500		$47,500
PING											
LVES											
Replace valves	4	ea	$1,000	15		60	$65.00	$4,000	$3,900		$7,900
OTAL THIS PAGE											$102,900.00
CCOUNT TOTAL											

STIMATE WORKSHEET
UGH ORDER OF MAGNITUDE
DOM-16
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT
OMESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
JMP #1											
Replace pump	1	ea	$18,000	180		180	$65.00	$18,000	$11,700		$29,700
UMP #2											
Replace pump	1	ea	$18,000	180		180	$65.00	$18,000	$11,700		$29,700
IPING											
ood condition											
ALVES											
Replace valves	4	ea	$800	15		60	$65.00	$3,200	$3,900		$7,100
TOTAL THIS PA											$66,500.00
ACCOUNT TOTAL											

'IMATE WORKSHEET
ıH ORDER OF MAGNITUDE
DOM-17
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

M.T.O. Est. by: EP
Ckd. BB

PLACE EQUIPMENT
IESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
IP #1											
eplace pump	1	ea	$18,000	180		180	$65.00	$18,000	$11,700		$29,700
NG											
VES											
eplace valves	2	ea	$800	15		30	$65.00	$1,600	$1,950		$3,550
ump #2											33250.00
(Added)											
TAL THIS PAGE											66500 ~~$33,250.00~~
COUNT TOTAL											

OECEST1.WK

TIMATE WORKSHEET
GH ORDER OF MAGNITUDE
uilding H79,So, DOM-18
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT
MESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
MP #1											
~~eplace pump~~	1	ea	$6,000	180		180	$65.00	$6,000	$11,700		~~$17,700~~
MP #2											
eplace pump	1	ea	$6,000	180		180	$65.00	$6,000	$11,700		$17,700
MP #3											
eplace pump	1	ea	$6,000	180		180	$65.00	$6,000	$11,700		$17,700
LVES											
eplace valves	5	ea	$250	8		40	$65.00	$1,250	$2,600		$3,850
MPHOUSE											
eplace exhauxt fan	1	LS	$2,000	60		60	$65.00	$2,000	$3,900		$5,900
TAL THIS PAGE											41900 ~~$62 [illegible]0.00~~
COUNT TOTAL											

'IMATE WORKSHEET

3H ORDER OF MAGNITUDE

SPS-1,2,3,4

Water Pump Station

(Area)

CITY OF VALLEJO

Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

M.T.O. Est. by: EP

Ckd. BB

PLACE EQUIPMENT

IESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
IPS #1&2											
eplace pump	8	ea	$18,000	180		1440	$65.00	$144,000	$93,600		$237,600
IPHOUSE											
eplace sump pump	4	LS	$8,000	80		320	$65.00	$32,000	$20,800		$52,800
eplace exhaust fan	4	LS	$2,000	60		240	$65.00	$8,000	$15,600		$23,600
OTAL THIS PAGE											$314,000.00
CCOUNT TOTAL											

TIMATE WORKSHEET
IGH ORDER OF MAGNITUDE
SPS-5
Water Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT
MESTIC SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
MP #1&2											
Replace pump	2	ea	$6,000	180		360	$65.00	$12,000	$23,400		$35,400
ING											
LVES											
Replace valves	4	ea	$250	8		32	$65.00	$1,000	$2,080		$3,080
MPHOUSE											
											$3[illegible]0.00
COUNT TOTAL											

TIMATE WORKSHEET
GH ORDER OF MAGNITUDE
SPS-NAD-1
Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
MP #1											
eplace pump	1	ea	$18,000	300		300	$65.00	$18,000	$19,500		$37,500
MP #2											
eplace pump	1	ea	$18,000	300		300	$65.00	$18,000	$19,500		$37,500
MP PUMP											
eplace sump pump	1	LS	$8,000	80		80	$65.00	$8,000	$5,200		~~$13,200~~
VES											
eplace valves	4	ea	$250	8		32	$65.00	$1,000	$2,080		$3,080
TAL THIS PAGE						632 ~~712~~		37000 ~~$45,000~~		78080	→ ~~$91,280.00~~
COUNT TOTAL											

ꜱTIMATE WORKSHEET
UGH ORDER OF MAGNITUDE
SPS-NAD-2
Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)
Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit		Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
IMP #1											
Replace pump	1	ea	$18,000	300		300	$65.00	$18,000	$19,500		$37,500
JMP #2											
Replace pump	1	ea	$18,000	300		300	$65.00	$18,000	$19,500		$37,500
ALVES											
Replace valves	4	ea	$250	8		32	$65.00	$1,000	$2,080		$3,080
OTAL THIS PAG						632		$37,000			$78,080.00
CCOUNT TOTAL											

TIMATE WORKSHEET

GH ORDER OF MAGNITUDE

SPS-NAD-3

Sewage Pump Station

(Area)

CITY OF VALLEJO

Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

M.T.O. Est. by: EP

Ckd. BB

PLACE EQUIPMENT

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
MP #1											
eplace pump	1	ea	$18,000	300		300	$65.00	$18,000	$19,500		$37,500
MP #2											
eplace pump	1	ea	$18,000	300		300	$65.00	$18,000	$19,500		$37,500
VES											
eplace valves	4	ea	$250	8		32	$65.00	$1,000	$2,080		$3,080
TAL THIS PAGE											$78,080.00
COUNT TOTAL											

ᵢTIMATE WORKSHEET
JGH ORDER OF MAGNITUDE
STS-H
Shore Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT
IORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
IMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
ILVES											
Replace valves	4	ea	$250	8		32	$65.00	$1,000	$2,080		$3,080
LERS #1&2											
Fix and clean oilers	2	ea	$120	4		8	$65.00	$240	$520		$760
OTAL THIS PAG						640		$37,240			$78,840.00
ICCOUNT TOTAL											

TIMATE WORKSHEET

GH ORDER OF MAGNITUDE

STS-I

Shore Sewage Pump Station

(Area)

CITY OF VALLEJO

Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

M.T.O. Est. by: EP

Ckd. BB

EPLACE EQUIPMENT

ORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
I PUMP #1,2&3											
eplace pump	3	ea	$18,000	300		900	$65.00	$54,000	$58,500		$112,500
VES											
eplace valves	6	ea	$250	8		48	$65.00	$1,500	$3,120		$4,620
TAL THIS PAGE											$117,120.00
COUNT TOTAL											

TIMATE WORKSHEET
JGH ORDER OF MAGNITUDE
STS-R,S,T
Shore Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB

EPLACE EQUIPMENT
ORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
S-R PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
S-S PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
S- T PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
VEL CONTROLS											
Replace level controls and	6	ea	$1,200	40.00		240	$65.00	$7,200	$15,600		$22,800
ccessories											
LVES											
Replace valves	4	ea	$250	8		32	$65.00	$1,000	$2,080		$3,080
OTAL THIS PAGI						2072		$116,200			$250,880.00
CCOUNT TOTAL											

STIMATE WORKSHEET
UGH ORDER OF MAGNITUDE
STS-A,C,J,K,N,O,V
Shore Sewage Pump Station
(Area)

CITY OF VALLEJO
Customer

MARE ISLAND REUSE INFRASTRUCTUTE STUDY
(Project Title)

Mare Island, Vallejo, California
(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP
Ckd. BB Date:3/31/97

EPLACE EQUIPMENT
IORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
'S-A PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
'S-C PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
'S-J PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
'S-K PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
'S-N PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
'S-O PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
'S-V PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
SC.											
Lighting	7	LS	$5,000	80		560	$65.00	$35,000	$36,400		$71,400
Ventilation	7	LS	$7,000	60		7	$65.00	$49,000	$455		$49,455
Gas Detection, local alarm	7	LS	$6,000	40		7	$65.00	$42,000	$455	26252 / 00 sta.	$42,455
Ladder w/ cage	7	LS	$3,000	30		7	$65.00	$21,000	$455		$21,455
LVES											
Replace valves	14	ea	$250	8		112	$65.00	$3,500	$7,280		$10,780
					10780/7 = 1540 ea sta.						
					dect, mtrs, Pumps 75000 ea sta						
OTAL THIS PAGE						4893		$402,500			$720,545.00
CCOUNT TOTAL											

:STIMATE WORKSHEET

OUGH ORDER OF MAGNITUDE

STS-L,M

Shore Sewage Pump Station

(Area)

CITY OF VALLEJO

Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSE INFRASTRUCTUTE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

M.T.O. Est. by: EP

Ckd. BB

REPLACE EQUIPMENT

HORE SEWAGE

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
TS-L PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
TS-M PUMP #1&2											
Replace pump	2	ea	$18,000	300		600	$65.00	$36,000	$39,000		$75,000
ISC.											
Lighting	2	LS	$5,000	80		160	$65.00	$10,000	$10,400		$20,400
Ventilation	2	LS	$7,000	60		7	$65.00	$14,000	$455		$14,455
Gas Detection, local alarm	2	LS	$6,000	40		7	$65.00	$12,000	$455		$12,455
. Ladder w/ cage	2	LS	$3,000	30		7	$65.00	$6,000	$455		$6,455
ALVES											
Replace valves	8	ea	$250	8		64	$65.00	$2,000	$4,160		$6,160
OTAL THIS PAGE						1445		$116,000			$209,925.00
CCOUNT TOTAL											

STIMATE WORKSHEET

UGH ORDER OF MAGNITUDE

SDPS-13

Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSEINFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O. Est. by: EP

Ckd. BB

REPLACE EQUIPMENT

TORMDRAIN

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
JMP											
Replace pump	1	ea	$6,000	120		120	$65.00	$6,000	$7,800		$13,800
PING											
ALVES											
Replace valves	2	ea	$150	6		12	$65.00	$300	$780		$1,080
JMPHOUSE											
Replace exhauxt fan	1	LS	$2,000	60		60	$65.00	$2,000	$3,900		$5,900
OTAL THIS PAGE											$20,780.00
CCOUNT TOTAL											

STIMATE WORKSHEET

UGH ORDER OF MAGNITUDE

SDPS-14

Pump Station

(Area)

CITY OF VALLEJO

Customer

MARE ISLAND REUSEINFRASTRUCTURE STUDY

(Project Title)

Mare Island, Vallejo, California

(Location) (Job No.)

OCAMPO-ESTA CORP

M.T.O.

Ckd. BB

Est. by: EP

Date:3/31/97

REPLACE EQUIPMENT

TORMDRAIN

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
ao Pump Sta.											
JMP #1											
Replace pump	1	ea	$18,000	300		300	$65.00	$18,000	$19,500		$37,500
JMP #2											
Replace pump	1	ea	$18,000	300		300	$65.00	$18,000	$19,500		$37,500
ump #3 (Added)											
PING											
ALVES											
Replace valves	4	ea	$250	8		32	$65.00	$1,000	$2,080		$3,080
							3/2x	78080 =			
OTAL THIS PAG										117120	~~$7[illegible]080.00~~
CCOUNT TOTAL											

TIMATE WORKSHEET
UGH ORDER OF MAGNITUDE
SDPS-15
Pump Station
(Area)

CITY OF VALLEJO
Customer

OCAMPO-ESTA CORP

MARE ISLAND REUSEINFRASTRUCTURE STUDY
(Project Title)
Mare Island, Vallejo, California
(Location) (Job No.)

M.T.O.
Ckd. BB

Est. by: EP
Date:3/31/97

EPLACE EQUIPMENT
ORMDRAIN

Description	Quantity	Unit	Material $/Unit	Man-Hrs Hr./Unit	Sub-Cont. IFR	Total Man-hours	$/Hr.	Material	Labor	Sub-Contract $	Total Cost
MP #1											
Replace pump	1	ea	$10,000	200		200	$65.00	$10,000	$13,000		$23,000
MP #2											
Replace pump	1	ea	$10,000	200		200	$65.00	$10,000	$13,000		$23,000
PING											
LVES											
Replace valves	4	ea	$250	8		32	$65.00	$1,000	$2,080		$3,080
Replace ~~[illegible]~~ Add'l Pump (add New Pit & House)			3/2 x 49080 = 73620								
OTAL THIS PAGE						432		$21,000		73620	~~$49,080.00~~
CCOUNT TOTAL											

APPENDIX C

CAUSEWAY BRIDGE

EXISTING CONDITIONS AND RECOMMENDATIONS

PREPARED BY

OCAMPO – ESTA CORPORATION

INTRODUCTION

Mechanical and electrical condition of the Mare Island Causeway Bridge has been evaluated based upon the following information:

– Results from inspection of the bridge machinery rooms and observation of operation.
– Preventive maintenance records from 1980 through 1988.
– Job and Work Orders from 1980 through 1988.
– As-built drawings.
– Interview of bridge operators.
– Telephone conversations with experienced personnel

Results and recommendations are provided in the section on Results.

This information will be used when developing the Mare Island Utility Operations and Capital Improvement Plan.

RESULTS

The Machinery Rooms at the top of the East and West towers were each inspected by Ocampo-Esta (IOE) personnel while the bridge was stationary and moving in the upper and lower directions. Inspector's Removable Records (IRR) from 1980 through 1988, Job Orders (JO) from 1981 through 1988 and As-built drawings (AB) were reviewed as part of investigation of problems found. Bridge operators (BO) were interviewed regarding the problems. Records were reviewed for any continuing problems. Operators were requested to identify any problems not recorded. All problems were investigated and recommended actions prepared.

The bridge operators Referenced Mr. Roger Friend as the most knowledgeable person for adjustment of cams and relays and information on other matters related to the bridge. Mr. Friend was an Electrical Technician at the Mare Island Naval Shipyard Public Works Center (PWC). He was contacted regarding the problems found. He Referenced a Civil Engineer, Mr. George Young, at the Caretaker's Office. He, in turn, Referenced a Structural Engineer, Mr Craig Pyle, who was in the PWC and now is in the Caretaker's Office. Results of telephone conversations with these men are included in the following.

ITEM 1: Brake drums and shoe pads

IOE: West Tower North brake and the East Tower South brake drum surfaces are rough and have some pitting. The West Tower South and the East Tower North brake drums have minor grooving in surfaces. At both towers the North and South brake shoe pads are old.

IRR: Record of 11/01/88 indicates that East Machinery Room Main Drive Brake Shoes (both sets) need repair.
***JO, BO & AB*:** No information.

Recommendation: In both towers, turn both drums to achieve a smooth surface. Replace brake shoe pads at the same time.

ITEM 2: Clattering sound at West Tower

IOE: When the bridge is moving downward and slowing for stop there is a clattering sound from the vicinity of the motor coupling or reduction gear. When raising the bridge there is a clattering sound during approximately half the elapsed time after the bridge achieved steady speed. The clattering noise appears above approximately 20 feet and ends prior to attaining full height. It appears to come from the area of the coupling and/or the South brake assembly. No clattering sounds are heard during operations in the East Tower.

IRR & JO: No information.

BO: Bridge operator Dennis says he doubts that these items have ever been opened for inspection.

AB: References (a) and (b) show coupling and reduction gear details.

Mr. Friend: To his knowledge, these items have never been opened for inspection.

Recommendation: Disassemble the brake assemblies and motor coupling, inspect and report problems found, reassemble, lubricate coupling and retest. If clattering persists, open and inspect the reduction gear, correct problems found and retest.

ITEM 3: Low frequency binding/ rubbing sound - West Tower

IOE: When the bridge is starting upward there is a momentary low frequency "binding" or "rubbing" sound. Source could not be located.

IRR: No specific mention of this. However, the Span Locks are one possible source. The IRRs indicate that those at the East corners of the bridge were greased on the average of every 5.1 months. These are the most frequently greased items on IRR records. They may have been greased relatively frequently to prevent binding. The only record for locks at the West corners was one notation of greasing on 11/01/88.

JO: The following possible related items are mentioned:

4/27/82	"Binding SE corner of bridge span. Request investigation." No action was indicated.
10/13/82	"Make adjustments to ensure proper seating of bridge span." "Replaced switch for low limit seating."
10/16/82	"SW seating will not lift off at times." "-repaired"
9/20/83	"SE corner will not seat without using bypass; span locks will not lock without using bypass." "Checked 9/19, 9/20 and once more (with engineer). Couldn't find sticking problem."
6/23/83	"SE Lock: Has to be jammed into position." "Greased and checked lock -unable to find one sticking."

10/11/83 "SW Lock: Lock does not activate to out position sometimes. It disables opening of span." "Checked 10/05/83 and unable to find a problem."

5/09/84 Work order requires "Grind apron plates" (allowing the SE corner of the lift span to descend another 1/4 inch) and "adjust tension of wire ropes . . . . ".

No mention of binding or sticking problems were found in subsequent Job Orders.

BO: The bridge operator, Dennis, was more concerned with Item 4 (slowing down of the bridge). He said that the bridge operates satisfactorily except for Item 4. He said jamming or any other problem that has occurred in the past usually took about 10 minutes to clear. A normal bridge opening takes about 5-6 minutes.

AB: Reference (a) shows the lock equipment arrangement.

Mr. Friend: Regarding the Job Orders written for seating, jamming and lock operation problems in the early 1980's, he thinks they were most likely the result of inadequate adjustment of cams and relays. Source of the reported problems at that time could not be found by inspection.

Mr. Pyle: Some binding or rubbing could be expected to be normal. It could occur at guides upward along the towers, where decks come together and where railroad tracks come together. "The way the seats are constructed (with rocker assemblies), slight differentials shouldn't affect operation that much." He said no measurements had been taken to check relative elevation of seats, not even after the Loma Prieta earthquake. He said the North East seat was damaged during the earthquake. It was repaired and the bridge operated satisfactorily afterwards.

IOE Comment: The new bridge was installed approximately 1977 (according to Mr. Friend). Binding or sticking problems may or may not be related to locks, lift span binding in guide rails or at seats, unequal tension in cables and maladjusted cams and relays. Binding may also be related to seasonal shifting of bridge or temperature changes. The importance of this problem is actually minimal because, except for one recorded case, the bridge could be opened by going into bypass mode. Delays to transportation are minimal.

Recommendation: Structural inspectors check for any signs of rubbing and report to the City. Proceed with maintenance actions recommended for Items 4 and 11 as they might eliminate the noise. Audibly monitor the noise and identify any increased noise or vibration.

ITEM 4: Bridge slows down then returns to the ordered speed of 50 RPM

IOE: The slowing was observed in both towers.

JO & IRR: No mention of this problem.

BO: The bridge operator says that this problem started occurring just after the cams and relays were adjusted several years ago. He said you have to start the bridge upwards at no less than setting No. 2 (100 RPM) or the bridge will slow and stop between 8 and 11 feet. He said many years ago they were having this problem at 60 feet height. That was corrected by adjusting cams and relays. (For bridge speeds see Page 8) It is desirable to start the bridge up slowly to maximize operator control and minimize stress and wear on bridge cabling, machinery and seats. Currently a bridge operator who is not familiar with this bridge would cause it to jam if he started at 50 rpm.

Mr. Friend: He thinks that every time the bridge is lifted the cables reposition themselves slightly and that the cables stretch slightly with time. Over a year the cables must be adjusted for equal tension and cams and relays adjusted. He believes tensioning and adjustment should be done every year. Every time he has adjusted the cams and relays the slowing problem was eliminated. It then returns over a period of time.

AB: Reference (a) provides information on cable tension adjustment. Cams and relays are described. Could find no mention of need to regularly adjust cams and relays.

Recommendation: Adjust cables for equal tension and adjust cams and relays yearly. Include in Preventive Maintenance program.

ITEM 5: Hard pasty grease on open gears (pinions and rings), cables and cable guides

IOE: New grease overlays the old. No defects in gears could be seen. However, most areas were obscured by the thick old grease.

IRR: Gears have been greased on the average of every 9.8 months, and lift cables and cable guides every 26.3 months. MobilTac-E or equal was specified. Greasing was not performed during the last inspection record of 11/06/88.

JO: 5/09/84 Job order required greasing of span and counterweight guides - scrape off old grease first..

BO: The last time old grease on gears was removed and replaced was approximately three years ago.

Mr. Friend: Lubrication P.M.s continued after November, 1988.

AB: References (c) through (e) provide details of the ring gear, sheave bearing, pinion shaft and counterweight ropes (cables). Reference (h) provides lubrication requirements.

Recommendation: Scrape off old grease from gears. Inspect for unusual wear. Install new grease. Add grease to cables and cable guides.

ITEM 6: Lubrication

IOE: Page 8 lists lubricants found in a locker. It could not be readily determined if they were the proper lubricants. They were not marked for their specific service.

IRR: Records indicate "open gear" grease MobilTac-E for Pinion and Ring Gear Set; and "#2" grease for the Main Sheave Shaft Bearings and the Pillow Block Bearings, and #4 gear oil for Falk Triple Reduction Gears..

BO: No information.

AB: "Causeway Bridge Alterations, Mare Island naval Shipyard, Lubrication Chart 1 & 2" lists required lubrication. This drawing is mounted on the wall in both machinery rooms and included in Reference (a).

Recommendation: Review the lubricants in the lockers and determine whether they meet the requirements of the drawing. Mark each container indicating the specific service for which it should be used. Lubrication types should not be mixed.

ITEM 7: Fire Extinguisher

IOE: No fire extinguisher is installed in either tower.

IRR, BO & AB: No information.

Recommendation: Install fire extinguisher in each tower.

ITEM 8: Safety Chain

IOE: The safety chain at the equipment shipping door is missing in the West Tower. Several flimsy rope strands are installed. Chain is installed in the East Tower.

IRR, BO & AB: No information.

Recommendation: Install safety chain at the equipment shipping door in the West Tower.

ITEM 9: Lighting System

IOE: In the West Tower the light switch on the East side does ~~not work. Several~~ lamps are missing from the overhead in both towers. There are no energy saving automatic timers installed for securing lights after exit.
IRR & BO: No information.

AB: Reference (f) shows the lighting diagram.

Recommendation: Install missing lamps. Replace switch. Improvement item, install timers on all switches to save energy.

ITEM 10: Electrical Panels and Space Heaters

IOE: There were no signs of hot spots in any of the electrical panels. Space heaters function satisfactorily.

IRR, BO & AB: No information.

Recommendation: No action.

ITEM 11: Preventive Maintenance

IOE: Equipment, except where noted above, is in good condition. There is adequate new grease in most cases. Oil sight glasses show adequate levels and clear (clean) oil.

IRR: Review of problems found and recorded on the IRR cards shows no recurring maintenance problems. In the eight years covered, seven electrical and one mechanical problem were identified. All were indicated as repaired except for the mechanical item (Brake shoes in the East Tower - See Item 1).

The policy for frequency of inspection and preventive maintenance indicated on the records is once a month. Actual average time between inspection varies considerably:

- Electrical equipment: Ranges between 11 and 23.5 months depending upon the component. The average for all electrical equipment has been 18.7 months .
- Mechanical equipment not requiring lubrication: Ranges between 11 and 23.7 months with an average for all such equipment of 19.9 months.
- Mechanical equipment where lubrication is specified by the IRR card: Ranges between 5.1 and 23.7 months. The average for each is listed below:

  Span Locks: Average time between maintenance (lubrication) of 5.1 months. (grease)
  Main Sheave Shaft Bearings: Average of 6.4 months. (grease)
  Pillow Block Bearings: Record of being greased only once - 11/6/87. (grease)
  Traffic Gates: Average of 7.2 months. (grease)

  Hub City Parallel Shaft Reducers and Horsburg & Scott Single Reduction Speed Reducers: Average of 8.7 months. (oil)
  Pinion and Ring Gear Sets: Average of 9.8 months. ~~(grease)~~
  Lift cables and Cable Guides: Average of 26.3 months. (grease)

The last entries in the IRR cards indicate that the last inspection was in October, 1988 for electrical equipment and November, 1988 for mechanical equipment. Mr. Friend and bridge operator, Dennis, say that maintenance has continued after that time. Responsibility was changed from the Public Works Center to the Power House and different records were kept.

A list of items included on IRR cards is included on Page 15 for Reference. It is notable that there are no IRR cards requiring check of internal components of reduction gears, motors and couplings, and bearings. Mr. Friend and bridge operator, Dennis, said these items had not been opened for inspection to their knowledge and probably had not been opened.

JO: A review of Job Orders showed recurring problems with seating, binding, sticking of the lift span. After grinding apron plates and adjusting tension in cables in 1984 no further Job Orders were written on this problem. (Please refer to Items 3 and 4.)

Job orders usually required monthly preventive maintenance and inspection. A memo written in 1982 indicated that Manufacturer's Maintenance Manuals specify monthly P.M.s , that they were too expensive and that quarterly P.M. would be sufficient. A tabulation of Bridge P.M. Hourly Records shows 777 manhours in Fiscal Year 82 and 796 manhours expended in Fiscal Year 1983. A Job order was written for quarterly inspection. However, subsequent Job Orders requested monthly P.M.s. As can be seen from the section on IRRs the policy on frequency of inspection, whether monthly or quarterly, had little relation to what was actually done.

ITEM 12: Memoranda listing number of bridge openings per month:

Data from such memoranda have been plotted on Page C-15. They show that the peak month of July, 1983, required 364 openings and that the average over the period of almost four years was 184 openings per month. Since the bridge was installed in approximately 1977 it has opened approximately 44,000 times.

BO: The operator says to his knowledge the gearboxes and couplings have not been open for inspection in the last six years. It may be assumed the same is true for the motors.

Recommendation: Establish a realistic preventive maintenance and inspection plan. It should meet the requirements of Reference (h) including schedule. Also, someone should visit each machinery room monthly and witness operation of the bridge while listening and observing any unusual noise and vibration. Mechanical components not requiring lubrication and electrical components should be inspected every 18 months. Cable tension should be checked and adjusted yearly. Cams and relays should be adjusted immediately and checked yearly.

REFERENCES

(a) Mare Island Naval Shipyard Causeway Bridge Operating Manual, Volume 1, 1980.
(b) Horsburgh & Scott Technical Manual included in ref.(a).
(c) Steward Machine Co. drawing 906-1, Ring Gear
(d) Steward Machine Co. drawing 906-2, Sheave Bearing Assembly and Pinion Shaft
(e) Steward Machine Co. drawings 901-1, 901-2 & 901-3, Counterweight Ropes
(f) Contra Costa Electric, Inc., drawing D22279 Sheets 4 & 5, Master Conduit Layout
(g) Westinghouse Electric Co. drawing 4958C13, Sheets 34 & 35.
(h) Lubrication Charts 1 and 2 of Reference (a).

GREASE IN LOCKERS

WEST TOWER
Union A Grease-O: 5 gal
Shell Lithium Base MP Grease: 14.5 oz
Chevron SR1 Grease 2: 5 gal
Union 76 Onion MP Automotive Grease NLGI-Z: 5 gal, 5 gal
Grease General Purpose MIL-G-24139 A Shell Oil: 5 gal, 5 gal

EAST TOWER
Union 76 MP Automotive Grease NLG1-2: 5 gal, 5 gal
Chevron SR1 Grease-2: 5 gal, 5 gal
RPM Universal Gear Lubricant SAE 80W-90: 5 gal
Mobil TAC Open Gear Lubricant WB2K9BS: 10 gal
Grease, General Purpose MIL-G-24139 A Shell Oil Co.: 5 gal, 5 gal, 5 gal

BRIDGE SPEED LEVELS

Level	RPM*
1	50
2	100
3	200
4	400
5	650

* According to the bridge operator.

LIST OF PREVENTIVE MAINTENANCE ITEMS
(Data from Inspectors Removable Records - IRR)

Item	Manufacturer	Location
Limit Switch		West side only
Limit Switch	Security Products	SE & NE corner of span
Limit Switch	Security Products	SW & NW corner of span
Air Compressor Drive Motor		North West pad below bridge
Main Drive Motor		West Equip Room
Main Drive Motor		East Equip Room
Resistor Main Drive Motor Secondary		West Equip Room
Horizontal Drive Motor		West Equip Room
Horizontal Drive Motor		East Equip Room
Gear Motor	Reuland, Model A000	West Equip Room North end
Gear Motor	Reuland, Model A000	East Equip Room
Resistor		East Equip Room
Air Ejector motor/controller	Toshiba, B0034FGF2A4	Under Bridge West side
Air Ejector motor/controller		East Equip Room
Position Xmeter	Henschell Corp. Amesbury, Mass.	West Equip Room
Position Xmeter	Henschell Corp. Amesbury, Mass.	East Equip Room
Security Light		West Equip Room
Security Light		East Equip Room
Sound Powered Phone	Hose-McCann Tele Co N.Y.	West Equip Room
Sound Powered Phone	Hose-McCann Tele Co N.Y.	East Equip Room
Sound Powered Phone Jack & Dolphin Lights		East Tower below bridge

Item	Manufacturer	Location
Sound Powered Phone Jack & Dolphin Lights		West Tower below bridge
Brake Motor (2 ea) Truster		West Equip Room
Brake Motor (2 ea) Truster		East Equip Room
Hoist Motor	Baldor 1.5 Ton, 3782108	West Equip Room
Hoist Motor	Baldor 1.5 Ton, 3782108	East Equip Room
Aux Air Drive Motor	Chicago Pneumatic Tool Co N.Y.	West Equip Room
Aux Air Drive Motor	Chicago Pneumatic Tool Co N.Y.	East Equip Room
Gear Box	Hub City, 200	West Equip Room
Gear Box	Hub City, 200	East Equip Room
Power Panel - DP-WMH	Westinghouse	West Equip Room
Power Panel	480V, 3ph, 100A, WEHB	East Equip Room
Control Box		NW pad above sewage pump
Control Box		East Equip Room
Control Xformer	Westinghouse, 6E1065	West Equip Room
Control Xformer	480V, 3ph	East Equip Room
Lighting Panel	Westinghouse	West Equip Room
Lighting Panel	Westinghouse	East Equip Room
Heavy Duty Safety Switch	Westinghouse	West Equip Room
Heavy Duty Safety Switch	Westinghouse	East Equip Room
Locked Indicator		NE end outside below bridge
Locked Indicator		SE end outside below bridge
Locked Indicator		NW end outside below bridge
Locked Indicator		SW end outside below bridge
Drive Motor - Span Lock		NE end outside below bridge

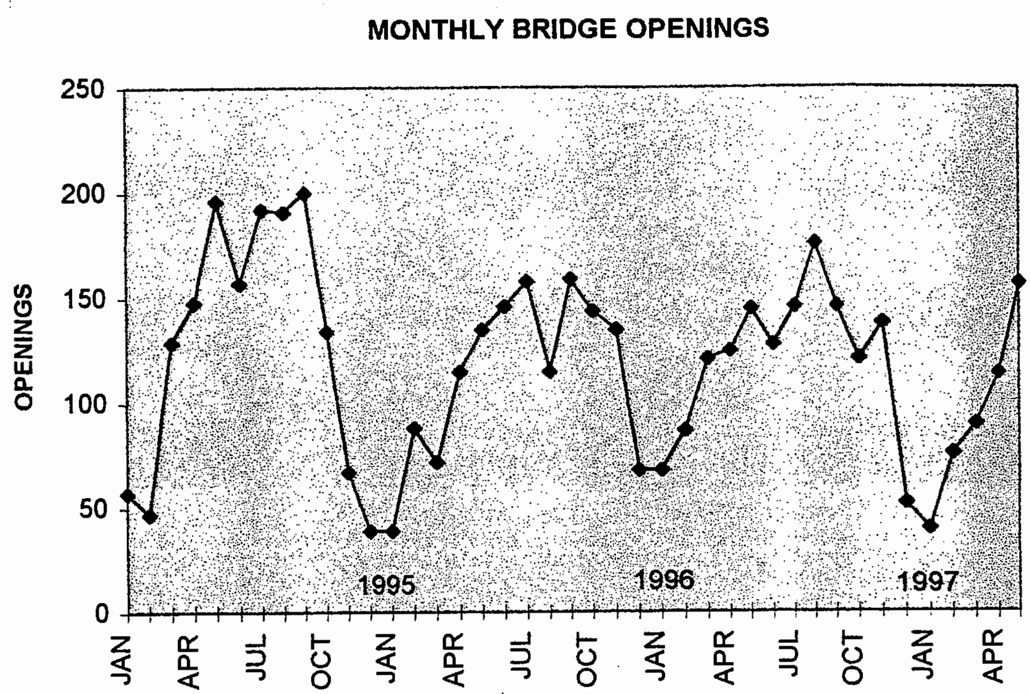
Item	Manufacturer	Location
Drive Motor - Span Lock		SE end outside below bridge
Drive Motor - Span Lock		NW end outside below bridge
Drive Motor - Span Lock		SW end outside below bridge
Sending Unit		NE end outside below bridge
Sending Unit		SE end outside below bridge
Sending Unit		NW end outside below bridge
Sending Unit		SW end outside below bridge
Check Valve #D		Center North below bridge outside
Holding Tank #C		Center North below bridge outside
Filter & Oiler Regulator		West Equip Room
Filter & Oiler Regulator		East Equip Room
Couplings (all)		East tower
Couplings (all)		West tower
Hub City Parallel Shaft Reducer	Check the sight gage and dip stick (monthly - with machinery not running). Keep gear box filled to sight glass with Grade 4 gear oil.*	West Machinery Room
Hub City Parallel Shaft Reducer	Check the sight gage and dip stick (monthly - with machinery not running). Keep gear box filled to sight glass with Grade 4 gear oil.*	East Machinery Room
Horsburgh & Scott single Reduction Speed Reducer	Horsburgh & Scott, 155-S Check the sight gage and dip stick (monthly - with machinery not running). Keep gear box filled to sight glass with Grade 4 gear oil.*	West Machinery Room

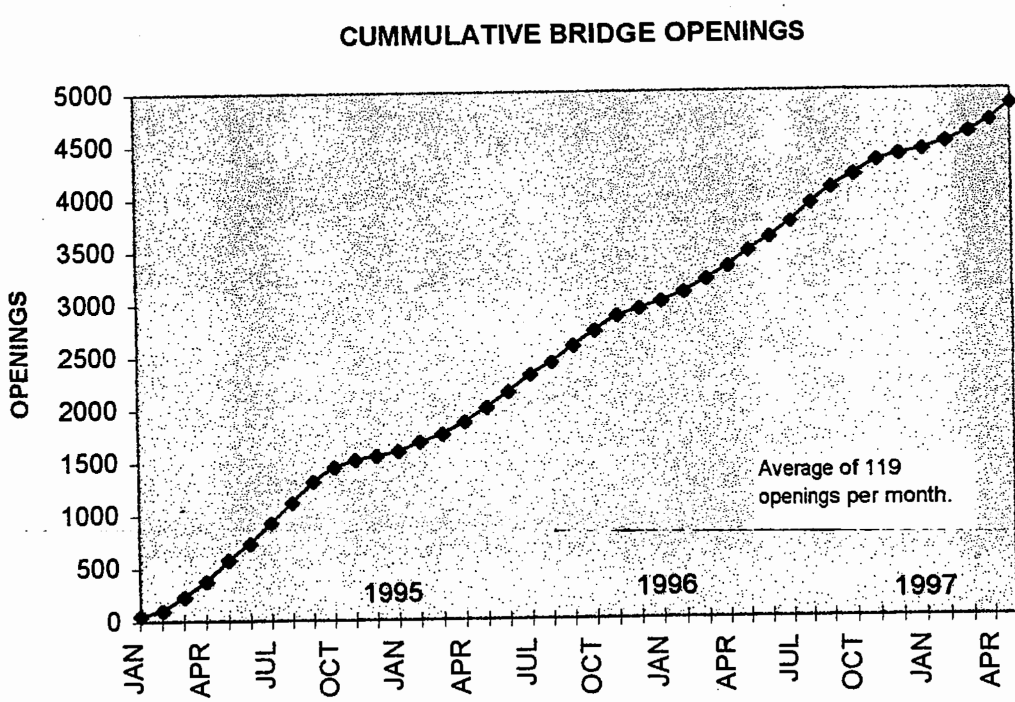
Item	Manufacturer	Location
Horsburgh & Scott double Reduction Speed Reducer	Horsburgh & Scott, 110-D Check the sight gage and dip stick (monthly - with machinery not running). Keep gear box filled to sight glass with Grade 4 gear oil.*	West Machinery Room
Horsburgh & Scott double Reduction Speed Reducer	Horsburgh & Scott, 110-D Check the sight gage and dip stick (monthly - with machinery not running). Keep gear box filled to sight glass with Grade 4 gear oil.*	East Machinery Room
Pinion & Ring Gear Set	Dress the gears with open gear grease (monthly - Mobiltac E or equal).*	West Machinery Room
Pinion & Ring Gear Set	Dress the gears with open gear grease (monthly - Mobiltac E or equal).*	West Machinery Room
Gear box, Falk triple reduction speed (red)		NE end outside below bridge
Gear box, Falk triple reduction speed (red)		SE end outside below bridge
Gear box, Falk triple reduction speed (red)	Check oil level - use #4 gear oil*	NW end outside below bridge
Gear box, Falk triple reduction speed (red)	Check oil level - use #4 gear oil*	SW end outside below bridge
Main Sheave Shaft Bearing	Grease gun lubricate with No. 2 grease (monthly).* Force grease into all fittings until new grease extrudes from between shafts and bearings.	West Machinery Room
Main Sheave Shaft Bearing	Grease gun lubricate with No. 2 grease (monthly).* Force grease into all fittings until new grease extrudes from between shafts and bearings.	East Machinery Room

Item	Manufacturer	Location
Bearings, Pillow Block (2)		NE end outside below bridge
Bearings, Pillow Block (2)		SE end outside below bridge
Bearings, Pillow Block	Grease with #2 grease*	NW end outside below bridge
Bearings, Pillow Block	Grease with #2 grease*	SW end outside below bridge
Drive Gear Bearings	Miether Machine Works	West Machinery Room
Drive Gear Bearings	Miether Machine Works	East Machinery Room
Main Drive Brake Shoes (both sets)		West Machinery Room
Main Drive Brake Shoes (both sets)		East Machinery Room
2 1/8" Improved Plow Steel Wire Rope 6x25		SW Cables
2 1/8" Improved Plow Steel Wire Rope 6x25		NW Cables
2 1/8" Improved Plow Steel Wire Rope 6x25		SE Cables
2 1/8" Improved Plow Steel Wire Rope 6x25		NE Cables
Position Indicator	Check for set and tightness	West Equip Room
Position Indicator	Check for set and tightness	East Equip Room
Span Lock	Grease with #2 grease*	NE end outside below bridge
Span Lock	Grease with #2 grease*	SE end outside below bridge
Span Lock	Grease with #2 grease*	NW end outside below bridge
Span Lock	Grease with #2 grease*	SW end outside below bridge
SW Traffic Gate	Grease with #2 grease*	

Item	Manufacturer	Location
NW Traffic Gate	Grease with #2 grease*	
SE Traffic Gate	Grease with #2 grease*	
NE Traffic Gate	Grease with #2 grease*	
Air Compressor #B		Center North below bridge outside

* Lubrication requirements are identified in Reference (h).


MONTHLY BRIDGE OPENINGS
OPENINGS
250
200
150
100
50
0
1995
1996
1997
JAN
APR
JUL
OCT
JAN
APR
JUL
OCT
JAN
APR
JUL
OCT
JAN
APR


CUMMULATIVE BRIDGE OPENINGS
OPENINGS
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Average of 119 openings per month.
1995
1996
1997
JAN
APR
JUL
OCT
JAN
APR
JUL
OCT
JAN
APR
JUL
OCT
JAN
APR

APPENDIX D1

WATER SYSTEM

Cybernet Version: 2.18 SN: 1132183775 29-04-1997
Description: 4500 gpm fire (MIULT) with all pipe upgrades
Drawing: D:\MIULTFIR

Fire Flow Summary.

JCT No.	Max. Day Demand (gpm)	Max. Day Pressure (psi)	Zone No.	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	@Residual Pressure (psi)	Min. Zone Pressure (psi)	@JCT No.
3410	13.3	78.2	1	4513.3	8000.0	29.9	25.3	15620
13960	0.0	80.2	1	4500.0	8000.0	74.7	23.1	15620
13970	0.0	79.3	1	4500.0	8000.0	74.3	22.9	15620
13980	13.8	76.8	1	4513.8	8000.0	67.5	23.3	15620
13990	13.8	80.6	1	4513.8	6131.7	20.0	24.5	15620
14000	13.8	77.5	1	4513.8	8000.0	55.1	25.2	15620
14010	5.0	68.0	1	4505.0	7593.7	20.0	25.3	15620
14020	13.8	75.3	1	4513.8	8000.0	55.6	25.2	15620
14030	13.8	77.1	1	4513.8	8000.0	57.6	25.2	15620
14040	16.6	73.2	1	4516.6	7734.4	20.0	25.3	15620
14050	13.8	74.0	1	4513.8	8000.0	55.1	25.2	15620
14060	5.0	65.8	1	4505.0	5404.9	26.1	20.0	14080
14070	5.0	61.0	1	4505.0	4864.3	20.0	25.7	15620
14080	0.0	58.9	1	4500.0	5139.4	20.0	24.5	14070
14090	13.8	75.3	1	4513.8	4970.1	20.0	25.6	15620
14100	13.8	75.7	1	4513.8	7486.5	20.0	22.3	14090
14110	13.8	75.3	1	4513.8	8000.0	50.4	25.2	15620
14120	5.0	72.3	1	4505.0	8000.0	53.8	25.2	15620
14130	5.0	73.2	1	4505.0	8000.0	51.3	25.2	15620
14140	5.0	73.1	1	4505.0	8000.0	46.2	25.2	15620
14150	13.8	80.1	1	4513.8	4185.6*	20.0	25.7	15620
14160	13.8	76.6	1	4513.8	6221.8	20.0	25.5	15620
14170	13.8	76.1	1	4513.8	7562.6	20.0	25.3	15620
14180	13.8	75.2	1	4513.8	8000.0	41.1	25.2	15620
14190	16.6	73.1	1	4516.6	8000.0	42.0	25.3	15620
14200	13.8	75.2	1	4513.8	8000.0	40.4	25.2	15620
14210	0.0	75.2	1	4500.0	8000.0	43.1	25.3	15620
14220	16.6	75.2	1	4516.6	8000.0	43.0	25.3	15620
14230	0.0	73.1	1	4500.0	8000.0	25.7	25.3	15620
14240	9.1	73.1	1	4509.1	6920.0	20.0	25.4	15620
14250	9.1	73.1	1	4509.1	8000.0	20.9	25.3	15620
14260	9.1	73.1	1	4509.1	6524.1	20.0	25.5	15620
14270	5.0	72.3	1	4505.0	6910.4	20.0	25.5	15620
14275	0.0	68.8	1	4500.0	7051.2	20.0	25.4	15620
~~14280~~	~~9.1~~	~~67.6~~	~~1~~	~~4509.1~~	~~5294.4~~	~~20.0~~	~~25.7~~	~~15620~~
14300	9.1	56.8	1	4509.1	6011.3	20.0	25.6	15620
14310	9.1	63.2	1	4509.1	5398.7	20.0	25.7	15620
14320	0.0	53.8	1	4500.0	8000.0	34.8	25.4	15620
~~14330~~	~~9.1~~	~~53.8~~	~~1~~	~~4509.1~~	~~8000.0~~	~~41.7~~	~~25.4~~	~~15620~~
14340	9.1	62.4	1	4509.1	5164.5	20.0	25.7	15620
14350	9.1	65.4	1	4509.1	3943.2*	20.0	25.8	15620

* Needed Fire Flow not attained.

JCT No.	Max. Day Demand (gpm)	Max. Day Pressure (psi)	Zone No.	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	@Residual Pressure (psi)	Min. Zone Pressure (psi)	@JCT Number
14440	13.8	77.4	1	4513.8	8000.0	28.9	25.2	15620
14450	13.8	75.2	1	4513.8	8000.0	41.9	25.3	15620
14460	24.9	75.2	1	4524.9	8000.0	42.0	25.3	15620
14470	24.9	75.2	1	4524.9	8000.0	40.9	25.3	15620
14480	8.3	73.0	1	4508.3	8000.0	39.3	25.3	15620
14490	8.3	77.4	1	4508.3	8000.0	35.5	25.3	15620
14500	0.0	73.0	1	4500.0	5611.2	20.0	24.4	14530
14510	0.0	73.0	1	4500.0	5343.5	20.0	25.6	15620
14520	8.3	73.9	1	4508.3	5687.5	20.0	25.6	15620
14530	8.3	73.0	1	4508.3	2410.6*	20.0	25.9	15620
14540	0.0	73.9	1	4500.0	5196.7	20.0	23.5	14550
14550	0.0	73.9	1	4500.0	4053.2*	20.0	25.8	15620
14560	8.3	73.9	1	4508.3	4571.7	20.0	25.7	15620
14570	8.3	73.9	1	4508.3	4134.6*	20.0	25.8	15620
14580	16.6	75.2	1	4516.6	7132.8	20.0	25.4	15620
14590	24.9	75.2	1	4524.9	8000.0	24.3	25.3	15620
14600	24.9	75.2	1	4524.9	8000.0	32.7	25.3	15620
14610	24.9	75.2	1	4524.9	5296.3	20.0	25.6	15620
14620	24.9	73.0	1	4524.9	8000.0	21.6	25.3	15620
14630	16.6	73.0	1	4516.6	8000.0	24.5	25.3	15620
14640	16.6	73.0	1	4516.6	8000.0	25.7	25.3	15620
14650	13.3	75.1	1	4513.3	8000.0	27.1	25.3	15620
14660	13.3	75.1	1	4513.3	7954.3	20.0	25.3	15620
14670	0.0	73.0	1	4500.0	8000.0	23.8	25.3	15620
14680	13.3	75.1	1	4513.3	8000.0	26.5	25.3	15620
14690	16.6	73.0	1	4516.6	6057.6	20.0	25.6	15620
14700	5.0	73.9	1	4505.0	3993.2*	20.0	25.8	15620
14710	16.6	73.0	1	4516.6	8000.0	21.4	25.3	15620
14720	13.3	75.1	1	4513.3	8000.0	24.4	25.3	15620
14730	16.6	73.0	1	4516.6	7810.5	20.0	25.3	15620
14740	13.3	77.3	1	4513.3	6934.3	20.0	25.4	15620
14750	13.3	79.9	1	4513.3	6646.2	20.0	25.5	15620
14760	13.3	79.9	1	4513.3	6046.3	20.0	25.6	15620
14770	24.9	78.2	1	4524.9	5960.6	20.0	20.0	14880
14780	16.6	78.2	1	4516.6	8000.0	26.8	25.3	15620
14790	0.0	78.2	1	4500.0	8000.0	28.8	25.3	15620
14800	13.3	77.3	1	4513.3	8000.0	24.7	25.3	15620
14810	13.3	79.9	1	4513.3	6044.3	20.0	25.6	15620
14830	16.6	77.3	1	4516.6	8000.0	25.4	25.3	15620
14840	13.3	78.2	1	4513.3	8000.0	30.4	25.3	15620

* Needed Fire Flow not attained.

JCT No.	Max. Day Demand (gpm)	Max. Day Pressure (psi)	Zone No.	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	@Residual Pressure (psi)	Min. Zone Pressure (psi)	@JCT Number
14850	13.3	77.3	1	4513.3	8000.0	28.3	25.3	15620
14860	13.3	79.9	1	4513.3	7077.6	20.0	25.4	15620
14870	16.6	78.2	1	4516.6	8000.0	27.6	25.3	15620
14880	0.0	78.2	1	4500.0	1354.5*	20.0	26.0	15620
14890	13.3	78.2	1	4513.3	8000.0	30.1	25.3	15620
14900	13.3	79.9	1	4513.3	7702.7	20.0	25.3	15620
14910	13.3	78.2	1	4513.3	8000.0	29.4	25.3	15620
14920	13.3	78.2	1	4513.3	8000.0	30.2	25.3	15620
14930	13.3	78.2	1	4513.3	8000.0	29.9	25.3	15620
14940	16.6	78.2	1	4516.6	8000.0	29.5	25.3	15620
14950	16.6	78.2	1	4516.6	8000.0	28.1	25.3	15620
14960	16.6	78.1	1	4516.6	7761.4	20.0	23.0	15050
14970	16.6	78.1	1	4516.6	8000.0	24.5	24.6	15060
14980	16.6	78.1	1	4516.6	6326.2	20.0	25.5	15620
14990	16.6	78.1	1	4516.6	6734.7	20.0	21.5	15070
15000	16.6	78.1	1	4516.6	6924.2	20.0	20.2	14980
15010	16.6	78.1	1	4516.6	7707.7	20.0	20.9	15000
15020	16.6	78.1	1	4516.6	8000.0	20.6	21.3	15100
15030	16.6	78.1	1	4516.6	8000.0	22.0	22.0	15020
15040	16.6	78.1	1	4516.6	7820.9	20.0	20.4	1515[illegible]
15050	16.6	78.1	1	4516.6	7659.3	20.0	24.3	1501[illegible]
15060	16.6	78.1	1	4516.6	8000.0	23.2	23.3	15030
15070	16.6	78.1	1	4516.6	5856.3	20.0	25.6	15620
15080	16.6	78.1	1	4516.6	7181.1	20.0	24.4	15160
15090	16.6	78.1	1	4516.6	7150.6	20.0	24.7	15100
15100	16.6	78.1	1	4516.6	7224.7	20.0	23.5	15090
15110	16.6	78.1	1	4516.6	7235.4	20.0	21.7	15170
15120	16.6	78.1	1	4516.6	7103.5	20.0	20.0	15170
15130	16.6	78.1	1	4516.6	6680.7	20.0	25.5	15620
15140	16.6	78.1	1	4516.6	7274.8	20.0	24.0	15150
15150	16.6	78.1	1	4516.6	7479.9	20.0	20.9	15140
15160	16.6	78.1	1	4516.6	7134.7	20.0	25.0	15080
15170	16.6	78.1	1	4516.6	1621.3*	19.9	19.9	15180
15180	0.0	78.1	1	4500.0	688.2*	19.8	26.0	15620
15640	0.0	73.9	60	4500.0	5207.7	20.0	20.8	15490
15650	0.0	74.3	1	4500.0	5916.6	20.0	25.6	15620
15660	8.3	78.0	1	4508.3	8000.0	61.2	22.9	15620
15670	16.6	80.6	1	4516.6	8000.0	24.3	22.9	15620

APPENDIX D2

SANITARY SEWER SYSTEM

Land Use	Total Pipe Length	Total Qsan	Total Qinf	U/S Node Tag	D/S Node Tag	U/S Invert	D/S Invert	Pipe Segment Length	Pipe DIA	Pipe Slope	Pipe Mat'l	Pipe "n"	Qsan in pipe	Peaked Qsan	Infiltra-tion	TOTAL Q	*Qcap	% Cap.	Over Cap	Recm DIA
	ft	mgd	mgd			ft	ft	ft	in	ft/ft			mgd	mgd	mgd	mgd	mgd			in
	14,074	0.2886	1.5240																	
1				2080FE027	2080FE026	104.39	102.09	303.56	8	0.0076	TC	0.013	0.01	0.02	0.03	0.05	0.68	7%		
1				2080FE026	2080FE025	102.09	100.42	201.76	8	0.0083	TC	0.013	0.01	0.03	0.05	0.08	0.71	12%		
1				2080FE025	2080FE024	100.42	101.11	82.69	8	-0.0083	TC	0.013	0.01	0.03	0.06	0.10	-0.71	-14%	Neg Slope	
1				2080FE024	2080FE023	101.00	100.34	169.38	8	0.0039	TC	0.013	0.02	0.04	0.08	0.12	0.49	25%		
1				2080FE023	2080FE022	100.30	100.00	26.34	8	0.0114	TC	0.013	0.02	0.04	0.08	0.13	0.83	15%		
1				2080FE022	2080FE021	102.39	103.15	36.96	10	-0.0206	TC	0.013	0.02	0.05	0.09	0.13	-2.03	-7%	Neg Slope	
1				2080FE030	2080FE029	101.38	100.64	296.21	10	0.0025	CMP	0.024	0.01	0.03	0.07	0.10	0.38	26%		
1				2080FE029	2080FE028	100.64	99.29	189.78	10	0.0071	CMP	0.024	0.02	0.04	0.09	0.13	0.65	20%		
1				2080FE028	8912	99.29	0.00	131.51	10	0.0071	CMP	0.024	0.02	0.05	0.10	0.15	0.65	24%		
1				8912	2080FE021	0.00	102.20	5.26	10	0.0071	CMP	0.024	0.01	0.03	0.05	0.08	0.65	12%		
1				8912	2080FE020	0.00	102.95	9.21	10	0.0071	CMP	0.024	0.01	0.03	0.05	0.08	0.65	12%		
1				2080FE021	2080FE020	103.45	103.15	7.10	10	0.0422	CMP	0.024	0.03	0.07	0.14	0.21	1.58	14%		
1				2080FE020	2079FE004	102.95	96.20	469.78	10	0.0144	CIP	0.015	0.05	0.13	0.24	0.37	1.47	25%		
1				2079FE004	2079FF002	96.20	0.00	29.21	10	0.0144	CIP	0.015	0.05	0.13	0.25	0.37	1.47	25%		
1				2079FE003	2079FE005	103.26	102.67	172.88	15	0.0034	CMP	0.024	0.05	0.15	0.29	0.44	1.32	33%		
1				2079FE005	2079FE008	102.67	101.63	229.63	15	0.0045	CMP	0.024	0.06	0.16	0.31	0.48	1.52	31%		
1				2079FE008	2079FE007	101.48	0.00	128.55	18	0.0055	CMP	0.024	0.06	0.17	0.33	0.50	2.73	18%		
1				2079FE007	2080FE001	0.00	99.78	178.84	18	0.0055	CMP	0.024	0.07	0.18	0.35	0.53	2.73	19%		
1				2080FE001	2080FE002	99.78	99.37	204.20	18	0.0020	CMP	0.024	0.09	0.24	0.46	0.69	1.65	42%		
1				2080FE002	2080FE003	99.27	98.22	385.33	18	0.0027	CMP	0.024	0.09	0.26	0.50	0.76	1.92	39%		
1				2080FE012	2080FE011	103.35	102.92	235.83	10	0.0018	CMP	0.024	0.01	0.02	0.04	0.06	0.33	17%		
1				2080FE011	2080FE010	102.92	101.60	252.43	10	0.0052	CMP	0.024	0.01	0.04	0.08	0.12	0.55	21%		
1				2080FE010	2080FE009	101.60	101.45	123.98	10	0.0012	CMP	0.024	0.02	0.05	0.09	0.14	0.27	52%		
1				2080FE009	2080FE008	101.45	101.12	134.32	8	0.0025	CMP	0.024	0.02	0.05	0.11	0.16	0.21	77%		
1				2080FE008	2080FE007	101.12	100.62	106.64	10	0.0047	CMP	0.024	0.02	0.06	0.12	0.18	0.53	34%		
1				2080FE007	2080FE006	100.62	100.15	150.63	10	0.0031	CMP	0.024	0.03	0.07	0.13	0.20	0.43	47%		
1				2080FE006	2080FE005	100.15	99.15	347.60	12	0.0029	CMP	0.024	0.03	0.09	0.17	0.26	0.67	39%		
1				2080FE005	2080FE003	99.15	98.32	319.02	12	0.0026	CMP	0.024	0.04	0.11	0.21	0.31	0.64	49%		
1				2080FE003	2080FE004	98.17	98.01	97.49	21	0.0016	RCP	0.013	0.14	0.20	0.72	0.92	4.15	22%		
1				2180FE003	2080FE004	107.45	97.96	284.03	8	0.0334	CMP	0.024	0.02	0.06	0.12	0.17	0.77	23%		
1				2080FE004	2180FE004	97.91	0.00	277.86	21	0.0013	RCP	0.013	0.16	0.24	0.86	1.10	3.67	30%		
1				2180FE004	2180FE005	0.00	97.42	102.71	21	0.0013	RCP	0.013	0.17	0.24	0.87	1.12	3.67	30%		
1				2080FE037	2080FE035	0.00	0.00	57.69	8	0.0061	CMP	0.024	0.00	0.00	0.01	0.01	0.33	3%		
1				2080FE035	2080FE034	0.00	102.38	171.46	8	0.0061	CMP	0.024	0.00	0.01	0.02	0.04	0.33	11%		
1				2080FE034	2080FE033	101.63	100.50	185.48	8	0.0061	CMP	0.024	0.01	0.02	0.04	0.07	0.33	21%		
1				2080FE033	2180FE005	100.50	97.75	250.22	8	0.0110	CMP	0.024	0.02	0.04	0.08	0.12	0.44	28%		
1				2180FE005	2180FE006	97.42	97.25	190.70	21	0.0009	RCP	0.013	0.18	0.27	0.98	1.25	3.06	41%		
1				2180FE006	2180FE007	97.25	96.29	535.29	21	0.0018	RCP	0.013	0.20	0.29	1.03	1.32	4.34	30%		
1				2081FE004	2081FE003	106.45	104.32	174.79	8	0.0122	CMP	0.024	0.02	0.07	0.13	0.20	0.47	43%		
1				2081FE003	2081FE002	104.32	0.00	126.33	8	0.0122	CMP	0.024	0.03	0.07	0.14	0.22	0.47	47%		

1				2081FE002	2081FE001	0.00	103.22	102.08	8	0.0122	CMP	0.024	0.03	0.08	0.16	0.24	0.47	51%		
1				2081FE001	2180FE010	103.22	100.90	217.04	8	0.0107	CMP	0.024	0.04	0.10	0.20	0.31	0.44	70%		
1				2180FE010	2180FE009	100.90	101.93	118.17	10	-0.0087	CMP	0.024	0.04	0.11	0.22	0.33	-0.72	-46%	Neg Slope	
1				2180FE009	2180FE008	101.93	98.76	274.09	10	0.0116	CMP	0.024	0.05	0.13	0.25	0.37	0.82	45%		
1				2180FE008	2180FF001	98.76	0.00	95.09	10	0.0116	CMP	0.024	0.05	0.13	0.26	0.39	0.82	47%		
1				2180FG001	2181FE006	0.00	103.45	539.19	21	0.0018	RCP	0.013	0.26	0.37	1.35	1.72	4.34	40%		
1				2181FE006	2181FE007	103.45	102.70	492.13	21	0.0015	RCP	0.013	0.27	0.38	1.40	1.79	4.00	45%		
1																				
	10,038	0.1465	0.6912																	
2				2181FE067	2181FE066	107.80	107.28	204.96	8	0.0025	CMP	0.024	0.03	0.07	0.14	0.21	0.21	98%		
2				2181FE066	2181FE065	107.28	104.35	238.03	8	0.0123	CMP	0.024	0.03	0.08	0.15	0.23	0.47	50%		
2				2181FE079	2181FE065	105.01	104.35	357.88	8	0.0018	CMP	0.024	0.03	0.07	0.12	0.19	0.18	105%	Yes	
2				2181FE065	2181FE064	104.35	103.58	148.18	12	0.0052	CMP	0.024	0.06	0.16	0.30	0.46	0.90	51%		
2				2181FE064	2181FE063	103.58	103.19	114.87	12	0.0034	CMP	0.024	0.06	0.17	0.31	0.48	0.73	67%		
2				2181FE063	2181FE301	103.19	102.72	114.43	15	0.0041	CMP	0.024	0.06	0.18	0.32	0.50	1.45	34%		
2				2181FE301	2181FE300	102.72	102.10	148.93	15	0.0042	CMP	0.024	0.07	0.18	0.33	0.51	1.46	35%		
2				2181FE300	2181FE062	102.10	101.50	81.24	15	0.0074	CMP	0.024	0.07	0.19	0.34	0.52	1.94	27%		
2				2181FE050	2181FE049	105.39	104.90	62.76	10	0.0078	PVC	0.012	0.01	0.02	0.04	0.06	1.36	5%		
2				2181FE049	2181FE058	103.25	102.90	81.39	15	0.0043	PVC	0.012	0.01	0.03	0.06	0.09	2.97	3%		
2				2181FE058	2181FE059	102.90	102.80	30.98	15	0.0032	PVC	0.012	0.01	0.04	0.06	0.10	2.57	4%		
2				2181FE059	2181FE060	102.80	102.37	158.00	15	0.0027	PVC	0.012	0.02	0.04	0.07	0.12	2.36	5%		
2				2181FE060	2181FE061	102.37	102.15	77.93	15	0.0028	PVC	0.012	0.02	0.05	0.08	0.12	2.40	5%		
2				2181FE061	2181FE062	102.05	101.50	23.82	15	0.0231	PVC	0.012	0.02	0.05	0.08	0.13	6.87	2%		
2				2181FE062	2181FE010	101.50	101.49	102.91	15	0.0001	CMP	0.024	0.09	0.24	0.42	0.66	0.22	295%	Yes	22
2				2182FE042	2181FE039	0.00	0.00	978.19	12	0.0031	STL	0.015	0.03	0.09	0.15	0.24	1.12	21%		
2				2181FE039	9295	0.00	0.00	126.48	21	0.0031	RCP	0.013	1.48	2.04	7.50	9.54	5.74	166%	Yes	25
2				2182FE013	2182FE012	109.19	108.28	289.39	12	0.0031	CMP	0.024	0.02	0.05	0.09	0.15	0.70	21%		
2				2182FE012	2182FE011	108.23	107.82	271.23	12	0.0015	CMP	0.024	0.02	0.07	0.11	0.18	0.48	37%		
2				2182FE011	2182FE010	107.82	107.75	54.87	12	0.0013	CMP	0.024	0.02	0.07	0.12	0.18	0.45	42%		
2				2182FE010	2182FE009	107.75	107.51	103.06	12	0.0023	CMP	0.024	0.03	0.07	0.13	0.20	0.60	34%		
2				2182FE009	2182FE008	107.46	107.15	126.35	12	0.0025	CMP	0.024	0.03	0.08	0.14	0.22	0.62	35%		
2				2182FE033	2182FE032	111.20	110.63	97.47	10	0.0058	VCP	0.013	0.01	0.04	0.13	0.17	1.08	16%		
2				2182FE032	2182FE022	110.53	109.93	177.20	10	0.0034	VCP	0.013	0.02	0.05	0.14	0.19	0.82	23%		
2				2182FE022	2182FE021	109.88	108.82	311.48	10	0.0034	VCP	0.013	0.03	0.09	0.24	0.34	0.83	41%		
2				2182FE021	2182FE008	108.72	107.15	288.68	12	0.0054	CMP	0.024	0.04	0.11	0.28	0.39	0.92	42%		
													0.01							
	20,768	0.2230	1.4398																	
3				2181FE007	2181FE008	102.55	102.35	114.54	21	0.0017	RCP	0.013	0.27	0.39	1.41	1.80	4.28	42%		
3				2181FE008	2181FE009	102.35	105.70	366.56	21	-0.0091	RCP	0.013	0.27	0.39	1.43	1.83	-9.79	-19%	Neg Slope	
3				2181FE018	2181FE017	101.60	99.60	148.80	8	0.0134	PVC	0.012	0.01	0.02	0.04					

3				2181FE028	2181FE026	104.30	103.65	74.22	8	0.0088	CMP	0.024	0.00	0.01	0.03	0.04	0.40	10%		
3				2181FE026	2181FE025	103.65	102.90	137.09	8	0.0055	PVC	0.012	0.01	0.02	0.05	0.07	0.63	10%		
3				2181FE025	2181FE024	102.90	102.42	130.47	8	0.0037	PVC	0.012	0.01	0.02	0.06	0.08	0.51	15%		
3				2181FE024	2181FE017	102.42	99.60	131.02	8	0.0215	PVC	0.012	0.01	0.03	0.06	0.09	1.24	7%		
3				2181FE017	2181FE016	99.60	100.40	27.22	10	-0.0294	PVC	0.012	0.02	0.04	0.10	0.15	-2.63	-6%	Neg Slope	
3				2181FE003	2181FE015	108.49	105.00	145.79	10	0.0239	PVC	0.012	0.02	0.05	0.11	0.16	2.37	7%		
3				2181FE015	2181FE009	105.00	105.70	150.51	10	-0.0047	PVC	0.012	0.02	0.05	0.12	0.18	-1.05	-17%	Neg Slope	
3				2181FE009	2181FE010	105.70	101.49	306.50	21	0.0137	RCP	0.013	0.29	0.42	1.58	2.00	12.00	17%		
3				2181FE010	2181FE011	101.49	100.15	365.17	24	0.0037	RCP	0.013	0.38	0.55	2.03	2.58	8.86	29%		
3				2181FE032	2181FE011	110.20	102.91	253.69	12	0.0287	VCP	0.013	0.00	0.01	0.02	0.02	3.90	1%		
3				2181FE011	2181FE012	100.15	100.33	220.34	24	-0.0008	RCP	0.013	0.39	0.56	2.08	2.64	-4.18	-63%	Neg Slope	
3				2181FE035	2181FE034	107.49	103.60	340.90	8	0.0114	VCP	0.013	0.00	0.01	0.03	0.05	0.83	5%		
3				2181FE034	2181FE012	103.60	100.33	228.66	8	0.0143	VCP	0.013	0.01	0.02	0.05	0.07	0.93	7%		
3				2181FE012	2181FE014	100.33	102.82	470.07	24	-0.0053	RCP	0.013	0.41	0.58	2.16	2.74	-10.64	-26%	Neg Slope	
3				2282FE037	2282FE031	107.30	105.02	108.96	12	0.0209	VCP	0.013	0.01	0.02	0.04	0.06	3.33	2%		
3				2282FE031	2282FE030	105.02	104.18	40.06	12	0.0210	VCP	0.013	0.01	0.03	0.08	0.11	3.33	3%		
3				2282FE030	2282FE029	104.18	104.09	17.55	12	0.0051	VCP	0.013	0.01	0.04	0.10	0.14	1.65	8%		
3				2282FE029	2282FE028	104.09	103.75	112.80	12	0.0030	VCP	0.013	0.02	0.06	0.13	0.19	1.26	15%		
3				2282FE028	2282FE013	103.75	103.03	49.29	12	0.0146	VCP	0.013	0.02	0.06	0.14	0.20	2.78	7%		
3				2282FE019	2282FE017	105.46	105.44	153.10	10	0.0001	VCP	0.013	0.02	0.05	0.13	0.18	0.16	113%	Yes	11
3				2282FE017	2282FE016	105.44	104.84	29.24	15	0.0205	VCP	0.013	0.02	0.06	0.15	0.21	5.98	4%		
3				2282FE016	2282FE015	104.84	104.10	106.51	15	0.0069	VCP	0.013	0.02	0.07	0.16	0.22	3.48	6%		
3				2282FE015	2282FE014	104.10	103.39	143.81	15	0.0049	VCP	0.013	0.03	0.07	0.17	0.25	2.93	8%		
3				2282FE014	2282FE013	103.39	103.03	39.43	15	0.0091	VCP	0.013	0.03	0.08	0.18	0.26	3.99	6%		
3				2282FE043	2282FE042	0.00	109.14	86.89	12	0.0146	VCP	0.013	0.00	0.01	0.03	0.04	2.78	1%		
3				2282FE042	2282FE041	109.14	0.00	212.63	12	0.0146	VCP	0.013	0.01	0.02	0.04	0.06	2.78	2%		
3				2282FE059	2282FE060	110.93	110.04	172.58	12	0.0052	VCP	0.013	0.06	0.17	0.07	0.24	1.65	15%		
3				2282FE060	2282FE061	110.04	109.40	130.35	12	0.0049	VCP	0.013	0.06	0.17	0.08	0.25	1.61	16%		
3				2282FE049	2282FE051	110.18	110.17	26.03	27	0.0004	RCP	0.013	0.85	1.18	4.24	5.43	3.92	138%	Yes	30
3				2282FE051	2282FE063	110.17	109.85	206.01	27	0.0016	RCP	0.013	0.85	1.19	4.29	5.48	7.89	70%		
3				2282FE063	2282FE062	109.85	109.75	68.11	27	0.0015	RCP	0.013	0.85	1.19	4.30	5.49	7.67	72%		

3				2282FE062	2282FE061	109.75	109.40	157.87	27	0.0022	RCP	0.013	0.86	1.20	4.31	5.50	9.43	58%		
3				2282FE061	2282FE064	109.40	108.96	356.77	27	0.0012	RCP	0.013	0.92	1.29	4.42	5.70	7.03	81%		
3				2282FE065	2282FE064	115.35	111.50	135.09	8	0.0285	ACP	0.013	0.00	0.01	0.02	0.03	1.32	3%		
3				2282FE064	2182FE004	108.96	108.31	186.70	27	0.0035	RCP	0.013	0.93	1.29	4.45	5.75	11.81	49%		
3				2282FE006	2282FE007	112.41	111.28	234.60	15	0.0048	VCP	0.013	0.00	0.01	0.03	0.04	2.90	1%		
3				2282FE007	2182FE004	111.28	109.86	301.19	15	0.0047	VCP	0.013	0.01	0.02	0.05	0.07	2.87	2%		
3				2182FE004	2182FE003	108.31	107.84	231.33	27	0.0020	RCP	0.013	0.94	1.31	4.52	5.83	9.02	65%		
3				2182FE003	2182FE002	106.14	0.00	145.27	27	0.0036	RCP	0.013	0.94	1.31	4.53	5.84	12.00	49%		
3				2182FE002	2182FE001	0.00	103.87	486.50	27	0.0036	RCP	0.013	0.95	1.32	4.59	5.91	12.00	49%		
3				2182FE008	2182FE007	106.95	105.74	291.48	15	0.0042	CMP	0.024	0.07	0.20	0.43	0.64	1.46	44%		
3				2182FE007	2182FE001	105.74	105.52	154.12	15	0.0014	CMP	0.024	0.08	0.21	0.45	0.66	0.85	77%		
3				2182FE001	2181FE014	105.28	102.82	464.37	27	0.0053	RCP	0.013	1.03	1.43	5.07	6.50	14.57	45%		
3				2281FE003	2281FE001	110.51	102.06	275.46	10	0.0307	VCP	0.013	0.00	0.01	0.02	0.03	2.48	1%		
3				2281FE001	2181FE045	101.96	101.33	110.36	10	0.0057	VCP	0.013	0.01	0.02	0.04	0.06	1.07	5%		
3				2181FE045	2181FE047	101.33	101.23	65.72	10	0.0015	VCP	0.013	0.01	0.02	0.04	0.06	0.55	11%		
3				2181FE047	2181FE042	101.18	0.00	82.27	10	0.0015	VCP	0.013	0.01	0.03	0.07	0.09	0.55	17%		
3				2181FE041	2181FE040	101.25	108.92	323.22	10	-0.0237	VCP	0.013	0.01	0.04	0.09	0.13	-2.18	-6%	Neg Slope	
3				2181FE040	2181FE014	108.92	0.00	288.64	10	-0.0237	VCP	0.013	0.02	0.05	0.11	0.15	-2.18	-7%	Neg Slope	
3				2182FE023	2182FE022	115.74	114.53	79.18	8	0.0153	VCP	0.013	0.01	0.03	0.08	0.11	0.97	12%		
3				329	2181FE038	0.00	103.70	798.07	24	0.0237	RCP	0.013	0.75	1.06	3.82	4.88	22.52	22%		
3				2181FE038	9329	0.00	0.00	39.14	24	0.0237	RCP	0.013	0.75	1.06	3.82	4.88	22.52	22%		
3				9329	9353	0.00	0.00	87.37	72	0.0237	CON	0.013	0.75	1.06	3.83	4.89	421.68	1%		
	6,855	0.0984	0.4832																	
4				2283FE087	2283FE086	121.29	121.08	82.14	12	0.0026	CMP	0.024	0.00	0.01	0.02	0.02	0.63	4%		
4				2283FE086	2283FE085	121.08	120.25	286.20	18	0.0029	CMP	0.024	0.01	0.03	0.07	0.10	1.98	5%		
4				2283FE085	2283FE084	120.25	0.00	131.77	18	0.0024	CMP	0.024	0.01	0.04	0.08	0.12	1.81	6%		
4				2283FE084	2283FE083	0.00	119.50	178.60	18	0.0024	CMP	0.024	0.02	0.04	0.09	0.14	1.81	8%		
4				2283FE083	2283FE069	118.66	118.00	26.96	12	0.0245	CMP	0.024	0.02	0.04	0.10	0.14	1.95	7%		
4				2283FE069	2283FE068	118.00	116.21	165.51	12	0.0108	CMP	0.024	0.08	0.22	0.73	0.96	1.30	74%		
4				2283FE068	2283FE067	116.21	114.17	213.90	12	0.0095	CMP	0.024	0.09	0.23	0.75	0.98	1.22	80%		
4				2283FE097	2283FE096	125.32	125.32	17.92	15	0.0251	CMP	0.024	0.00	0.01	0.03	0.04	3.58	1%		
4				2283FE096	2283FE095	121.22	120.30	126.71	15	0.0073	CMP	0.024	0.02	0.05	0.10	0.15	1.93	8%		

4				2283FE095	2283FE114	118.37	118.01	46.46	10	0.0077	CMP	0.024	0.02	0.05	0.11	0.16	0.68	23%	
4				2283FE114	2283FE093	118.01	117.65	47.31	10	0.0076	CMP	0.024	0.02	0.06	0.12	0.17	0.67	26%	
4				2283FE093	2283FE092	117.65	116.67	200.73	10	0.0049	CMP	0.024	0.02	0.06	0.13	0.20	0.54	36%	
4				2283FE092	2283FE067	116.67	114.17	150.66	10	0.0166	CMP	0.024	0.03	0.07	0.14	0.21	0.99	21%	
4				2283FE067	2283FE066	113.92	112.81	240.61	15	0.0046	CMP	0.024	0.11	0.17	0.91	1.08	1.54	70%	
4				2283FE066	2283FE063	112.81	111.85	198.15	15	0.0048	CMP	0.024	0.12	0.17	0.92	1.09	1.57	70%	
4				2283FE061	2283FE062	111.68	110.94	516.52	27	0.0014	RCP	0.013	0.72	1.01	3.28	4.29	7.58	57%	
4				2283FE062	2283FE063	110.84	110.85	57.91	27	-0.0002	RCP	0.013	0.72	1.01	3.28	4.29	-2.63	-163%	Neg Slope
4				2283FE063	2283FE064	110.85	110.70	141.39	27	0.0011	RCP	0.013	0.84	1.17	4.21	5.39	6.52	83%	
4				2283FE064	2283FE065	110.70	110.67	26.01	27	0.0012	RCP	0.013	0.84	1.17	4.21	5.39	6.80	79%	
4				2283FE065	2282FE050	110.67	110.55	55.75	27	0.0022	RCP	0.013	0.84	1.18	4.22	5.39	9.29	58%	
4				2282FE050	2282FE049	110.55	110.18	166.60	27	0.0022	RCP	0.013	0.84	1.18	4.23	5.41	9.43	57%	
4				2283FE008	2283FE007	104.90	103.15	102.58	8	0.0171	VCP	0.013	0.00	0.01	0.02	0.03	1.02	3%	
4				2283FE007	2283FE006	103.15	102.92	113.08	8	0.0020	VCP	0.013	0.01	0.02	0.03	0.04	0.35	12%	
4				2283FE006	2283FE005	102.92	102.67	15.83	8	0.0158	VCP	0.013	0.01	0.02	0.03	0.04	0.98	5%	
4				2283FE005	2283FE004	102.67	101.43	77.40	8	0.0160	VCP	0.013	0.01	0.02	0.03	0.05	0.99	5%	
4				2283FE004	2283FE003	101.43	99.93	142.13	8	0.0106	VCP	0.013	0.01	0.02	0.04	0.07	0.80	9%	
4				2283FE003	2283FE001	99.93	99.23	89.09	8	0.0079	VCP	0.013	0.01	0.03	0.05	0.08	0.69	11%	
4				2282FE301	2283FE300	0.00	0.00	76.90	8	0.0150	CIP	0.015	0.00	0.00	0.01	0.01	0.83	1%	
4				2283FE300	2283FE013	1.00	113.99	83.78	12	0.0150	VCP	0.013	0.00	0.01	0.01	0.02	2.82	1%	
4				2283FE013	2283FE012	113.99	111.85	142.86	12	0.0150	VCP	0.013	0.00	0.01	0.02	0.03	2.82	1%	
4				2283FE012	9415	111.85	111.80	23.65	12	0.0021	STL	0.015	0.00	0.01	0.02	0.04	0.92	4%	
4				9415	2283FE011	111.80	103.96	25.54	12	0.3070	STL	0.015	0.01	0.01	0.02	0.04	11.06	0%	
4				2283FE011	2283FE001	103.96	101.08	193.14	15	0.0149	VCP	0.013	0.01	0.02	0.04	0.06	5.10	1%	
4				2283FE001	2283FE016	99.08	98.63	65.65	15	0.0069	RCP	0.013	0.02	0.05	0.09	0.15	3.46	4%	
4				2283FE016	2283FE017	98.63	98.57	32.89	15	0.0018	RCP	0.013	0.02	0.05	0.10	0.15	1.78	8%	
4				2283FE017	2283FE018	98.57	98.42	81.04	15	0.0019	RCP	0.013	0.03	0.08	0.16	0.25	1.80	14%	
4				2283FE018	2283FE019	98.42	98.21	111.78	15	0.0019	RCP	0.013	0.03	0.09	0.17	0.26	1.81	14%	
4				2283FE019	2283FE020	98.21	97.86	183.21	15	0.0019	RCP	0.013	0.03	0.09	0.18	0.28	1.82	15%	
4				2283FE020	2283FE021	97.86	0.00	82.87	15	0.0019	RCP	0.013	0.04	0.11	0.21	0.31	1.82	17%	
	19,289	0.2120	1.3668																
5				2384FE026	2384FE025	101.65	101.51	47.73	12	0.0029	CMP	0.024	0.01	0.03	0.06	0.09	0.68	13%	
5				2384FE025	2384FE021	101.51	101.01	125.82	12	0.0040	CMP	0.024	0.01	0.03	0.07	0.10	0.79	13%	

5	2384FE021	2384FE020	101.01	100.66	88.82	12	0.0039	CMP	0.024	0.01	0.04	0.09	0.12	0.78	16%		
5	2384FE020	2384FE014	100.66	100.17	263.25	12	0.0019	CMP	0.024	0.02	0.04	0.11	0.15	0.54	28%		
5	2384FE015	2384FE014	103.90	102.32	87.21	8	0.0181	CMP	0.024	0.01	0.02	0.05	0.07	0.57	12%		
5	2284FE003	2384FE013	103.52	101.73	111.58	12	0.0160	CMP	0.024	0.00	0.01	0.03	0.04	1.58	2%		
5	2384FE013	2384FE011	101.73	100.23	93.79	12	0.0160	CMP	0.024	0.01	0.01	0.03	0.05	1.58	3%		
5	2384FE011	2384FE010	100.03	99.60	121.62	12	0.0035	CMP	0.024	0.01	0.02	0.05	0.07	0.74	9%		
5	2384FE010	2384FE009	99.60	99.45	267.21	12	0.0006	CMP	0.024	0.01	0.03	0.07	0.10	0.30	33%		
5	2384FE007	2284FE017	104.34	103.96	324.26	12	0.0012	CMP	0.024	0.04	0.10	0.25	0.35	0.43	83%		
5	2284FE026	2284FE028	102.36	102.02	146.42	21	0.0023	RCP	0.013	0.34	0.49	0.87	1.36	4.94	28%		
5	2284FE051	2284FE200	112.62	111.92	140.93	12	0.0050	VCP	0.013	0.08	0.22	0.63	0.85	1.62	52%		
5	2284FE200	2284FE049	111.82	111.22	151.12	12	0.0040	VCP	0.013	0.08	0.22	0.64	0.86	1.45	60%		
5	2284FE049	2284FE033	111.22	103.27	232.56	12	0.0342	VCP	0.013	0.08	0.23	0.66	0.89	4.26	21%		
5	2284FE043	2284FE033	104.23	103.27	66.32	8	0.0145	VCP	0.013	0.01	0.03	0.06	0.09	0.94	9%		
5	2284FE033	2284FE030	103.27	0.00	176.02	15	0.0032	RCP	0.013	0.15	0.22	0.99	1.21	2.35	51%		
5	2284FE030	2284FE029	0.00	102.51	63.38	15	0.0032	RCP	0.013	0.15	0.23	1.00	1.22	2.35	52%		
5	2284FE029	2284FE028	102.51	102.52	146.17	15	-0.0001	RCP	0.013	0.16	0.23	1.01	1.24	-0.35	-358%	Neg Slope	
5	2284FE028	2284FE014	101.92	101.45	241.21	21	0.0019	RCP	0.013	0.50	0.71	1.90	2.61	4.52	58%		
5	2284FE014	2284FE086	101.15	100.24	377.23	21	0.0024	RCP	0.013	0.25	0.37	0.98	1.34	5.03	27%		
5	2284FE009	2284FE008	0.00	104.26	12.19	12	0.0024	VCP	0.013	0.26	0.37	0.99	1.37	1.14	120%	Yes	13
5	2284FE008	2284FE007	104.26	103.37	363.98	12	0.0024	VCP	0.013	0.26	0.38	1.02	1.40	1.14	123%	Yes	13
5	2284FE007	2283FD005	103.37	102.26	454.06	12	0.0024	VCP	0.013	0.27	0.39	1.05	1.44	1.14	126%	Yes	13
5	2283FD005	2283FE104	102.26	101.90	143.35	12	0.0025	VCP	0.013	0.27	0.39	1.06	1.45	1.15	126%	Yes	13
5	2283FE101	2283FE102	104.58	102.52	196.08	12	0.0105	CMP	0.024	0.01	0.03	0.06	0.09	1.28	7%		
5	2283FE102	2283FE103	102.37	102.03	60.63	12	0.0056	CMP	0.024	0.01	0.03	0.07	0.10	0.93	10%		
5	2283FE103	2283FE104	101.93	101.90	70.43	12	0.0004	CMP	0.024	0.01	0.03	0.07	0.10	0.26	41%		
5	2283FE104	2283FE105	101.90	100.59	156.48	12	0.0084	CMP	0.024	0.28	0.41	1.15	1.55	1.14	136%	Yes	13
5	2283FE105	2283FE106	100.59	100.00	123.38	12	0.0048	CMP	0.024	0.28	0.41	1.16	1.57	0.86	181%	Yes	15
5	2283FE106	2284FE098	100.00	98.50	240.19	12	0.0062	CMP	0.024	0.29	0.41	1.19	1.60	0.99	163%	Yes	14
5	2284FE086	2284FE091	100.24	99.56	367.34	21	0.0019	RCP	0.013	0.27	0.39	1.07	1.46	4.41	33%		
5	2284FE091	2284FE098	99.56	98.50	212.17	21	0.0050	RCP	0.013	0.27	0.39	1.09	1.48	7.24	20%		
5	2284FE098	2283FE030	98.50	0.00	298.75	27	0.0050	RCP	0.013	0.56	0.80	2.30	3.10	14.15	22%		

5				2283FE034	2283FE033	109.61	107.12	119.18	10	0.0209	VCP	0.013	0.01	0.02	0.05	0.07	2.05	3%		
5				2283FE033	2283FE032	107.12	0.00	60.24	10	0.0209	VCP	0.013	0.01	0.02	0.05	0.07	2.05	3%		
5				2283FE032	2283FE031	0.00	0.00	142.11	12	0.0065	RCP	0.013	0.08	0.21	0.53	0.75	1.86	40%		
5				2283FE031	2283FE030	0.00	0.00	25.65	12	0.0065	RCP	0.013	0.08	0.22	0.54	0.75	1.86	40%		
5				2283FE030	2283FE029	0.00	0.00	45.68	27	0.0065	RCP	0.013	0.64	0.91	2.84	3.74	16.19	23%		
5				2283FE029	2283FE028	0.00	99.16	109.50	27	0.0053	RCP	0.013	0.64	0.91	2.85	3.75	14.63	26%		
5				2283FE028	2283FE027	99.16	0.00	171.16	27	0.0053	RCP	0.013	0.65	0.91	2.86	3.77	14.63	26%		
5				2283FE027	2283FE026	0.00	97.95	55.48	27	0.0053	RCP	0.013	0.65	0.91	2.86	3.77	14.63	26%		
5				2283FE026	2283FE025	97.95	97.53	248.14	27	0.0017	RCP	0.013	0.65	0.92	2.91	3.83	8.24	46%		
5				2283FE025	2283FE024	97.53	0.00	83.27	27	0.0017	RCP	0.013	0.65	0.92	2.91	3.83	8.24	47%		
5				1045	2283FE050	0.00	106.53	122.52	8	0.0036	CIP	0.015	0.00	0.00	0.01	0.01	0.41	3%		
5				2283FE050	2283FE049	106.53	105.91	170.07	10	0.0036	CMP	0.024	0.00	0.01	0.02	0.03	0.46	6%		
5				2283FE049	2283FE048	105.91	0.00	288.12	10	0.0102	CMP	0.024	0.01	0.02	0.04	0.06	0.78	8%		
5				2283FE048	2283FE047	0.00	0.00	92.79	10	0.0102	CMP	0.024	0.01	0.02	0.05	0.07	0.78	9%		
5				2283FE047	2283FE046	0.00	99.31	263.45	10	0.0102	VCP	0.013	0.01	0.03	0.07	0.09	1.43	7%		
5				2283FE046	2283FE045	99.31	98.98	65.57	10	0.0050	VCP	0.013	0.01	0.03	0.07	0.10	1.00	10%		
5				2283FE045	2283FE024	98.98	0.00	164.91	10	0.0050	VCP	0.013	0.01	0.03	0.08	0.12	1.00	12%		
5				2283FE024	2283FE023	0.00	0.00	60.84	27	0.0017	RCP	0.013	0.67	0.94	3.00	3.94	8.24	48%		
5				2283FE023	2283FE022	0.00	0.00	483.50	27	0.0017	RCP	0.013	0.67	0.95	3.03	3.98	8.24	48%		
5				2283FE022	2283FE021	0.00	0.00	49.11	27	0.0017	RCP	0.013	0.67	0.95	3.04	3.98	8.24	48%		
5				2283FE056	2283FE057	0.00	0.00	57.17	10	0.0106	TC	0.013	0.01	0.02	0.04	0.06	1.45	4%		
5				2283FE057	2283FE017	0.00	0.00	123.98	10	0.0106	TC	0.013	0.01	0.02	0.05	0.07	1.45	5%		
	15,985	0.0934	0.9161																	
6				2184FE007	2184FE008	108.96	107.84	297.34	8	0.0038	VCP	0.013	0.01	0.02	0.08	0.10	0.48	20%		
6				2184FE008	2183FE032	107.74	107.49	159.92	8	0.0016	VCP	0.013	0.01	0.03	0.11	0.14	0.31	45%		
6				2183FE032	2183FF001	107.44	0.00	149.24	8	0.0016	VCP	0.013	0.02	0.04	0.16	0.20	0.31	64%		
6				2183FE022	2183FE025	113.68	112.90	186.12	8	0.0042	VCP	0.013	0.01	0.01	0.05	0.07	0.51	13%		
6				2183FE025	2183FE026	112.90	111.52	404.35	8	0.0034	VCP	0.013	0.01	0.02	0.08	0.10	0.46	21%		
6				2183FE026	2183FE027	111.52	109.86	437.54	8	0.0038	VCP	0.013	0.01	0.03	0.10	0.13	0.48	27%		
6				2183FE028	2183FE027	113.21	110.06	300.67	8	0.0105	VCP	0.013	0.00	0.01	0.04	0.05	0.80	6%		
6				2183FE027	2183FE029	109.71	108.26	274.63	8	0.0053	VCP	0.013	0.02	0.04	0.15	0.20	0.57	34%		
6				2183FE029	2183FF001	108.16	0.00	88.90	8	0.0053	VCP	0.013	0.02	0.07	0.24	0.31	0.57	55%		

6				2183FE036	2283FE075	124.90	124.40	206.20	12	0.0024	VCP	0.013	0.05	0.13	0.46	0.59	1.13	52%		
6				2283FE075	2283FE074	124.40	123.93	175.00	12	0.0027	VCP	0.013	0.05	0.14	0.50	0.64	1.19	54%		
6				2283FE074	2283FE073	123.93	123.78	70.72	12	0.0021	VCP	0.013	0.05	0.15	0.54	0.68	1.06	64%		
6				2283FE073	2283FE072	123.78	123.32	203.25	12	0.0023	VCP	0.013	0.06	0.15	0.55	0.70	1.10	64%		
6				2283FE072	2283FE071	123.32	120.99	145.36	12	0.0160	VCP	0.013	0.06	0.16	0.58	0.74	2.92	25%		
6				2283FE071	2283FE070	120.99	119.12	150.37	12	0.0124	VCP	0.013	0.06	0.16	0.59	0.75	2.57	29%		
6				2283FE070	2283FE069	119.12	118.00	301.90	12	0.0037	VCP	0.013	0.06	0.17	0.62	0.80	1.40	57%		
6				2283FE089	2283FE086	0.00	121.08	271.07	15	0.0037	CMP	0.024	0.00	0.01	0.04	0.05	1.38	3%		
6				2183FE014	2283FE097	126.38	125.77	140.60	15	0.0043	CMP	0.024	0.00	0.01	0.03	0.03	1.49	2%		
6				2183FE008	2183FE005	126.78	125.86	123.57	8	0.0074	TC	0.013	0.00	0.01	0.02	0.03	0.67	4%		
6				2183FE005	2183FE004	125.56	124.79	78.97	8	0.0098	TC	0.013	0.00	0.01	0.04	0.05	0.77	6%		
6				2183FE004	2183FE003	124.79	123.85	77.84	8	0.0121	TC	0.013	0.00	0.01	0.04	0.05	0.86	6%		
6				2183FE003	2183FE002	123.85	122.65	126.83	8	0.0095	TC	0.013	0.00	0.01	0.05	0.06	0.76	8%		
6				2183FE002	2183FE001	122.65	121.82	83.26	8	0.0100	TC	0.013	0.01	0.01	0.05	0.07	0.78	9%		
6				2183FE001	2182FE039	121.82	119.05	154.92	8	0.0179	TC	0.013	0.01	0.02	0.06	0.08	1.04	8%		
6				2182FE039	2182FE038	118.55	117.24	153.89	8	0.0085	TC	0.013	0.01	0.02	0.08	0.11	0.72	15%		
6				2182FE038	2182FE037	117.09	0.00	155.05	10	0.0053	VCP	0.013	0.01	0.03	0.09	0.12	1.03	12%		
6				2182FE037	2182FE036	0.00	115.85	79.61	10	0.0078	VCP	0.013	0.01	0.03	0.10	0.13	1.25	10%		
6				2182FE036	2182FE035	114.30	0.00	117.69	10	0.0078	VCP	0.013	0.01	0.03	0.10	0.13	1.25	11%		
6				2182FE035	2182FE034	0.00	112.79	75.57	10	0.0078	VCP	0.013	0.01	0.03	0.11	0.14	1.25	11%		
6				2182FE034	2182FE033	112.79	111.20	292.53	10	0.0054	VCP	0.013	0.01	0.03	0.13	0.16	1.04	15%		
6				2283FE100	2284FE130	0.00	0.00	230.77	8	0.0091	VCP	0.013	0.00	0.01	0.05	0.06	0.74	8%		
6				2284FE130	2284FE129	0.00	121.14	256.86	8	0.0091	VCP	0.013	0.01	0.03	0.09	0.12	0.74	16%		
	12,184	0.0671	0.7040																	
8				2285FE067	2285FE066	144.19	142.77	152.31	8	0.0093	VCP	0.013	0.00	0.01	0.04	0.05	0.75	6%		
8				2285FE066	2285FE065	142.77	138.63	256.86	8	0.0161	VCP	0.013	0.00	0.01	0.05	0.06	0.99	6%		
8				2285FE065	2285FE064	138.53	135.33	249.19	8	0.0128	VCP	0.013	0.01	0.02	0.07	0.08	0.89	9%		
8				2285FE064	2285FE055	135.33	134.06	121.78	8	0.0104	VCP	0.013	0.01	0.02	0.08	0.10	0.80	12%		
8				2285FE057	2285FE055	135.09	134.06	201.86	8	0.0051	VCP	0.013	0.01	0.02	0.08	0.11	0.56	19%		
8				2285FE055	2285FE053	134.06	134.18	24.44	8	-0.0049	VCP	0.013	0.02	0.04	0.16	0.21	-0.55	-38%	Neg Slope	
8				2285FE053	2285FE052	133.88	131.45	236.44	8	0.0103	VCP	0.013	0.02	0.05	0.18	0.23	0.79	29%		

8				2285FE052	2284FE073	131.45	129.70	199.18	8	0.0088	VCP	0.013	0.02	0.05	0.19	0.24	0.73	33%		
8				2284FE073	2284FE072	129.62	128.38	330.86	10	0.0037	VCP	0.013	0.02	0.06	0.21	0.27	0.87	31%		
8				2284FE072	2284FE068	128.38	127.53	257.02	10	0.0033	VCP	0.013	0.02	0.06	0.22	0.28	0.81	35%		
8				2284FE068	2284FE056	127.53	126.48	237.04	12	0.0044	VCP	0.013	0.02	0.07	0.25	0.32	1.53	21%		
8				2285FE039	2285FE038	167.59	0.00	161.08	10	0.0198	VCP	0.013	0.03	0.07	0.14	0.21	1.99	11%		
8				2285FE038	2285FE037	0.00	162.95	73.22	10	0.0198	VCP	0.013	0.03	0.07	0.15	0.22	1.99	11%		
8				2285FE037	2285FE036	162.95	159.83	124.91	10	0.0250	VCP	0.013	0.03	0.07	0.15	0.23	2.24	10%		
8				2285FE036	2285FE035	159.83	155.83	148.54	12	0.0269	VCP	0.013	0.03	0.08	0.16	0.24	3.78	6%		
8				2285FE035	2285FE033	155.83	152.10	168.60	15	0.0221	VCP	0.013	0.03	0.08	0.17	0.25	6.21	4%		
8				2285FE033	2284FE067	152.10	149.48	285.77	15	0.0092	VCP	0.013	0.03	0.08	0.19	0.27	4.00	7%		
8				2284FE067	2284FE065	149.48	144.65	143.51	15	0.0337	VCP	0.013	0.03	0.08	0.20	0.28	7.66	4%		
8				2284FE065	2284FE305	144.65	140.39	128.92	15	0.0330	VCP	0.013	0.03	0.09	0.20	0.29	7.59	4%		
8				2284FE305	2284FE063	140.39	120.13	36.72	8	0.5518	VCP	0.013	0.03	0.09	0.21	0.29	5.80	5%		
8				2284FE063	2284FE064	140.39	139.35	34.29	12	0.0303	VCP	0.013	0.04	0.11	0.30	0.41	4.01	10%		
8				2284FE064	2284FE056	139.35	131.45	223.96	12	0.0353	VCP	0.013	0.04	0.11	0.31	0.43	4.33	10%		
8				2284FE056	2284FE055	126.48	126.14	60.00	12	0.0057	VCP	0.013	0.07	0.18	0.57	0.75	1.73	43%		
8				2284FE125	2284FE300	125.22	124.05	210.87	8	0.0055	VCP	0.013	0.01	0.02	0.07	0.09	0.58	15%		
8				2284FE300	2284FE121	124.05	123.35	210.87	8	0.0033	VCP	0.013	0.01	0.02	0.08	0.10	0.45	23%		
8				2284FE121	2284FE119	123.35	122.02	114.23	8	0.0116	VCP	0.013	0.01	0.03	0.10	0.13	0.84	16%		
8				2284FE119	2284FE118	122.02	121.40	100.49	8	0.0062	VCP	0.013	0.01	0.03	0.11	0.13	0.61	22%		
8				2284FE118	2284FE117	121.35	120.13	181.91	8	0.0067	VCP	0.013	0.01	0.03	0.12	0.15	0.64	23%		
8				2284FE112	2284FE111	126.03	125.55	164.04	8	0.0029	VCP	0.013	0.00	0.01	0.04	0.05	0.42	13%		
8				2284FE111	2284FE110	125.55	125.09	217.89	8	0.0021	VCP	0.013	0.01	0.01	0.05	0.07	0.36	19%		
8				2284FE110	2284FE109	125.09	124.15	227.20	8	0.0041	VCP	0.013	0.01	0.02	0.07	0.09	0.50	17%		
8				2284FE109	2284FE106	124.15	0.00	124.06	8	0.0147	VCP	0.013	0.01	0.02	0.08	0.09	0.95	10%		
	15,711	0.2183	0.9518																	
9				2385FE030	2385FE029	121.33	111.98	43.33	6	0.2158	VCP	0.013	0.01	0.04	0.06	0.09	1.68	6%		
9				2385FE029	2385FE037	111.98	110.93	229.51	12	0.0046	RCP	0.013	0.21	0.30	0.16	0.46	1.56	30%		
9				2385FE037	2385FE038	110.93	110.43	203.94	12	0.0025	RCP	0.013	0.21	0.31	0.17	0.48	1.14	42%		
9				2385FE040	2385FE039	118.30	118.00	93.87	8	0.0032	PEP	0.013	0.01	0.04	0.06	0.09	0.44	21%		
9				2385FE039	2385FE038	117.85	110.48	285.13	10	0.0258	VCP	0.013	0.02	0.05	0.07	0.12	2.28	5%		
9				2385FE038	2385FE042	110.43	105.40	229.75	15	0.0219	RCP	0.013	0.23	0.34	0.26	0.60	6.18	10%		

9				2385FE042	2384FE036	105.20	104.07	318.74	15	0.0035	RCP	0.013	0.26	0.37	0.38	0.76	2.49	30%	
9				2384FE036	2284FE017	104.07	103.51	426.49	15	0.0013	RCP	0.013	0.27	0.39	0.43	0.81	1.51	54%	
9				2284FE017	2284FE018	103.51	103.97	158.19	18	-0.0029	RCP	0.013	0.33	0.47	0.79	1.26	-3.66	-35%	Neg Slope
9				2284FE018	2284FE021	102.77	102.93	102.88	18	-0.0016	RCP	0.013	0.33	0.48	0.82	1.30	-2.68	-49%	Neg Slope
9				2284FE021	2284FE026	102.83	0.00	207.13	18	0.0023	RCP	0.013	0.34	0.49	0.86	1.34	3.27	41%	
9				2285FE010	2285FE080	118.73	120.80	99.34	10	-0.0208	VCP	0.013	0.01	0.03	0.05	0.07	-2.04	-4%	Neg Slope
9				2285FE080	2284FE074	121.16	131.47	228.86	10	-0.0450	VCP	0.013	0.01	0.04	0.06	0.10	-3.01	-3%	Neg Slope
9				2284FE076	2284FE074	140.58	134.17	143.70	8	0.0446	VCP	0.013	0.01	0.03	0.05	0.08	1.65	5%	
9				2284FE074	2284FE301	132.17	118.78	150.93	12	0.0887	RCP	0.013	0.04	0.11	0.18	0.29	6.86	4%	
9				2284FE301	2284FE035	118.78	0.00	172.02	12	0.0244	TC	0.013	0.04	0.11	0.19	0.30	3.60	8%	
9				2284FE035	2284FE034	0.00	110.09	183.69	12	0.0244	TC	0.013	0.05	0.12	0.21	0.33	3.60	9%	
9				2284FE034	2284FE033	108.67	0.00	271.84	12	0.0244	TC	0.013	0.06	0.15	0.25	0.41	3.60	11%	
9				2284FE129	2284FE117	121.14	120.18	106.07	8	0.0091	VCP	0.013	0.01	0.03	0.10	0.13	0.74	18%	
9				2284FE117	2284FE116	120.08	119.50	239.83	10	0.0024	VCP	0.013	0.03	0.07	0.23	0.30	0.70	43%	
9				2284FE116	2284FE115	119.50	116.90	292.73	10	0.0089	VCP	0.013	0.03	0.08	0.25	0.33	1.33	25%	
9				2284FE115	2284FE114	116.15	0.00	48.69	10	0.0039	VCP	0.013	0.03	0.08	0.25	0.33	0.88	38%	
9				2284FE114	2284FE102	0.00	115.70	67.28	10	0.0039	VCP	0.013	0.03	0.09	0.26	0.34	0.88	39%	
9				2284FE106	2284FE105	0.00	0.00	204.35	10	0.0147	VCP	0.013	0.02	0.04	0.12	0.16	1.72	9%	
9				2284FE105	2284FE104	0.00	115.82	238.25	10	0.0147	VCP	0.013	0.02	0.05	0.13	0.18	1.72	11%	
9				2284FE104	2284FE103	115.77	113.66	373.31	12	0.0057	VCP	0.013	0.02	0.07	0.15	0.22	1.73	13%	
9				2284FE103	2284FE102	113.41	113.05	55.06	12	0.0065	RCP	0.013	0.03	0.07	0.16	0.23	1.86	12%	
9				2284FE102	2283FE032	113.05	0.00	576.26	12	0.0065	RCP	0.013	0.07	0.18	0.45	0.62	1.86	34%	
9				2284FE055	2284FE054	126.09	124.40	219.08	12	0.0077	VCP	0.013	0.07	0.19	0.58	0.77	2.02	38%	
9				2284FE054	2284FE053	124.40	114.80	301.48	12	0.0318	VCP	0.013	0.08	0.20	0.60	0.81	4.11	20%	
9				2284FE053	2284FE051	114.80	112.62	179.77	12	0.0121	VCP	0.013	0.08	0.21	0.61	0.82	2.54	33%	
	8,415	0.1868	0.0382																
10				2486FE005	2486FE006	101.66	100.95	188.20	10	0.0038	VCP	0.013	0.00	0.01	0.00	0.01	0.87	2%	
10				2486FE009	2486FE006	103.54	101.50	53.54	10	0.0381	VCP	0.013	0.00	0.01	0.00	0.01	2.76	0%	
10				2486FE009	2486FF001	0.00	103.54	71.77	10	-1.4428	VCP	0.013	0.00	0.00	0.00	0.00	-17.01	0%	Neg Slope

10				2385FE015	2385FF001	0.00	0.00	67.67	10	0.0035	CMP	0.024	0.03	0.09	0.04	0.13	0.45	28%		
10				2385FE022	2385FE023	113.41	112.72	197.35	12	0.0035	RCP	0.013	0.17	0.25	0.07	0.32	1.36	23%		
10				2385FE023	2385FE024	112.72	112.47	172.80	12	0.0014	RCP	0.013	0.17	0.25	0.07	0.32	0.88	37%		
10				2385FE024	2385FE029	112.27	111.98	186.37	12	0.0016	RCP	0.013	0.19	0.28	0.09	0.37	0.91	41%		
	3,722	0.0004	0.0000																	
12				2486FE002	2486FE003	104.51	103.60	244.54	8	0.0037	VCP	0.013	0.00	0.00	0.00	0.00	0.48	0%		
12				2486FE003	2486FE004	103.50	102.37	261.66	8	0.0043	VCP	0.013	0.00	0.00	0.00	0.00	0.51	0%		
12				2486FE004	2486FE005	102.32	101.66	261.42	10	0.0025	VCP	0.013	0.00	0.00	0.00	0.00	0.71	0%		

APPENDIX D3

STORM WATER SYSTEM

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
	12,375	37.2																
A			2080GC087	2080GC086	102.88	102.61	124.88	18	0.0022	RCP		0.013	1.492	4.884	30.5%			106.50
A			2080GC086	2080GD044	102.61	102.05	191.98	10	0.0029	CMP		0.024	2.069	0.641	322.8%	Yes	16	105.51
A			2080GD044	2080GC085	102.05	0	150.46	12	0.0031	CMP		0.024	2.522	1.068	236.2%	Yes	17	106.90
A			2080GC085	2080GC084	0	101.14	146.90	12	0.0031	CMP		0.024	3.912	1.068	366.4%	Yes	20	
A			2080GC084	2080GC083	101.14	101.74	24.54	15	-0.0245	BOX	15"X15"	0.016	3.986	-54.775	-7.3%	Neg Slope		106.29
A			2080GC083	2080GC075	101.74	99.29	178.92	15	0.0137	VCP		0.014	4.524	7.019	64.4%			105.89
A			2080GC072	7640	0	101.79	57.27	18	0.0031	CMP		0.024	1.168	3.161	36.9%			104.24
A			7640	2080GC073	101.79	101.44	113.38	18	0.0031	RCP		0.013	1.616	5.836	27.7%			
A			2080GC073	2080GC074	101.44	101.17	171.12	18	0.0016	RCP		0.013	2.130	4.173	51.0%			105.44
A			2080GC074	2080GC075	100.84	99.29	169.98	18	0.0091	RCP		0.013	2.698	10.031	26.9%			
A			2080GC075	2080GD043	99.29	0	34.53	21	0.0037	CMP		0.024	7.326	5.188	141.2%	Yes	24	104.84
A			2080GD043	2080GD039	99.29	0	224.49	21	0.0037	CMP		0.024	8.001	5.188	154.2%	Yes	25	
A			2080GC041	2080GD037	104.03	102.38	286.78	21	0.0058	CMP		0.024	0.930	6.510	14.3%			
A			2080GD037	8295	102.38	0	325.23	21	0.0058	CMP		0.024	1.908	6.510	29.3%			
A			8295	2080GC043	0	101.6	34.45	21	0.0026	CMP		0.024	2.021	4.397	46.0%			
A			2080GC043	2080GC044	101.6	101.05	209.58	21	0.0026	CMP		0.024	2.651	4.397	60.3%			106.25
A			2080GC044	2080GC045	101.05	100.43	43.57	24	0.0142	CMP		0.024	2.782	14.617	19.0%			105.45
A			2080GC045	2080GC046	100.43	100.23	125.83	24	0.0016	CMP		0.024	3.160	4.885	64.7%			104.73
A			2080GC046	2080GC047	100.23	100.23	98.76	24	0.0001	CMP		0.024	3.566	1.225	291.0%	Yes	36	104.43
A			2080GC047	2080GC048	100.23	100.23	103.18	24	0.0001	CMP		0.024	4.012	1.225	327.4%	Yes	38	105.02
A			2080GC048	2080GD038	100.23	100.5	253.09	24	-0.0011	CMP		0.024	4.772	-4.002	-119.2%	Neg Slope		105.23
A			2080GD038	2080GD039	100.5	0	118.93	24	-0.0011	CMP		0.024	5.130	-4.002	-128.2%	Neg Slope		105.80
A			2080GD039	2079GD019	0	97.84	137.78	24	0.0037	CMP		0.024	13.545	7.407	182.9%	Yes	31	
A			2079GD019	2079GC019	97.84	98.7	244.57	21	-0.0035	RCP		0.013	14.715	-9.396	-156.6%	Neg Slope		103.29
A			2080GC067	2080GC068	101.87	100.92	150.58	12	0.0063	BOX	9"X12"	0.016	1.987	10.385	19.1%			105.77
A			2080GC068	2080GC069	100.92	100.97	34.76	12	-0.0014	BOX	9"X12"	0.016	2.092	-4.959	-42.2%	Neg Slope		105.31
A			2080GC069	2079GC026	100.97	100.37	305.17	15	0.0020	BOX	10"X15"	0.016	3.009	8.923	33.7%			105.37
A			2079GC026	2079GC020	100.37	100.48	34.40	15	-0.0032	BOX	12"X15"	0.016	3.113	-14.648	-21.2%	Neg Slope		104.57
A			2079GC020	2079GC019	100.48	98.7	60.85	15	0.0293	BOX	12"X15"	0.016	3.295	44.307	7.4%			104.73
A			2079GC019	2079GI001	0	98.7	158.23	24	0.0293	BOX	24"X24"	0.016	18.486	209.798	8.8%			104.60
A			2079GI001	2079GD004	0	105.06	285.58	18	0.0297	TC		0.013	23.282	18.110	128.6%	Yes	20	
A			2079GD004	2079GD003	105.06	102.98	69.98	30	0.0297	RCP		0.013	23.492	70.716	33.2%			
A			2079GD007	2079GD006	103.21	103.14	134.59	15	0.0005	CMP		0.024	6.910	0.798	866.0%	Yes	34	
A			2079GD006	2079GD005	103.14	102.53	77.30	15	0.0079	CMP		0.024	7.227	3.108	232.5%	Yes	21	
A			2079GD005	2079GD003	102.53	103.23	80.34	15	-0.0087	CMP		0.024	7.541	-3.266	-230.9%	Neg Slope		
A			2079GD003	2079GD002	102.98	102.6	270.35	30	0.0014	RCP		0.013	31.846	15.378	207.1%	Yes	40	
A			2079GD002	2079GD001	102.6	101.68	490.28	30	0.0019	RCP		0.013	33.320	17.768	187.5%	Yes	38	
A			2079GD001	2179GD001	100.83	111.6	491.14	30	-0.0219	RCP		0.013	35.817	-60.739	-59.0%	Neg Slope		
A			2179GD001	2179GL001	100.83	0	460.10	30	0.2192	RCP		0.013	37.200	192.015	19.4%			

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
	16,806	37.9																
B			2080GD056	2080GD057	105.73	105.45	116.33	18	0.0024	RCP		0.013	3.256	5.153	63.2%			
B			2080GD057	2080GD058	105.45	0	63.05	18	0.0010	RCP		0.013	3.852	3.356	114.8%	Yes	19	
B			2080GD058	8299	0	0	110.75	18	0.0010	RCP		0.013	4.102	3.356	122.2%	Yes	20	
B			8299	2080GD059	0	0	49.59	18	0.0010	RCP		0.013	4.940	3.356	147.2%	Yes	21	
B			2080GD059	8317	0	105.13	90.18	18	0.0010	RCP		0.013	5.144	3.356	153.3%	Yes	22	
B			8317	8320	105.13	105.3	154.91	24	-0.0011	RCP		0.013	5.685	-7.494	-75.9%	Neg Slope		
B			8320	2080GD061	105.3	104.54	137.21	24	0.0055	RCP		0.013	6.932	16.836	41.2%			
B			2080GD061	2080GD063	104.54	105.57	147.93	24	-0.0070	RCP		0.013	7.644	-18.877	-40.5%	Neg Slope		
B			2080GD063	2080GC095	104.54	109.79	150.53	24	-0.0349	RCP		0.013	8.123	-42.248	-19.2%	Neg Slope		
B			2080GC095	2080GD300	109.79	0	159.29	24	0.0323	RCP		0.013	8.834	40.680	21.7%			
B			2080GD300	2080GD012	0	104	19.76	24	0.0323	RCP		0.013	9.151	40.680	22.5%			
B			2080GD012	2080GD011	104	103.99	106.69	24	0.0001	RCP		0.013	10.816	2.190	493.8%	Yes	44	
B			2080GD011	2080GD090	104.64	103.61	130.99	24	0.0079	RCP		0.013	11.200	20.061	55.8%			
B			2080GD090	2080GD009	103.61	0	164.27	24	0.0018	RCP		0.013	13.627	9.545	142.8%	Yes	28	
B			2080GD009	2080GD008	0	102.86	257.04	24	0.0018	RCP		0.013	14.307	9.545	149.9%	Yes	28	
B			2080GD008	2080GD036	102.86	102.85	59.80	24	0.0002	RCP		0.013	16.789	2.926	573.8%	Yes	47	
B			2080GD036	2080GD006	102.85	102.16	105.72	24	0.0065	RCP		0.013	17.027	18.276	93.2%			
B			2080GD006	2080GC021	102.16	102.5	94.28	24	-0.0036	RCP		0.013	18.526	-13.585	-136.4%	Neg Slope		
B			2081GC012	2180GC166	107.44	104.31	256.92	18	0.0122	RCP		0.013	1.362	11.594	11.7%			116.34
B			2180GC166	2180GD025	104.31	105.04	137.25	18	-0.0053	RCP		0.013	2.003	-7.661	-26.1%	Neg Slope		
B			2180GD025	2180GC020	104.44	103.32	156.39	24	0.0072	RCP		0.013	2.356	19.145	12.3%			114.14
B			2180GC020	2080GD054	103.32	104.44	205.74	24	-0.0054	RCP		0.013	3.530	-16.691	-21.2%	Neg Slope		
B			2080GD054	2180GD024	104.74	104.82	52.51	30	-0.0015	RCP		0.013	5.748	-16.010	-35.9%	Neg Slope		
B			2180GD024	2080GC015	104.82	104.68	181.25	24	0.0008	RCP		0.013	6.157	6.287	97.9%			
B			2080GC015	7660	104.88	0	81.92	24	0.0027	RCP		0.013	6.398	11.790	54.3%			
B			7660	2080GD024	0	104.28	138.98	24	0.0027	RCP		0.013	6.823	11.790	57.9%			
B			2080GD024	2080GD023	104.28	104.49	34.90	24	-0.0060	RCP		0.013	6.901	-17.549	-39.3%	Neg Slope		
B			2080GD023	2080GC021	104.49	102.5	355.28	24	0.0056	RCP		0.013	8.902	16.931	52.6%			
B			2080GD040	2080GC052	0	0	202.30	10	0.0005	BOX	8"X10"	0.016	1.940	1.870	103.8%	Yes	19	
B			2080GC052	2080GC051	0	102.68	98.14	10	0.0005	BOX	8"X10"	0.016	2.162	1.870	115.6%	Yes	20	
B			2080GC051	2080GC050	102.68	0	102.08	10	0.0005	BOX	8"X10"	0.016	3.027	1.870	161.9%	Yes	22	
B			2080GC050	2080GC021	0	102.5	295.46	10	0.0005	BOX	8"X10"	0.016	3.693	1.870	197.5%	Yes	24	
B			2080GC021	2080GD004	102.5	105.8	157.41	36	-0.0210	RCP		0.013	31.628	-96.572	-32.8%	Neg Slope		
B			2080GD004	2080GD003	105.8	102.06	70.88	36	0.0528	RCP		0.013	33.531	153.207	21.9%			
B			2080GD003	2080GD060	102.06	101.97	174.05	36	0.0005	RCP		0.013	33.923	15.167	223.7%	Yes	49	
B			2080GD060	2080GD001	101.97	107.16	140.34	36	-0.0370	RCP		0.013	35.125	-128.266	-27.4%	Neg Slope		
B			2080GD001	2180GD002	107.16	0	222.54	48	0.0111	RCP		0.013	36.083	151.232	23.9%			
B			2180GD002	2180GD001	0	101.49	288.99	36	0.0111	RCP		0.013	36.735	70.222	52.3%			
B			2180GD001	2180GL005	101.49	100.7	516.69	36	0.0015	RCP		0.013	37.900	26.080	145.3%	Yes	42	

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
	6,166	17.6																
C			2181GC167	2180GC016	109.7	0	167.04	10	0.0124	CMP		0.024	2.579	1.322	195.0%	Yes	13	
C			2180GC016	2180GD018	0	105.28	189.03	10	0.0124	CMP		0.024	3.422	1.322	258.8%	Yes	15	
C			2180GD018	2180GD014	105.28	0	47.50	10	0.0124	CMP		0.024	3.731	1.322	282.2%	Yes	15	
C			2180GD014	2180GD013	0	0	137.42	15	0.0068	CMP		0.024	6.627	2.887	229.5%	Yes	21	
C			2180GD013	2180GD012	0	0	54.34	15	0.0068	CMP		0.024	6.782	2.887	234.9%	Yes	21	
C			2180GD016	2180GD012	0	0	189.67	10	0.0068	CMP		0.024	2.936	0.979	299.8%	Yes	16	
C			2180GD012	2180GD011	0	104.3	211.45	8	0.0068	CMP		0.024	10.483	0.540	1940.9%	Yes	25	
C			2180GD011	2180GD007	104.3	102.13	318.74	22	0.0068	CMP		0.024	11.392	8.017	142.1%	Yes	26	
C			2180GD008	2180GD007	102.68	102.13	147.53	12	0.0037	CMP		0.024	2.031	1.178	172.4%	Yes	15	
C			2180GD007	2180GD006	102.13	100.53	208.13	24	0.0077	RCP		0.013	14.018	19.835	70.7%			
C			2180GD021	2180GD006	102.53	101.08	304.70	12	0.0048	TC		0.013	2.074	2.458	84.4%			
C			2180GD006	2180GD005	100.53	101.9	87.71	24	-0.0156	RCP		0.013	16.454	-28.273	-58.2%	Neg Slope		
C			2180GD005	2180GL003	101.9	100.6	401.39	30	0.0032	RCP		0.013	17.600	23.343	75.4%			
	24,847	43.4																
D			2182GD011	2182GD012	110.39	110.19	52.57	10	0.0038	VCP		0.014	1.110	1.255	88.4%			
D			2182GD012	2181GC061	110.19	109.99	224.17	10	0.0009	VCP		0.014	2.388	0.608	393.0%	Yes	17	
D			2181GC061	2181GC060	109.99	109.56	207.48	10	0.0021	VCP		0.014	2.791	0.926	301.4%	Yes	16	
D			2181GC060	2181GC059	109.56	108.83	181.75	10	0.0040	VCP		0.014	3.151	1.289	244.4%	Yes	14	
D			2181GD043	2181GC059	110.55	109.93	287.85	10	0.0022	CIP		0.015	1.729	0.881	196.2%	Yes	13	
D			2181GC059	2181GD025	108.83	107.66	282.23	15	0.0041	CMP		0.024	5.533	2.253	245.6%	Yes	22	
D			2181GD026	2181GD025	108.02	107.46	169.00	12	0.0033	TC		0.013	1.876	2.051	91.5%			
D			2181GD025	2181GC043	110.02	0	24.39	10	0.0106	TC		0.013	2.322	2.260	102.8%	Yes	11	
D			2181GC043	2181GD023	0	0	126.99	10	0.0106	TC		0.013	2.700	2.260	119.5%	Yes	11	
D			2181GD023	2181GC042	0	106.61	169.09	10	0.0106	TC		0.013	3.224	2.260	142.6%	Yes	12	
D			2181GC042	2181GD022	106.61	105.57	80.17	10	0.0130	TC		0.013	3.847	2.495	154.2%	Yes	12	
D			2181GD022	2181GD021	105.57	0	76.48	10	-0.0073	TC		0.013	4.437	-1.867	-237.7%	Neg Slope		
D			2181GD039	2181GD021	108.38	0	314.51	12	0.0130	VCP		0.014	1.546	3.768	41.0%			
D			2181GD021	2181GD020	0	106.49	50.25	10	-0.0073	TC		0.013	6.157	-1.867	-329.8%	Neg Slope		
D			2181GD020	2181GD019	106.49	0	263.67	12	0.0075	CIP		0.015	7.217	2.677	269.6%	Yes	18	
D			2181GD019	2181GD018	0	104.42	11.81	12	0.0075	CIP		0.015	7.378	2.677	275.7%	Yes	18	
D			2181GD018	2181GD017	104.42	104.77	14.46	12	-0.0242	CIP		0.015	7.403	-4.803	-154.1%	Neg Slope		
D			2181GD017	2181GD016	104.77	0	122.95	12	0.0037	CMP		0.024	9.362	1.178	795.0%	Yes	27	
D			2181GD016	2181GD015	0	104.09	59.68	16	0.0037	CMP		0.024	9.466	2.536	373.2%	Yes	27/0.013	
D			2181GD015	2181GD014	104.09	0	41.69	16	-0.0040	CMP		0.024	9.930	-2.632	-377.2%	Neg Slope	27/0.013	

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
D			2181GD014	2181GC018	0	104.35	23.12	16	-0.0040	CMP		0.024	10.106	-2.632	-383.9%	Neg Slope	27/0.013	
D			2181GD013	2181GC018	0	104.35	73.51	18	-0.0040	CMP		0.024	0.864	-3.604	-24.0%	Neg Slope		
D			2181GC018	2181GD012	104.35	0	214.24	24	0.0023	VCP		0.014	11.344	9.990	113.5%	Yes	27/0.013	
D			2181GD012	2181GD011	0	103.71	68.74	24	0.0023	VCP		0.014	11.464	9.990	114.8%	Yes	27/0.013	
D			2181GD011	2181GD010	103.71	0	22.25	24	-0.0073	VCP		0.014	11.923	-17.990	-66.3%	Neg Slope	27/0.013	
D			2181GD010	2181GD009	0	104.7	112.73	24	-0.0073	RCP		0.013	12.204	-19.374	-63.0%	Neg Slope	27/0.013	
D			2181GD009	2181GD001	103.97	104.15	283.67	24	-0.0006	RCP		0.013	13.449	-5.699	-236.0%	Neg Slope	27/0.013	
D			2181GD025	2181GD044	107.23	107.21	144.73	15	0.0001	CMP		0.024	5.382	0.411	1308.4%	Yes	24/0.013	
D			2181GD044	2181GD045	107.21	107.06	132.63	15	0.0011	CMP		0.024	5.770	1.177	490.3%	Yes	24/0.013	
D			2181GD045	2181GD046	107.06	107.01	60.31	15	0.0008	CMP		0.024	5.875	1.007	583.1%	Yes	24/0.013	
D			2181GD046	2181GD047	107.01	106.52	139.57	15	0.0035	CMP		0.024	8.600	2.073	414.8%	Yes	24/0.013	
D			2181GD047	2181GD048	106.52	106.58	101.00	15	-0.0006	CMP		0.024	9.157	-0.853	-1073.6%	Neg Slope	27/0.013	
D			2181GD048	2181GD049	106.58	106.3	9.37	15	0.0299	CMP		0.024	9.506	6.049	157.1%	Yes	27/0.013	
D			2181GD049	2181GD050	106.3	0	31.28	15	-0.0007	CMP		0.024	9.608	-0.901	-1066.0%	Neg Slope	27/0.013	
D			2181GD050	2181GC006	0	106.46	209.82	15	-0.0007	CMP		0.024	9.975	-0.901	-1106.6%	Neg Slope	27/0.013	
D			2180GD025	2180GC019	104.12	105.04	44.93	18	-0.0205	RCP		0.013	0.078	-15.032	-0.5%	Neg Slope		
D			2180GC019	2181GD065	105.04	104.12	219.02	18	0.0042	RCP		0.013	0.461	6.808	6.8%			113.37
D			2181GD065	2181GD064	106.4	0	228.40	15	0.0042	RCP		0.013	0.878	4.187	21.0%			
D			2181GD064	2181GD096	0	106.4	7.87	15	0.0042	RCP		0.013	0.892	4.187	21.3%			
D			2181GD067	2181GD096	107	106.4	130.65	15	0.0046	RCP		0.013	4.525	4.378	103.4%	Yes	16	
D			2181GD096	2181GD063	106.4	0	93.98	12	-0.0001	RCP		0.013	5.581	-0.370	-1507.8%	Neg Slope	24/0.013	
D			2181GD063	2181GD062	0	0	95.63	15	-0.0001	RCP		0.013	6.088	-0.671	-907.1%	Neg Slope	24/0.013	
D			2181GD062	2181GD061	0	0	111.25	15	-0.0001	RCP		0.013	6.787	-0.671	-1011.3%	Neg Slope	24/0.013	
D			2181GD061	2181GC006	0	106.46	255.00	15	-0.0001	RCP		0.013	7.841	-0.671	-1168.4%	Neg Slope	24/0.013	
D			2181GC007	2181GD006	108.57	108.44	79.32	15	0.0016	CMP		0.024	2.832	1.417	199.9%	Yes	15/0.013	
D			2181GD006	2181GD005	108.44	107.98	85.00	15	0.0054	CMP		0.024	2.981	2.574	115.8%	Yes	15/0.013	
D			2181GD005	8545	108.04	0	110.52	15	0.0110	CMP		0.024	3.439	3.669	93.7%		15/0.013	
D			8545	2181GD004	0	106.64	16.83	21	0.0110	CMP		0.024	3.485	8.999	38.7%		21/0.013	
D			2181GD004	2181GC006	106.64	106.46	141.07	21	0.0013	CMP		0.024	5.322	3.066	173.6%	Yes	21/0.013	
D			2181GC006	2181GC005	106.46	106.09	140.19	21	0.0026	CMP		0.024	23.701	4.409	537.5%	Yes	30/0.013	
D			2181GC005	2181GC004	106.21	106.3	56.61	21	-0.0016	CMP		0.024	23.800	-3.422	-695.5%	Neg Slope	30/0.013	
D			2181GC004	2181GC003	106.3	106	62.96	24	0.0048	CMP		0.024	25.706	8.459	303.9%	Yes	30/0.013	

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
D			2181GC003	2181GG002	106	106.45	152.27	24	-0.0030	CMP		0.024	25.972	-6.661	-389.9%	Neg Slope	30/0.013	
			2181GG002	2181GC002	106.45	107.22	13.59	24	-0.0567	CMP		0.024	25.995	-29.168	-89.1%	Neg Slope	30/0.013	
D			2181GC002	2181GC001	107.22	105.16	61.82	24	0.0333	CMP		0.024	26.103	22.368	116.7%	Yes	30/0.013	
D			2181GC001	11352	107.6	0	145.73	24	0.0050	CMP		0.024	26.594	8.630	308.2%	Yes	30/0.013	
D			11352	2181GD003	0	0	89.06	24	0.0050	CMP		0.024	27.102	8.630	314.1%	Yes	30/0.013	
D			2181GD003	2181GD002	0	0	293.73	24	0.0050	CMP		0.024	27.989	8.630	324.3%	Yes	30/0.013	
D			2181GD002	2181GD001	0	104	197.36	24	0.0050	CMP		0.024	28.438	8.630	329.5%	Yes	30/0.013	
D			2181GD001	2181GL001	103.85	100	297.09	30	0.0130	CMP		0.024	43.400	25.292	171.6%	Yes	39/0.013	
	8,639	10.9																
E			2182GC065	2182GC064	111.98	111.54	198.25	8	0.0022	VCP		0.014	0.555	0.529	105.1%	Yes	9	
E			2182GC064	2182GC063	111.54	111.75	200.38	8	-0.0010	VCP		0.014	0.855	-0.363	-235.5%	Neg Slope		
E			2182GC063	2182GC062	111.75	111.71	147.08	10	0.0003	CIP		0.015	1.041	0.313	332.4%	Yes	16	
E			2182GC062	2182GC061	111.71	110.77	248.55	10	0.0038	VCP		0.014	1.417	1.251	113.2%	Yes	11	
E			2182GC061	2182GC060	110.77	110.84	210.36	10	-0.0003	VCP		0.014	1.712	-0.371	-461.4%	Neg Slope		
E			2182GC060	2182GD009	110.74	109.78	32.03	8	0.0300	VCP		0.014	1.753	1.943	90.2%			
E			2182GD015	2182GD009	111.75	109.28	292.59	8	0.0084	VCP		0.014	1.538	1.031	149.2%	Yes	10	
E			2182GD009	2182GD008	109.28	0	140.87	8	0.0064	VCP		0.014	3.468	0.899	385.8%	Yes	14	
E			2182GD008	8326	0	0	140.19	10	0.0064	TC		0.013	3.645	1.755	207.7%	Yes	14	
E			8326	2417	0	0	14.33	10	0.0064	TC		0.013	4.093	1.755	233.2%	Yes	14	
E			2417	7967	0	0	139.49	10	0.0064	TC		0.013	4.322	1.755	246.2%	Yes	15	
E			7967	2181GD091	0	0	88.23	10	0.0064	TC		0.013	4.637	1.755	264.2%	Yes	15	
E			2182GD003	2182GD002	115.05	111.77	264.11	10	0.0124	VCP		0.014	1.205	2.267	53.1%			
E			2182GD002	2182GD001	111.77	0	62.73	10	0.0124	VCP		0.014	1.284	2.267	56.6%			
E			2182GD001	2182GD019	0	0	343.29	10	0.0124	VCP		0.014	2.181	2.267	96.2%			
E			2182GD019	2182GC001	0	107.47	153.08	15	0.0124	VCP		0.014	2.374	6.685	35.5%			
E			2182GC001	2181GD091	107.47	0	260.49	15	0.0124	VCP		0.014	2.939	6.685	44.0%			
E			2181GD091	2181GD090	0	104.6	205.97	18	0.0064	TC		0.013	7.836	8.416	93.1%			
E			2181GD090	2181GD078	104.6	0	239.70	18	0.0057	TC		0.013	8.867	7.959	111.4%	Yes	19	
E			2181GD100	2181GD078	0	0	241.70	8	0.0057	CIP		0.015	0.977	0.794	123.1%	Yes	9	
E			2181GD078	2181GD077	0	0	224.22	18	0.0057	TC		0.013	10.126	7.959	127.2%	Yes	20	
E			2181GD077	2181GD076	0	101.4	93.48	18	0.0057	CMP		0.024	10.685	4.311	247.8%	Yes	26	
E			2181GD076	2181GD075	101.4	101.3	12.74	18	0.0079	CMP		0.024	10.701	5.042	212.2%	Yes	24	
E			2181GD075	7898	101.3	0	55.00	72	0.0105	RCP		0.013	10.770	432.956	2.5%			
E			7898	2181GL014	0	100	69.39	72	0.0105	RCP		0.013	10.900	432.956	2.5%			
	10,003	15.1																
F			2182GC026	2182GD029	114.74	113.41	97.25	10	0.0137	VCP		0.014	0.940	2.379	39.5%			

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
F			2182GD031	2182GD030	113.87	0	20.56	8	0.0126	CIP		0.015	1.070	1.176	91.0%			
F			2182GD030	2182GD029	0	113.41	15.94	8	0.0126	CIP		0.015	1.189	1.176	101.2%	Yes	9	
F			2182GD029	2182GD028	113.41	112.44	71.42	10	0.0136	VCP		0.014	2.888	2.371	121.8%	Yes	11	
F			2182GD028	2182GD027	112.44	112.01	123.49	10	0.0035	VCP		0.014	3.603	1.201	300.1%	Yes	16	
F			2182GD027	2182GD026	112.01	111.5	118.20	10	0.0043	VCP		0.014	3.993	1.336	298.8%	Yes	16	
F			2182GD026	2182GD025	111.3	111.2	70.61	12	0.0014	VCP		0.014	4.100	1.245	329.3%	Yes	19	
F			2182GD025	2336	111.2	0	111.40	12	0.0056	VCP		0.014	4.324	2.486	173.9%	Yes	15	
F			2336	2337	0	0	68.80	12	0.0056	VCP		0.014	4.460	2.486	179.4%	Yes	15	
F			2337	2182GD024	0	108.48	301.50	12	0.0056	VCP		0.014	4.946	2.486	198.9%	Yes	16	
F			2182GD024	2282GD006	108.34	0	189.48	15	0.0054	VCP		0.014	5.816	4.413	131.8%	Yes	17	
F			2282GD006	2282GD005	0	105.8	279.90	15	0.0054	VCP		0.014	6.386	4.413	144.7%	Yes	18	
F			2282GD005	2282GD004	105.8	105.31	68.40	15	0.0072	VCP		0.014	6.529	5.077	128.6%	Yes	17	
F			2282GD004	2282GD003	105.31	104.92	67.92	15	0.0057	VCP		0.014	6.632	4.545	145.9%	Yes	18	
F			2282GD003	2282GC015	104.92	102.94	164.88	15	0.0120	VCP		0.014	7.142	6.573	108.7%	Yes	16	
F			2282GD008	2539	108.99	0	47.41	10	0.0188	VCP		0.014	1.092	2.786	39.2%			
F			2539	2282GD007	0	0	122.41	10	0.0188	VCP		0.014	1.308	2.786	47.0%			
F			2282GD007	2282GC035	0	0	10.10	12	0.0188	VCP		0.014	1.324	4.531	29.2%			
F			2282GC035	2282GC032	0	105.39	12.03	12	0.0188	VCP		0.014	1.409	4.531	31.1%			
F			2282GC032	2282GC031	104.98	104.28	149.39	10	0.0047	VCP		0.014	1.858	1.393	133.4%	Yes	12	
F			2282GC031	2282GC030	103.93	103.5	131.77	15	0.0033	VCP		0.014	2.057	3.427	60.0%			
F			2282GC030	2282GC015	103.03	102.94	83.04	15	0.0011	VCP		0.014	2.381	1.975	120.6%	Yes	17	
F			2282GC015	2282GG001	102.94	102	52.99	21	0.0177	RCP		0.013	9.604	21.103	45.5%			
F			2281GD002	2282GD001	107.76	106.96	129.58	12	0.0062	CMP		0.024	0.965	1.516	63.6%			
F			2282GD002	2282GD001	0	106.96	144.80	6	0.0248	VCP		0.014	1.007	0.821	122.7%	Yes	7	
F			2282GD001	2282GC004	106.96	104.99	32.17	8	0.0612	VCP		0.014	2.020	2.777	72.8%			
F			2282GC004	2282GC003	104.99	0	139.05	18	0.0031	VCP		0.014	2.825	5.391	52.4%			
F			2282GC003	2282GC002	0	0	113.45	18	0.0031	VCP		0.014	3.023	5.391	56.1%			
F			2282GC002	2282GC001	0	103.87	114.20	18	0.0031	VCP		0.014	3.224	5.391	59.8%			
F			2335	2282GC008	117.07	110.84	298.39	9	0.0209	BRK	7"X9"	0.014	0.822	10.540	7.8%			
F			2282GC008	2499	110.14	0	81.93	15	0.0248	VCP		0.014	1.537	9.448	16.3%			
F			2499	2282GC001	0	103.87	170.79	15	0.0248	VCP		0.014	2.098	9.448	22.2%			
F			2282GC001	2282GG001	103.47	102	54.62	21	0.0269	RCP		0.013	5.436	25.994	20.9%			
F			2282GG001	2282GL001	103.47	102	40.02	21	0.0367	RCP		0.013	15.100	30.366	49.7%			
	9,438	10.2																
G			2282GC066	2282GD029	116.9	116.15	82.91	12	0.0090	ACP		0.012	0.472	3.671	12.9%			
G			2282GD029	2282GC065	116.15	115.04	203.18	10	0.0055	VCP		0.014	1.201	1.504	79.9%			
G			2282GC065	2593	114.74	0	87.00	15	0.0051	VCP		0.014	1.955	4.268	45.8%			
G			2593	2282GD027	0	113.43	171.79	15	0.0051	VCP		0.014	2.217	4.268	52.0%			

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
G			2282GC085	2282GD036	118.29	118.02	90.18	12	0.0030	VCP		0.014	0.327	1.810	18.1%			
G			2282GD036	2282GC084	117.74	117.1	85.84	12	0.0075	VCP		0.014	0.420	2.857	14.7%			
G			2282GC084	2282GG005	117.1	0	273.37	8	0.0107	VCP		0.014	0.716	1.160	61.7%			
G			2282GG005	2282GD027	0	113.43	69.75	8	0.0107	VCP		0.014	1.877	1.160	161.7%	Yes	10	
G			2282GD027	2282GD026	113.43	0	231.54	60	0.0288	RCP		0.013	4.548	442.143	1.0%			60.00
G			2282GD026	2282GG002	0	0	293.24	60	0.0288	RCP		0.013	5.074	442.143	1.1%			
G			2282GD049	2282GD048	108.06	107.12	79.30	12	0.0119	RCP		0.013	0.575	3.879	14.8%			
G			2282GD048	2282GD046	107.12	106.84	81.31	12	0.0034	RCP		0.013	0.679	2.091	32.5%			
G			2282GD046	2282GC096	105.61	0	56.20	12	0.0023	VCP		0.014	0.863	1.596	54.1%			
G			2282GC096	2282GC095	0	105.35	55.58	12	0.0023	VCP		0.014	0.923	1.596	57.8%			
G			2282GC095	2282GD040	105.35	104.38	111.60	12	0.0087	VCP		0.014	1.044	3.084	33.8%			
G			2282GD041	2282GD040	108.9	104.38	227.63	10	0.0199	RCP		0.013	0.889	3.087	28.8%			
G			2282GD040	2282GC094	104.38	104.35	59.34	18	0.0005	VCP		0.014	1.997	2.193	91.0%			
G			2282GC094	2282GC093	104.35	0	82.50	18	0.0067	VCP		0.014	2.164	8.008	27.0%			
G			2282GC093	2282GG006	0	103.3	73.29	21	0.0067	RCP		0.013	2.719	13.008	20.9%			
G			2282GG006	2282GC091	103.3	103.19	26.49	21	0.0042	RCP		0.013	2.747	10.210	26.9%			
G			2282GC091	2282GG002	103.19	0	47.69	21	0.0042	RCP		0.013	2.851	10.210	27.9%			
G			2282GD017	8133	115.25	0	42.39	8	0.0473	VCP		0.014	1.369	2.441	56.1%			
G			8133	2282GC045	0	107.9	112.88	8	0.0473	VCP		0.014	1.491	2.441	61.1%			
G			2282GC045	2282GD016	107.9	104.89	66.59	8	0.0452	CMP		0.024	1.946	1.392	139.8%	Yes	10	
G			2282GD016	2282GC044	104.89	0	105.54	15	0.0452	VCP		0.014	2.139	12.753	16.8%			
G			2282GC044	2282GD015	0	0	77.04	15	0.0452	VCP		0.014	2.239	12.753	17.6%			
G			2282GD015	2282GG002	0	0	22.35	15	0.0452	VCP		0.014	2.263	12.753	17.7%			
G			2282GG002	2282GL002	0	98	10.61	60	0.0288	RCP		0.013	10.200	442.143	2.3%			
	12,347	31.4																
H			2283GC037	2283GC036	124.19	123.85	119.68	10	0.0028	VCP		0.014	4.432	1.084	408.7%	Yes	17	
H			2283GC036	2283GD041	123.85	0	77.72	10	0.0029	VCP		0.014	4.630	1.104	419.4%	Yes	18	
H			2283GD041	2283GD040	0	123.5	41.16	10	0.0029	VCP		0.014	4.735	1.104	428.9%	Yes	18	
H			2283GD040	2283GD039	123.5	123.14	103.77	10	0.0035	VCP		0.014	4.999	1.198	417.1%	Yes	18	
H			2283GD039	2283GC035	123.14	122.52	59.67	15	0.0104	VCP		0.014	7.008	6.114	114.6%	Yes	16	
H			2283GC035	2283GD038	122.52	121.52	86.62	15	0.0115	VCP		0.014	7.228	6.445	112.2%	Yes	16	
H			2283GD038	2283GD037	121.52	121	94.54	15	0.0055	VCP		0.014	7.469	4.449	167.9%	Yes	19	
H			2283GD037	2283GD036	121	120.64	215.45	15	0.0017	CMP		0.024	10.563	1.430	738.5%	Yes	32	
H			2283GD036	2283GC034	119.44	119.22	197.47	21	0.0011	CMP		0.024	13.384	2.865	467.2%	Yes	38	

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
H			2283GC034	2283GD024	118.62	119.22	159.71	21	-0.0038	CMP		0.024	13.853	-5.261	-263.3%	Neg Slope		
H			2183GD003	2183GD002	124.36	123.2	302.70	12	0.0038	VCP		0.014	1.538	2.048	75.1%			
H			2183GD002	2183GD001	123.2	122.6	220.57	15	0.0027	VCP		0.014	2.278	3.128	72.8%			
H			2183GD001	2283GD029	122.6	122.44	208.11	15	0.0008	VCP		0.014	3.115	1.663	187.3%	Yes	19	
H			2183GC007	2283GD029	122.78	122.29	130.54	12	0.0038	VCP		0.014	1.166	2.027	57.5%			
H			2283GD029	2432	122.44	0	36.23	15	0.0133	VCP		0.014	4.373	6.928	63.1%			
H			2432	2283GD028	0	120.48	110.69	15	0.0133	VCP		0.014	4.685	6.928	67.6%			
H			2283GD028	2283GD027	120.48	119.9	31.81	15	0.0182	VCP		0.014	4.766	8.099	58.8%			
H			2182GD042	2282GD038	123.6	124.18	176.56	12	-0.0033	ACP		0.012	1.469	-2.212	-66.4%	Neg Slope		
H			2282GD038	8195	127.7	0	69.52	24	0.0254	VCP		0.014	2.186	33.495	6.5%			
H			8195	8190	0	0	12.06	24	0.0254	VCP		0.014	2.258	33.495	6.7%			
H			8190	8210	0	0	96.41	24	0.0254	VCP		0.014	2.554	33.495	7.6%			
H			8210	8207	0	0	30.37	24	0.0254	VCP		0.014	2.678	33.495	8.0%			
H			8207	8594	0	0	87.06	24	0.0254	VCP		0.014	2.953	33.495	8.8%			
H			8594	2283GD027	0	119.9	11.36	24	0.0254	VCP		0.014	3.021	33.495	9.0%			
H			2283GD027	2283GD026	119.9	120.44	22.09	24	-0.0244	VCP		0.014	6.332	-32.846	-19.3%	Neg Slope		
H			2283GD026	2283GD202	120.44	0	344.50	39	0.0043	BRK		0.014	7.208	50.046	14.4%			
H			2283GD027	8229	119.9	0	22.25	24	0.0044	VCP		0.014	1.567	13.943	11.2%			
H			8229	8234	0	0	5.92	24	0.0044	VCP		0.014	1.713	13.943	12.3%			
H			8234	2283GD031	0	119.25	119.37	24	0.0044	VCP		0.014	2.017	13.943	14.5%			
H			2283GD031	2283GD200	119.25	0	178.95	24	0.0044	VCP		0.014	2.544	13.943	18.2%			
H			2283GD200	2283GD202	0	0	26.34	24	0.0044	VCP		0.014	2.611	13.943	18.7%			
H			2283GD202	2283GD025	0	118.83	33.38	39	0.0043	BRK		0.014	9.904	50.046	19.8%			
H			2283GD025	2283GD024	118.53	118.62	73.25	39	-0.0012	BRK		0.014	12.236	-26.876	-45.5%	Neg Slope		
H			2283GD024	2283GG002	117.92	0	372.99	39	0.0054	BRK		0.014	27.037	56.206	48.1%			
H			2283GG002	2903	0	0	103.00	39	0.0054	BRK		0.014	27.377	56.206	48.7%			
H			2903	8247	0	0	85.31	39	0.0054	BRK		0.014	28.359	56.206	50.5%			
H			8247	2881	0	0	71.87	39	0.0054	BRK		0.014	28.675	56.206	51.0%			
H			2881	2283GD023	0	112.16	37.84	39	0.0054	BRK		0.014	28.815	56.206	51.3%			
H			2283GD023	2283GD022	112.16	111.64	17.93	24	0.0290	BRK		0.014	28.860	35.773	80.7%			
H			2283GD022	2283GD021	111.64	0	31.96	24	0.0290	BRK		0.014	28.942	35.749	81.0%			
H			2283GD021	2283GD019	0	103.9	235.29	24	0.0290	BRK		0.014	29.540	35.749	82.6%			
H			2283GD054	2283GD048	109.58	104.78	74.24	10	0.0647	CMP		0.024	1.098	3.018	36.4%			
H			2283GD048	2283GD019	104.78	103.9	148.65	16	0.0059	CMP		0.024	1.476	3.198	46.2%			

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
H			2283GD019	2283GD018	103.9	0	91.22	24	0.0290	RCP		0.013	31.248	38.499	81.2%			
H			2283GD018	2283GD017	0	0	9.02	24	0.0290	RCP		0.013	31.271	38.499	81.2%			
H			2283GD017	2283GL009	0	0	50.80	24	0.0290	RCP		0.013	31.400	38.499	81.6%			
	28,857	75.1																
I			2183GC026	2183GD012	115.06	114.15	250.99	12	0.0036	CMP		0.024	2.726	1.162	234.6%	Yes	17	
I			2183GC027	2183GD012	115.5	114.15	252.84	12	0.0053	CMP		0.024	1.134	1.410	80.4%			
I			2183GD012	2183GC030	114.15	112.4	227.64	12	0.0077	CMP		0.024	4.452	1.692	263.1%	Yes	18	
I			2183GC030	2183GD013	112.4	112.3	27.46	12	0.0036	CMP		0.024	4.592	1.165	394.3%	Yes	21	
I			2183GD013	2183GC033	112.3	111.62	213.43	12	0.0032	CMP		0.024	6.151	1.089	564.6%	Yes	23	
I			2183GC033	2183GD014	111.62	111.51	39.94	21	0.0028	RCP		0.013	6.323	8.316	76.0%			
I			2183GD014	2183GC036	111.51	111.59	33.46	21	-0.0024	RCP		0.013	6.884	-7.747	-88.9%	Neg Slope		
I			2183GC036	2183GC038	111.59	111.83	154.19	24	-0.0016	RCP		0.013	7.353	-8.925	-82.4%	Neg Slope		
I			2183GC038	2183GD015	111.83	111.75	23.38	24	0.0034	RCP		0.013	7.414	13.232	56.0%			
I			2183GD015	2184GC003	111.75	111.14	55.86	24	0.0109	RCP		0.013	8.753	23.641	37.0%			
I			2184GC003	2184GD007	110.64	110.26	185.11	24	0.0021	RCP		0.013	9.347	10.250	91.2%			
I			2184GD007	2184GD004	110	109.37	127.39	24	0.0049	RCP		0.013	9.877	15.909	62.1%			
I			2184GD005	2184GD004	109.86	109.67	65.19	24	0.0029	RCP		0.013	1.818	12.213	14.9%			
I			2184GD004	2184GD216	109.67	0	525.35	24	0.0013	RCP		0.013	13.063	8.026	162.8%	Yes	29	
I			2184GD216	2184GD003	0	0	400.01	24	0.0013	RCP		0.013	14.586	8.026	181.7%	Yes	31	
I			2184GD003	2184GD002	0	106.89	598.52	24	0.0013	RCP		0.013	17.444	8.026	217.3%	Yes	33	
I			2184GD002	2284GD076	105.79	104.99	996.19	36	0.0008	RCP		0.013	22.551	18.901	119.3%	Yes	39	
I			2284GD069	2284GC097	117.7	0	91.62	18	0.0612	TC		0.013	2.056	25.993	7.9%			
I			2284GC097	2284GD076	0	104.79	119.22	18	0.0612	TC		0.013	2.443	25.993	9.4%			
I			2284GD076	2284GD217	104.49	0	473.81	48	0.0009	RCP		0.013	27.108	43.103	62.9%			
I			2284GD217	2284GD218	0	0	72.21	48	0.0009	RCP		0.013	27.296	43.103	63.3%			
I			2284GD218	2284GD078	0	0	351.43	48	0.0009	RCP		0.013	28.211	43.103	65.4%			
I			2284GD078	2284GD083	0	0	43.01	48	0.0009	RCP		0.013	28.713	43.103	66.6%			
I			2284GD083	2284GD087	0	102.73	282.78	48	0.0009	RCP		0.013	30.962	43.103	71.8%			
I			2284GD087	8419	102.73	0	450.00	48	0.0013	RCP		0.013	32.523	52.507	61.9%			
I			8419	2283GD201	0	102.1	21.49	48	0.0013	RCP		0.013	32.914	52.507	62.7%			
I			2283GD201	5354	102.1	0	150.27	48	0.0023	RCP		0.013	33.306	68.469	48.6%			
I			5354	2284GD118	0	101.6	69.79	48	0.0023	RCP		0.013	33.553	68.469	49.0%			
			2284GC163	2284GD118	108.85	101.6	241.60	12	0.0300	RCP		0.013	0.629	6.172	10.2%			
I			2284GD118	2283GD070	101.6	101.61	238.85	48	0.0000	RCP		0.013	34.803	-9.295	-374.4%	Neg Slope		
I			2283GD070	2283GD069	101.61	101.21	417.23	48	0.0010	RCP		0.013	35.999	44.476	80.9%			

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
I			2283GC139	2283GC102	0	0	163.25	8	0.0010	CMP		0.024	0.735	0.203	362.7%	Yes	13	
			2283GC102	2283GD069	0	103.56	20.35	8	0.0010	CMP		0.024	0.788	0.203	388.9%	Yes	14	
I			2283GD069	3310	101.27	0	64.00	48	0.0048	RCP		0.013	36.953	99.796	37.0%			
I			3310	2283GD068	0	100.59	76.88	48	0.0048	RCP		0.013	37.213	99.796	37.3%			
I			2283GC088	11328	125.64	0	153.70	27	0.02591	BRK		0.014	1.365	46.287	2.9%			
I			11328	11327	0	0	22.04	27	0.02591	BRK		0.014	1.465	46.287	3.2%			
I			11327	2283GD205	0	117.27	147.35	27	0.02591	BRK		0.014	1.920	46.287	4.1%			
I			2283GD205	2283GD063	117.27	109.8	173.88	16	0.0430	VCP		0.014	2.373	14.768	16.1%			
I			2283GD063	2283GD062	0	0	40.17	18	0.0430	RCP		0.013	4.201	21.772	19.3%			
I			2283GD062	2283GD061	0	106.75	129.69	18	0.0430	RCP		0.013	5.050	21.772	23.2%			
I			2283GD061	2283GD060	106.75	104.92	123.41	18	0.0148	VCP		0.014	5.372	11.878	45.2%			
I			2283GD060	2283GD059	104.72	103.58	320.70	18	0.0036	VCP		0.014	6.737	5.816	115.8%	Yes	20	
I			2283GD059	2283GD300	103.58	0	10.25	18	0.0036	VCP		0.014	6.865	5.816	118.0%	Yes	20	
I			2283GD056	2283GD057	0	0	78.53	12	0.0058	VCP		0.014	1.008	2.510	40.2%			
I			2283GD057	2283GD058	104.8	104.14	114.68	12	0.0058	VCP		0.014	1.306	2.510	52.0%			
I			2283GC067	2283GC066	107.65	0	144.32	12	0.00747	RCP		0.013	0.895	3.080	29.1%			
I			2283GC066	3064	0	0	128.18	15	0.00747	RCP		0.013	1.296	5.584	23.2%			
I			3064	2283GC065	0	105.27	46.05	15	0.00747	RCP		0.013	1.474	5.584	26.4%			
I			2283GC065	2283GC064	105.27	104.94	25.56	15	0.0129	RCP		0.013	1.541	7.341	21.0%			
I			2283GC064	2283GD058	104.94	104.14	30.64	15	0.0261	RCP		0.013	1.620	10.438	15.5%			
I			2283GD058	2283GD300	104.14	0	222.47	12	0.0058	VCP		0.014	3.506	2.510	139.7%	Yes	14	
I			2283GD300	2283GC112	0	0	55.59	18	0.0060	VCP		0.014	10.515	7.544	139.4%	Yes	21	
I			2283GC112	2283GD074	0	102	79.68	18	0.0060	VCP		0.014	11.039	7.544	146.3%	Yes	21	
I			2283GD077	2283GD076	101.51	0	52.11	15	-0.0212	RCP		0.013	2.854	-9.406	-30.3%	Neg Slope		109.21
I			2283GD076	2283GD075	0	0	15.04	12	-0.0212	CMP		0.024	2.893	-2.810	-103.0%	Neg Slope		
I			2283GD075	2283GD074	0	104.08	54.08	12	-0.0212	CMP		0.024	3.124	-2.810	-111.2%	Neg Slope		
I			2283GD074	2283GC131	100.88	100.85	215.57	24	0.0001	RCP		0.013	14.724	2.669	551.7%	Yes	46	
I			2283GD096	2283GC118	105.67	0	281.92	12	0.0114	CMP		0.024	2.159	2.063	104.7%	Yes	12/0.013	
I			2283GC118	2283GC131	0	101.85	52.47	12	0.0114	CMP		0.024	3.376	2.063	163.7%	Yes	12/0.013	

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
I			2283GC131	2283GD073	99.95	100.56	328.42	30	-0.0019	RCP		0.013	19.652	-17.677	-111.2%	Neg Slope	42	
I			2283GD073	2283GD072	100.56	100.61	31.96	36	-0.0016	RCP		0.013	21.125	-26.380	-80.1%	Neg Slope	42	
I			2284GD082	2283GD088	109.48	108	300.49	8	0.0049	VCP		0.014	2.256	0.787	286.5%	Yes	18	
I			2283GD088	2283GD087	108	105	226.71	8	0.0132	VCP		0.014	9.824	1.291	761.1%	Yes	18	
I			2283GD087	2283GD086	105	0	33.29	8	0.0060	VCP		0.014	10.458	0.866	1206.9%	Yes	21	
I			2283GD086	2283GD085	0	0	444.52	8	0.0060	VCP		0.014	11.615	0.866	1340.4%	Yes	22	
I			2283GD085	2283GD072	0	101.81	57.16	8	0.0060	VCP		0.014	11.763	0.866	1357.6%	Yes	22	
I			2283GD072	2283GD071	100.31	99.43	233.84	36	0.0038	RCP		0.013	35.396	40.916	86.5%			
I			2283GD071	2283GD068	99.43	100.59	121.11	36	-0.0096	RCP		0.013	36.406	-65.276	-55.8%	Neg Slope		
I			2283GD068	2283GD067	100.59	99.86	93.12	36	0.0078	RCP		0.013	73.861	59.053	125.1%	Yes	60	
I			2283GD067	2283GL006	100.06	100.95	61.65	36	-0.0144	RCP		0.013	75.100	-80.139	-93.7%	Neg Slope	60	
	8,702	23.6																
J			2284GD107	2284GD106	109.48	0	262.58	14	0.0068	VCP		0.014	3.836	4.129	92.9%			
J			2284GD106	2284GD105	0	107.16	76.33	18	0.0068	VCP		0.014	4.852	8.070	60.1%			
J			2284GD105	2284GD120	107.16	106.02	53.51	18	0.0213	VCP		0.014	4.997	14.237	35.1%			
J			2284GD120	2284GC148	106.02	106.15	28.03	18	-0.0046	VCP		0.014	5.073	-6.642	-76.4%	Neg Slope		
J			2284GC148	2284GC147	105.85	106.24	48.41	18	-0.0081	VCP		0.014	5.679	-8.755	-64.9%	Neg Slope		
J			2284GC147	2284GC121	106.34	106.12	22.43	18	0.0098	VCP		0.014	5.740	9.659	59.4%			
J			2284GC121	2284GC122	106.02	105.3	111.18	18	0.0065	VCP		0.014	7.725	7.849	98.4%			
J			2284GC122	2284GD123	105.3	105.34	57.21	18	-0.0007	VCP		0.014	7.880	-2.579	-305.6%	Neg Slope		
J			2284GD123	2284GD124	105.34	105.3	20.98	18	0.0019	VCP		0.014	7.937	4.259	186.4%	Yes	23	
J			2284GD115	2284GD124	105.3	104.57	198.75	12	0.0037	VCP		0.014	1.676	2.005	83.6%			
J			2284GD124	2284GD097	105.3	104.57	391.73	12	0.0019	VCP		0.014	10.676	1.428	747.5%	Yes	26	
J			2284GD099	2284GD097	102.89	103.29	189.86	24	-0.0021	CMP		0.024	1.579	-5.624	-28.1%	Neg Slope		
J			2284GD097	2284GC140	103.29	0	32.47	24	0.0000	CMP		0.024	13.347	0.759	1757.5%	Yes	71	
J			2284GC140	2284GC139	0	0	63.61	24	0.0000	CMP		0.024	13.520	0.759	1780.3%	Yes	71	
J			2284GC139	2284GC138	0	0	68.79	24	0.0000	CMP		0.024	13.706	0.759	1804.8%	Yes	72	
J			2284GC138	2284GD096	0	103.28	95.54	18	0.0000	CMP		0.024	13.965	0.353	3960.4%	Yes	72	
J			2284GD096	2284GD095	102.88	102.2	115.80	18	0.0059	CMP		0.024	14.280	4.360	327.5%	Yes	29	
J			2284GD095	2284GD094	102.2	100.54	230.52	24	0.0072	CMP		0.024	15.475	10.398	148.8%	Yes	28	
J			2284GD094	2284GD089	100.54	99.93	251.71	24	0.0024	CMP		0.024	16.678	6.032	276.5%	Yes	36	
J			2284GD092	2284GD091	99.27	0	91.23	18	-0.0019	VCP		0.014	1.961	-4.261	-46.0%	Neg Slope		
J			2284GD091	2284GD089	0	99.95	265.11	18	-0.0019	TC		0.013	3.292	-4.589	-71.7%	Neg Slope		109.18
J			2284GD089	2384GD038	99.93	100.94	163.96	24	-0.0062	CMP		0.024	14.702	-9.618	-152.9%	Neg Slope		

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
J			2284GD089	2384GD038	99.93	100.94	159.68	18	-0.0063	VCP		0.014	7.622	-7.758	-98.3%	Neg Slope		
J			2384GD038	2384GD037	100.26	0	65.30	24	0.0050	VCP		0.014	23.445	14.835	158.0%	Yes	29	
J			2384GD037	2384GL007	0	99.65	57.00	24	0.0050	VCP		0.014	23.600	14.835	159.1%	Yes	29	
	4,026	6.1																
K			2284GC060	2284GD037	105.75	104.9	114.59	12	0.0074	VCP		0.014	1.744	2.849	61.2%			
K			2284GD037	2284GD036	104.9	0	73.90	18	0.0049	VCP		0.014	2.003	6.830	29.3%			
K			2284GD036	8439	0	0	118.64	18	0.0049	VCP		0.014	2.651	6.830	38.8%			
K			8439	2284GD032	0	103.61	70.53	18	0.0049	VCP		0.014	2.794	6.830	40.9%			
K			2284GD032	2284GD031	101.36	101.85	281.70	18	-0.0017	VCP		0.014	3.697	-4.068	-90.9%	Neg Slope		
K			2284GD031	2384GD032	101.48	98.19	350.63	24	0.0094	CMP		0.024	4.334	11.870	36.5%			
K			2384GD032	2384GD031	98.19	101.95	248.84	24	-0.0151	CMP		0.024	6.023	-15.063	-40.0%	Neg Slope		108.89
K			2384GD031	2384GL006	102.002	100.95	51.13	24	0.0206	CMP		0.024	6.100	17.578	34.7%			
	20,302	30.7																
L			2284GD064	2284GD063	123.8	122.5	289.57	12	0.0045	VCP		0.014	3.588	2.217	161.9%	Yes	15	
L			2284GD063	2284GD062	121.71	121.31	245.31	12	0.0016	TC		0.013	4.046	1.439	281.2%	Yes	18	
L			2284GD062	2284GD059	121.31	130.45	182.89	12	0.0016	TC		0.013	4.323	1.439	300.5%	Yes	19	
L			2284GD059	2284GD057	120.35	0	140.88	12	0.0016	VCP		0.014	5.292	1.336	396.1%	Yes	21	
L			2284GD057	2284GD056	0	0	155.10	10	0.0342	VCP		0.014	7.238	3.764	192.3%	Yes	13	
L			2284GD056	2284GC075	0	127.68	127.12	14	0.0342	CMP		0.024	7.430	5.385	138.0%	Yes	16	
L			2284GC075	2284GD055	127.68	114.01	210.24	14	0.0650	CMP		0.024	8.389	7.423	113.0%	Yes	15	
L			2284GD055	2284GD054	114.01	113.56	131.28	18	0.0034	VCP		0.014	8.588	5.711	150.4%	Yes	21	
L			2284GD054	2284GD053	113.56	112.28	181.76	18	0.0070	VCP		0.014	8.863	8.185	108.3%	Yes	19	
L			2284GD053	2284GD043	112.28	111.17	220.41	18	0.0050	VCP		0.014	9.887	6.922	142.8%	Yes	21	
L			2284GD046	2284GD045	137	128.18	230.57	18	0.0383	TC		0.013	3.317	20.545	16.1%			
L			2284GD045	2284GD043	128.18	123.87	106.64	18	0.0404	TC		0.013	3.478	21.118	16.5%			
L			2284GD043	2284GD042	114.67	113.38	53.43	24	0.0241	CMP		0.024	6.814	19.039	35.8%			
L			2284GD043	2284GD042	111.17	110.88	53.49	18	0.0054	TC		0.013	6.814	7.734	88.1%			
L			2284GD042	2284GD041	110.78	108.1	308.07	24	0.0087	TC		0.013	14.094	21.100	66.8%			
L			2284GD041	2284GD044	108.1	106.46	244.83	24	0.0067	CMP		0.024	14.487	10.029	144.5%	Yes	28	
L			2284GD044	2284GD019	106.46	0	247.50	24	0.0068	CMP		0.024	14.879	10.110	147.2%	Yes	28	
L			2284GD019	2284GD018	0	0	14.98	24	0.0068	CMP		0.024	18.271	10.110	180.7%	Yes	30	
L			2284GD018	2284GD015	0	104.5	25.49	24	0.0068	CMP		0.024	18.309	10.110	181.1%	Yes	30	
L			2284GD015	2284GD014	104.5	0	39.32	24	0.0022	RCP		0.013	19.097	10.665	179.1%	Yes	30	

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
L			2284GD014	2284GD012	0	104.34	32.67	24	0.0022	RCP		0.013	20.100	10.665	188.5%	Yes	31	
L			2284GD012	5019	104.34	0	74.08	24	0.0005	RCP		0.013	20.213	4.971	406.6%	Yes	41	
L			5019	2284GD009	0	0	127.52	24	0.0005	RCP		0.013	20.453	4.971	411.4%	Yes	41	
L			2284GD009	2384GD027	0	104.1	295.37	27	0.0005	RCP		0.013	21.916	6.806	322.0%	Yes	42	
L			2384GD027	2384GD025	104.1	0	147.65	33	0.0026	RCP		0.013	22.649	27.107	83.6%			
L			2384GD025	2384GD021	0	102.94	293.89	33	0.0026	RCP		0.013	23.502	27.107	86.7%			
L			2384GD021	2384GD014	102.94	102.74	87.64	33	0.0023	RCP		0.013	24.583	25.264	97.3%			
L			2384GD010	2384GD009	108.8	106.32	221.50	10	0.0112	VCP		0.014	1.719	2.153	79.9%			
L			2384GD009	4556	106.32	0	68.09	10	0.0240	VCP		0.014	2.129	3.154	67.5%			
L			4556	2384GD007	0	102.54	89.22	10	0.0240	VCP		0.014	2.290	3.154	72.6%			
L			2384GD007	2384GD012	102.68	102.65	65.82	12	0.0005	VCP		0.014	2.390	0.706	338.4%	Yes	19	
L			2384GD012	2384GD013	103.79	102.79	185.38	12	0.0054	VCP		0.014	3.526	2.430	145.1%	Yes	14	
L			2384GD013	2384GD014	103.12	102.79	130.49	15	0.0025	VCP		0.014	3.913	3.016	129.7%	Yes	17	
L			2384GD014	2384GC040	103.46	0	85.80	33	0.0043	RCP		0.013	28.665	34.592	82.9%			
L			2384GC040	2384GD020	0	102.54	129.25	33	0.0043	RCP		0.013	28.861	34.592	83.4%			
L			2384GD020	2384GD018	102.54	102.29	94.36	33	0.0026	RCP		0.013	29.192	27.222	107.2%	Yes	34	
L			2384GD018	2384GD017	102.17	101.84	129.01	33	0.0026	RCP		0.013	29.482	26.748	110.2%	Yes	35	
L			2384GD017	2384GD016	101.84	100.69	130.73	33	0.0088	RCP		0.013	29.680	49.602	59.8%			
L			2384GD016	2384GD015	100.84	101.67	59.92	33	-0.0139	RCP		0.013	30.387	-62.243	-48.8%	Neg Slope		
L			2384GD015	2384GL005	101.67	101.73	38.92	33	-0.0015	RCP		0.013	30.700	-20.766	-147.8%	Neg Slope		
	8,501	39.8																
M			2285GD005	2285GC012	120.14	119.36	61.65	24	0.0127	RCP		0.013	9.895	25.447	38.9%			
M			2285GC012	2285GD004	119.36	116.06	129.36	24	0.0255	RCP		0.013	10.501	36.133	29.1%			
M			2285GD004	2385GD033	116.06	110.5	274.05	24	0.0203	RCP		0.013	11.784	32.223	36.6%			
M			2284GD004	2285GC011	126.53	117.04	235.46	12	0.0403	VCP		0.014	1.693	6.642	25.5%			
M			2285GC011	2285GC008	117.74	117.28	57.64	10	0.0080	VCP		0.014	1.962	1.818	108.0%	Yes	11	
M			2285GC008	4861	113.48	0	149.31	24	0.0148	RCP		0.013	2.804	27.527	10.2%			
M			4861	2385GD032	0	110.72	37.10	24	0.0148	RCP		0.013	3.199	27.527	11.6%			
M			2385GD032	2385GD033	110.47	110.5	87.14	24	-0.0003	RCP		0.013	3.993	-4.197	-95.1%	Neg Slope		
M			2385GD033	4487	110.37	0	163.28	24	0.0038	RCP		0.013	16.541	14.006	118.1%	Yes	26	
M			4487	2385GD029	0	109.68	16.73	24	0.0038	RCP		0.013	16.820	14.006	120.1%	Yes	26	
M			2385GD029	4491	0	0	38.84	24	0.0038	CMP		0.024	17.782	7.587	234.4%	Yes	34	
M			4491	4493	0	0	29.03	24	0.0038	CMP		0.024	17.987	7.587	237.1%	Yes	34	
M			4493	2385GD028	0	0	18.67	24	0.0038	CMP		0.024	18.224	7.587	240.2%	Yes	34	
M			2385GD028	2385GD021	0	0	56.98	30	0.0038	RCP		0.013	20.428	25.395	80.4%			

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
M			2385GD023	2385GD022	111.06	109.48	118.18	18	0.0134	CMP		0.024	3.875	6.579	58.9%			
M			2385GC067	2385GC066	116.25	0	21.65	18	0.0347	TC		0.013	5.389	19.555	27.6%			
M			2385GC066	2385GD022	0	109.28	179.47	18	0.0347	TC		0.013	6.229	19.555	31.9%			
M			2385GD022	2385GC059	109.03	108.6	57.95	18	0.0074	CMP		0.024	10.375	4.901	211.7%	Yes	24	
M			2385GC059	2385GD021	108.6	107.7	61.92	18	0.0145	CMP		0.024	10.665	6.860	155.5%	Yes	22	
M			2385GD021	2385GD020	107.5	106.95	85.27	30	0.0065	RCP		0.013	31.492	32.943	95.6%			
M			2385GD020	2385GD030	106.25	103.65	246.25	36	0.0106	CMP		0.024	32.645	37.123	87.9%			
M			2385GD030	2384GD003	103.65	104.76	52.89	36	-0.0210	CMP		0.024	37.914	-52.339	-72.4%	Neg Slope		
M			2384GD003	2384GC002	104.76	104.54	39.74	30	0.0055	RCP		0.013	38.214	30.519	125.2%	Yes	33	
M			2384GC002	2384GD002	104.54	103.93	69.62	30	0.0088	RCP		0.013	38.540	38.395	100.4%	Yes	31	
M			2384GD002	2384GD001	103.93	103.39	52.99	30	0.0102	RCP		0.013	38.788	41.406	93.7%			
M			2384GD001	2384GL001	102.63	103	34.67	30	-0.0107	CMP		0.024	39.800	-22.952	-173.4%	Neg Slope		
	2,007	22.5																
N			2386GD016	2386GC043	107.97	107.93	81.66	12	0.0005	TC		0.013	3.330	0.789	422.3%	Yes	21	
N			2386GC043	2385GC010	108.13	107.77	53.09	12	0.0068	TC		0.013	3.925	2.934	133.8%	Yes	14	
N			2385GC010	2385GD008	107.77	107.55	97.15	12	0.0023	TC		0.013	6.151	1.695	362.8%	Yes	20	
N			2385GD008	2385GD007	107.55	107.43	137.89	12	0.0009	TC		0.013	8.172	1.051	777.5%	Yes	26	
N			2385GD007	2385GD004	107.13	0	138.89	12	0.0263	TC		0.013	9.729	5.782	168.3%	Yes	**	
N			2385GD004	8699	0	0	47.23	24	0.0263	CMP		0.024	10.259	19.887	51.6%		**	
N			8699	2385GD105	0	100.71	57.61	24	0.0263	CMP		0.024	17.094	19.887	86.0%		**	
N			2385GD105	2385GD003	100.71	0	93.49	24	-0.0296	CMP		0.024	18.141	-21.091	-86.0%	Neg Slope	**	108.81
N			2385GD003	2385GD002	0	103.83	11.83	24	-0.0296	CMP		0.024	18.274	-21.091	-86.6%	Neg Slope	**	
N			2385GD002	2385GL001	103.83	0	171.58	24	0.0263	CMP		0.024	22.500	19.887	113.1%	Yes	**	108.73
	2,912	27.6																
O			2386GD014	2386GD013	104.29	0	128.84	36	0.0015	CMP		0.024	8.199	13.966	58.7%			
O			2386GD013	2386GD010	0	103.89	138.83	36	0.0015	CMP		0.024	9.515	13.966	68.1%			
O			2386GD010	2386GD005	103.89	102.77	274.40	36	0.0041	CMP		0.024	20.209	23.082	87.6%			
O			2386GD005	2386GD004	102.17	102.99	86.13	36	-0.0095	CMP		0.024	23.252	-35.252	-66.0%	Neg Slope	**	108.97
O			2386GD004	2386GC250	102.99	103.08	52.78	36	-0.0017	CMP		0.024	23.753	-14.920	-159.2%	Neg Slope	**	
O			2386GC250	2386GD003	102.68	103.82	89.89	36	-0.0127	CMP		0.024	24.605	-40.686	-60.5%	Neg Slope	**	109.28
O			2386GD003	2386GL001	103.82	0	148.96	36	0.0041	CMP		0.024	27.600	23.082	119.6%	Yes	**	
	1,938	14.3																
P			2486GC017	2486GD008	111.66	111.13	40.26	18	0.0132	VCP		0.014	2.175	11.191	19.4%			
P			2486GD008	2486GD007	111.41	111.37	53.84	18	0.0007	VCP		0.014	3.757	2.659	141.3%	Yes	21	

Basin	Tot. Pipe Length ft	Total Qst cfs	U/S Node Tag	D/S Node Tag	U/S Invert ft	D/S Invert ft	Pipe Segment Length ft	Pipe DIA in	Pipe Slope ft/ft	Pipe Mat'l	Box Dimen.	Pipe "n"	Qst in pipe cfs	*Qcap cfs	% Cap	Over Cap	Recm DIA in	U/S Rim Elev ft
P			2486GD007	2486GD006	111.37	111.17	30.24	18	0.0066	VCP		0.014	3.980	7.932	50.2%			
P			2486GD006	2486GD005	111.17	109.07	61.73	18	0.0340	VCP		0.014	4.435	17.991	24.7%			
P			2486GC021	4061	111.93	0	136.03	10	0.0066	VCP		0.014	1.837	1.655	111.0%	Yes	11	
P			4061	2486GD005	0	109.07	47.64	10	0.0066	VCP		0.014	2.188	1.655	132.3%	Yes	12	
P			2486GD010	4088	110.54	0	60.38	12	0.0034	VCP		0.014	0.445	1.926	23.1%			
P			4088	4071	0	110.54	60.38	12	0.0034	VCP		0.014	1.915	1.926	99.4%			
P			4071	2486GD009	110.54	109.88	74.05	12	0.0089	VCP		0.014	2.569	3.123	82.3%			
P			2486GD009	4078	109.88	0	62.95	12	0.0089	VCP		0.014	3.034	3.123	97.1%			
P			4078	2486GD005	0	109.07	67.95	12	0.0089	VCP		0.014	3.650	3.123	116.9%	Yes	13	
P			2486GD005	2486GD011	109.07	106.33	105.96	18	0.0259	VCP		0.014	11.056	15.685	70.5%			
P			2486GD011	8704	106.33	0	27.04	12	0.0412	VCP		0.014	11.255	6.717	167.6%	Yes	15	
P			8704	2486GD003	0	103.81	34.10	12	0.0412	VCP		0.014	12.816	6.717	190.8%	Yes	16	
P			2486GD003	2486GD004	103.81	0	60.81	24	0.0412	VCP		0.014	14.043	42.647	32.9%			109.03
P			2486GD004	2486GL008	0	0	34.83	24	0.0412	VCP		0.014	14.300	42.647	33.5%			

APPENDIX E

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APPENDIX E2

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