

**City of Pinole**

**Pinole/Hercules WPCP Project**

**Technical Memorandum 19**

**Plant Utilities and Yard Piping**

March 1, 2013

PRELIMINARY  
FOR REVIEW ONLY



Prepared under the responsible charge of

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## Contents

<b>Executive Summary</b> .....	<b>1</b>
Purpose .....	1
Background.....	1
Conclusions .....	1
<b>Introduction</b> .....	<b>2</b>
<b>Design Criteria</b> .....	<b>2</b>
<b>Process Yard Piping</b> .....	<b>2</b>
<b>Plant Water System</b> .....	<b>3</b>
<b>Storm Water Drainage System</b> .....	<b>5</b>
<b>Service Air System</b> .....	<b>5</b>
<b>Natural Gas System</b> .....	<b>5</b>
<b>Cost Estimate Summary</b> .....	<b>6</b>

## Figures

Figure 19-1. Yard Piping .....	4
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## Tables

Table 19- 1. Water Systems, Sources, and Points of Use.....	3
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# TM 19 PLANT UTILITIES AND YARD PIPING

*Pinole/Hercules WPCP Predesign Report*

*March 1, 2013*

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Prepared by: Malar Perinpanayagam, P.E.

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## Executive Summary

### Purpose

The purpose of this technical memorandum (TM) is to identify existing plant utilities, yard piping, and modification of utilities/yard piping due to proposed improvements at the Pinole/Hercules Water Pollution Control Plant (WPCP).

### Background

The proposed improvements to meet new National Pollutant Discharge Elimination System (NPDES) requirements to treat flows up to 20 million gallons per day (mgd) to secondary standards will involve new connections and extension to and from existing utilities including, but not limited to process yard piping, plant water, storm water drainage, service air and natural gas systems. The plant has four water systems: 1W, 2W, 3W and 4W; a combined storm water and process drain system which flows back to plant Headworks; service air systems; and natural gas system serving co-generation and the waste gas flare. The capacity of existing utility systems is unknown and shall be evaluated in final design of proposed improvements.

### Conclusions

- ◆ New connections shall be constructed to connect new processes to existing piping system.
- ◆ The plant storm water and process drain system shall be extended to the new Headworks.
- ◆ The plant water systems shall be extended to new process areas as needed.
- ◆ The service air shall be extended to the new solids handling and electrical buildings.
- ◆ The natural gas pipe shall be extended to the new waste gas flare location.
- ◆ Engineer's preliminary cost estimate for yard piping is approximately \$2,700,000.

## Introduction

The Pinole/Hercules WPCP is preparing a preliminary design for treatment plant upgrades that are required to meet the WPCP's new Regional Water Quality Control Board NPDES Permit No. CA0037796, issued on August 14, 2012. The permit requires secondary treatment for peak wet weather flows (PWWF) up to 20 mgd.

Major components of the plant upgrades include a new headworks, a new primary clarifier, expansion and retrofitting of aeration basins, two new secondary clarifiers, replacement of pumps at the effluent pump station, and a new solids handling building. The existing utilities and yard piping will be modified or extended to these new process areas to meet process requirements. This TM identifies the existing and required utilities and yard piping for the proposed improvements, and includes the following:

- ◆ Process and yard piping
- ◆ Plant water system (1W, 2W, 3W, 4W)
- ◆ Storm water and drain system
- ◆ Service air system
- ◆ Natural gas system

## Design Criteria

The following design criteria are used in the design of site piping:

- ◆ Buried pipes shall have minimum 3 feet of cover.
- ◆ Pipes with gravity flow shall be sloped a minimum of 1 percent.
- ◆ Pressurized pipes shall be sized for a velocity range between 4 and 6 feet per second.

## Process Yard Piping

The plant upgrades will require modification and new connections to and disconnection from existing yard piping. The changes to the yard piping are as shown on Figure 19-1 and as follows:

- ◆ New interceptor manholes and influent sewer pipes will be installed to divert plant influent to the new headworks. Existing influent sewers will be disconnected and abandoned in place.
- ◆ New 30-in influent pipe will be constructed from the new headworks to the primary clarifier distribution box.
- ◆ A new 30-in bypass pipe will be constructed from the new headworks to the primary effluent distribution box to bypass primary clarifiers when flow exceeds 12 mgd.

- ◆ A new primary influent and effluent pipe will be constructed to/from the new Primary Clarifier No.3.
- ◆ New mixed liquor pipes will be constructed from the new secondary clarifier distribution box to existing pipes to Secondary Clarifiers No. 3, 4, and 5.
- ◆ New mixed liquor pipes will be constructed from the new secondary clarifier distribution box to the new Secondary Clarifiers No. 1 and 2.
- ◆ New secondary effluent pipes will be constructed from the secondary clarifiers to the chlorine contact basin.
- ◆ New return activated sludge/waste activated sludge (RAS/WAS) pipes will be constructed to/from the primary and secondary clarifiers and from/to RAS/WAS distribution box and then to the solids handling facility.
- ◆ Existing 18-in process drain pipe will be extended from existing headworks to new headworks.

## Plant Water System

The plant has four water systems: 1W, 2W, 3W and 4W. Water systems 1W and 2W are supplied by East Bay Municipal Water District (EBMUD), and 3W and 4W are supplied from the plant. An existing backflow prevention system separates 1W and 2W water systems and prevents contaminated water from plant equipment from flowing back into the domestic supply in case pressure drops in the EBMUD system. A cross connection valve in the 4W line allows the 3W to be used in the 4W system when it is out of service.

The capacity of the existing water systems and future demand are unknown at predesign stage and shall be evaluated during detailed design. Sources of existing water systems and points of use are listed in Table 19-1.

*Table 19- 1. Water Systems, Sources, and Points of Use*

Water System	Type	Source	Points of Use
1W	Fresh water	EBMUD prior to the backflow prevention system	All domestic purposes such as emergency eyewash and showers, showers and sinks at the plant
2W	Potable water	EBMUD following the backflow prevention system	Centrifuges, chemical feed system, gravity thickener and gas handling system
3W	Plant effluent	Plant chlorine contact basins	RAS system, odor control, gravity thickener, gland seals on various pumps, and secondary clarifier for surface spray water
4W	Dechlorinated plant effluent	Effluent pumps	Dilution water in gravity thickener, recycle in dissolved air floatation expansion tank, fill water for hydro trucks, and washdown water



**KEY NOTES:**

- 1 CONSTRUCT NEW INTERCEPTOR MANHOLES AND INFLUENT SEWER PIPES. DISCONNECT AND ABANDON EXISTING INFLUENT SEWERS IN PLACE.
- 2 CONSTRUCT NEW 30" INFLUENT PIPE FROM NEW HEADWORKS TO PRIMARY CLARIFIER DISTRIBUTION BOX.
- 3 CONSTRUCT NEW 30" BYPASS PIPE FROM NEW HEADWORKS TO PRIMARY EFFLUENT DISTRIBUTION BOX.
- 4 CONSTRUCT NEW PRIMARY INFLUENT AND EFFLUENT PIPES TO AND FROM NEW PRIMARY CLARIFIER NUMBER 3.
- 5 CONNECT NEW MIXED LIQUOR PIPES FROM NEW SECONDARY CLARIFIER DISTRIBUTION BOX TO EXISTING PIPES TO SECONDARY CLARIFIER NUMBER 3, 4 AND 5.
- 6 CONNECT NEW MIXED LIQUOR PIPES FROM NEW SECONDARY CLARIFIER DISTRIBUTION BOX TO EXISTING PIPES TO SECONDARY CLARIFIER NUMBER 1 AND 2.
- 7 CONSTRUCT NEW SECONDARY EFFLUENT PIPES FROM SECONDARY CLARIFIERS TO CHLORINE CONTACT BASIN.
- 8 CONSTRUCT NEW RAS/WAS PIPES.
- 9 EXTEND DRAIN PIPE TO NEW HEADWORKS.
- 10 EXTEND EXISTING AND CONSTRUCT NEW LOW PRESSURE AIR LINES.

PARCEL 5b  
4958 or 483  
CONTRA COSTA COUNTY FLOOD CONTROL

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PINOLE/HERCULES WPCP PROJECT  
YARD PIPING

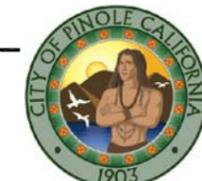
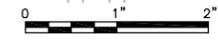
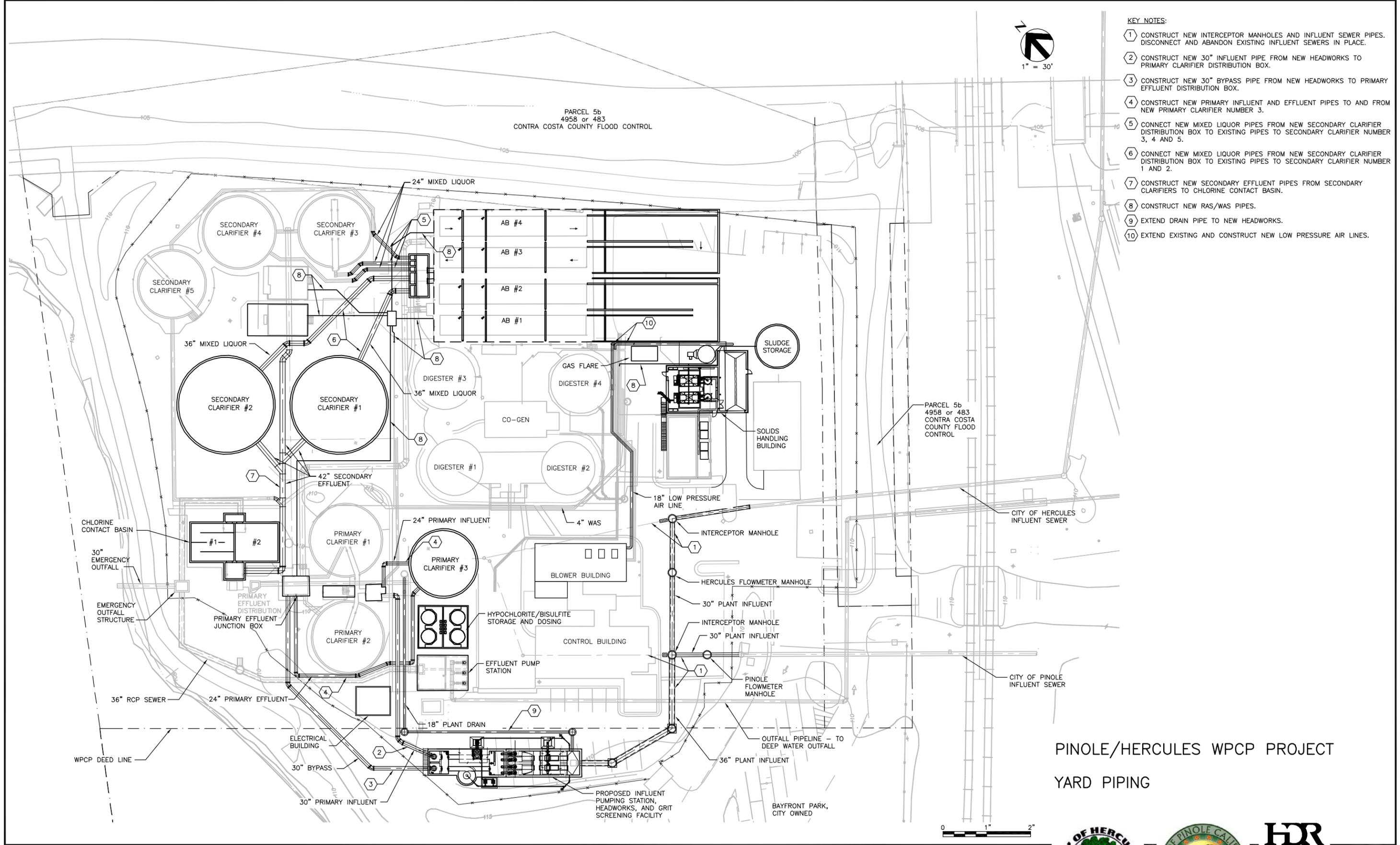


Figure 19-1

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The water system shall be extended and distributed to new process areas through new connections. Following are the potential locations for extension, new connection, or modification to the water system.

- ◆ New headworks – 4W to wash down grit removal and dumpster areas
- ◆ Hypochlorite/bisulfate storage and dosing area – 1W for emergency/eyewash shower
- ◆ New Primary Clarifier No. 3 – 3W
- ◆ Aeration Basin – 3W for surface spray water
- ◆ New secondary clarifiers – 3W for surface spray water
- ◆ Solids handling building – 1W for emergency eyewash and shower, 2W for chemical feed system, 3W for odor control, and 4W for washdown

## Storm Water Drainage System

The majority of the plant site is paved with asphalt or concrete, and graded to collect and direct storm water to catch basins. The storm water system is combined with the process drain system and routed back to the headworks for treatment along with the plant influent. Modifications to the existing storm water drainage system include the following:

- ◆ Repaving around new facilities to match existing site conditions and to direct storm water to catch basins
- ◆ Catch basins to be added in new process areas as needed

## Service Air System

The existing service air system shall remain same, and shall be extended to the new solids handling and electrical buildings. The capacity and demand of service air shall be evaluated during the final design.

## Natural Gas System

Natural gas is used in the waste gas flare and cogeneration system. The existing flare shall be relocated to facilitate construction of new Secondary Clarifier No. 1 and the 2½-in natural gas pipe shall be temporarily routed to the relocated flare. In addition, natural gas shall be used in heating, ventilation, and air conditioning (HVAC) equipment. The capacity of the existing system and the impact of the new demands shall be evaluated in final design.

## Cost Estimate Summary

The engineer's preliminary cost estimate for all site work and yard piping is approximately \$2,728,000 including approximately \$1,982,000 for yard piping and associated excavation, bedding, and backfilling. The cost breakdown for site work and yard piping associated with each process area is detailed in Divisions 2 and 15 of the respective process area TM cost estimates.

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