

*Prepared for the
Sacramento Regional County Sanitation District*

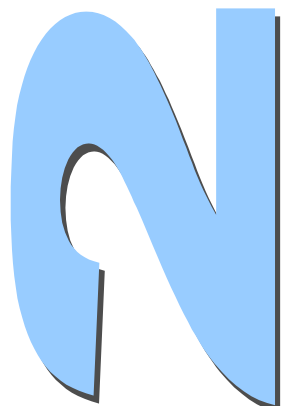
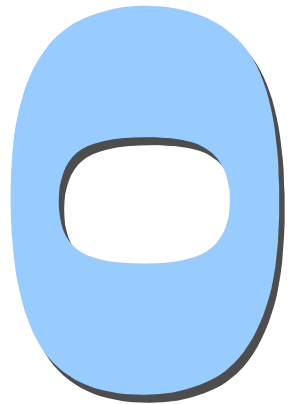
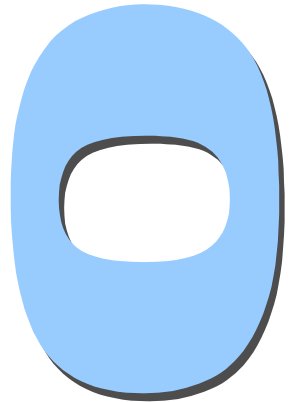
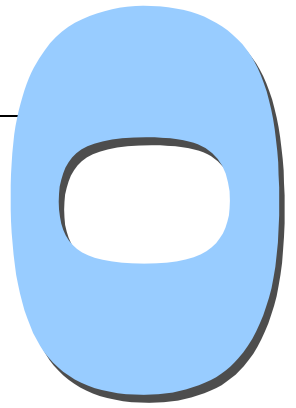
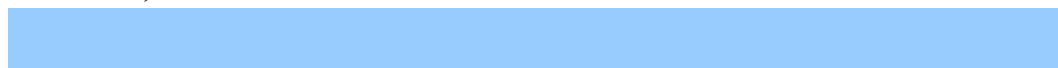
Interceptor System Master Plan 2000

Appendix D

Evaluation of Connection to SRWTP

Black & Veatch

October 5, 2000



SRCSD Interceptor System Master Plan 2000

<i>Table of Contents</i>	<i>Page</i>
1.0 Introduction	1
1.1 Influent Junction Structure and Headworks	1
1.2 Influent Pump Operations	2
1.3 Design Flows.....	3
1.4 Water Surface Elevations	3
1.5 Influent Junction Structure Alternatives	3
1.6 Conclusions	4

<i>List of Tables</i>	<i>Page</i>
Table 1	Page 2
Table 2	Page 3

1.0 Introduction

This memorandum constitutes the deliverable for Task 5.1.5 *Evaluate Connection to SRWTP*, for the Sacramento Regional County Sanitation District's (SRCSD) Interceptor System Master Plan 2000. Black & Veatch has performed the following subtasks:

- Reviewed the Influent Junction Structure and Headworks As-Built.
- Reviewed previous reports regarding influent pump operations.
- Evaluated flow-modeling results from the model runs undertaken as part of this Master Plan.
- Analyzed the impacts of influent pump operations on hydraulic grade lines and water surface elevations for the design flows at the Influent Junction Structure.
- Evaluated alternatives for modifying the Influent Junction structure capacity and grade to accommodate projected future flows.

The purpose of this Memorandum is to develop and recommend alternatives to accommodate all existing and proposed interceptors into the SRWTP. A hydraulic analysis of the alternatives was performed to ensure sufficient capacity in the existing or modified Influent Junction Structure (IJS) for the build-out peak wet weather flow.

1.1 Influent Junction Structure and Headworks

As-Built drawings and previous reports were reviewed to develop a hydraulic model of the IJS. There are currently two interceptors discharging into the IJS from the collection system. The 108" RCP City Interceptor brings flows from the City of Sacramento northwest of the treatment plant, and the 120" RCP Central Interceptor brings all flows from the south and northeast of the treatment plant. There are two unconnected openings in the IJS for future interceptors, both for 96" pipe maximum. The invert elevation of both the existing interceptors (City and Central) at the inlet to the IJS is 82.55 and the outlet elevation is 82.26. The outlet of the IJS is a 14-foot wide entrance to the roughly 863-foot long concrete box channel (influent conduit) leading to the headworks. There is also a 54" bypass pipe located in the IJS, which bypasses flows to an equalization basin. The invert elevation of this pipe is 94 feet (Sacramento Regional Wastewater Treatment Plant, February, 1976).

The influent conduit discharges to an expansion section of channel that is slightly trapezoidal in cross-section. This section expands from a 14-foot width to a 26-foot width over a distance of roughly 34 feet. Approximately 13 feet downstream of the transition, the channel is divided into three separate, 8-foot wide rectangular channels. These channels are each further divided into two 3.5-foot channels at varying lengths downstream, from 28 feet to 75 feet. These six 3.5-foot channels expand rapidly to 8-foot wide rectangular channels, each one making two 45-degree bends (except for bar screen channel 6, which makes a 90-degree bend) to pass through a bar screen. Bar screen channel 1 is the longest at roughly 75 feet and bar screen channel 6 is the shortest at roughly 30 feet to the pump inlet channel. The distance from the bar screen in each

channel to the entrance to the pump inlet channel is approximately 11 feet. The bar screen channel invert elevation is 77 feet at the entrance to the pump inlet channel. The pump inlet channel is approximately 96 feet long and 9 feet wide. The floor elevation of the channel is 68.33. Walls and slide gates separate the pump inlet channel so that each pump and bar screen channel can be isolated. The six influent pumps are aligned to draw from the pump inlet channel opposite each bar screen channel (Sacramento Regional Wastewater Treatment Plant, February, 1976).

In order to calculate hydraulic grade line (water surface elevation) for the IJS, a hydraulic profile was developed for the complete system. The hydraulic profile includes the IJS from the midpoint of the structure downstream to the pump inlet channel. However, Carollo Engineers published the downstream control point elevation of 91 feet at the end of the 14'x16' box culvert in the draft report, *Evaluation of Preliminary/Primary Treatment Alternatives*, July 2000. This control was ultimately used for the backwater calculations in order to maintain consistency between the Interceptor Master Plan and the Treatment Plant master planning efforts. Table 1 catalogues the stationing and pertinent data used for the calculations of water surface elevation in the IJS.

**Table 1
Hydraulic Profile**

Station (from the midpoint of the IJS)	Description	Channel Width (ft.)	Invert Elevation
0+00	End of 14'x16' Box channel	14	82.02
8+63	Begin 14'x16' Box channel	14	82.26
8+79	Influent Junction Structure at midpoint	33	82.40

1.2 Influent Pump Operations

The *Evaluation of Preliminary/Primary Treatment Alternatives* addresses influent pump operations and develops pump wet well elevations at various flow rates into the headworks.

Hydraulic conditions throughout the influent conduit vary with varying flows and outlet conditions. Although lowering the elevation at the pump inlet channel reduces the surcharging in the interceptors, it also introduces unstable flow conditions in the conduit and could increase the complexity of influent pump operations by requiring more pumps to be on at an earlier stage of a storm event.

1.3 Design Flows

The Hydroworks model has developed a flow of 628 mgd at the Influent Junction Structure for the build-out, peak dry weather flow (PDWF). The 2-year build-out design flow has been calculated at 851 mgd, the 10-year build-out design flow has been calculated at 916 mgd, and the 100-year peak flow is 962 mgd. Water surface profiles were developed for these flows.

1.4 Water Surface Elevations

A spreadsheet model was developed to calculate the backwater curve for the influent conduit from the outlet of the 14-foot box culvert to the midpoint of the Influent Junction Structure. Table 2 shows the results of this analysis.

**Table 2
High Flow Hydraulic Results**

Flow (mgd)	Beginning Elev.	Influent Junction Structure Elev. (end)
851	91	92.18
916	91	92.42
962	91	92.60

The elevations indicated above all exceed 91.55 feet, which is the top of the pipe for the 108” City Interceptor into the IJS. This means that for all design flows, the City Interceptor will be surcharged. The Central Interceptor will only be surcharged, slightly, in the 100-year event. In order to maintain the water surface elevation below 91.55 in the Influent Junction Structure, for design flows, we recommend limiting the elevation in the pump inlet channel and assuming operation of all six channels.

1.5 Influent Junction Structure Alternatives

The interceptor model was developed to account not only for pipe size and slope, but also to consider pipe depth in order to provide information for future project costs. There was concern expressed in the 1993 Master Plan that areas to the south of the treatment plant would be difficult to serve in the future unless the Influent Junction Structure were deepened or an additional pump station was built to deliver flows to the structure at its current elevation. Hydraulic analysis performed by the model indicates that a pump station will be required to serve the Laguna area and new developments to the south and east of the current service area. The existing influent junction structure will be able to accommodate flows from the new pump station.

1.6 Conclusions

The influent facilities that include the Influent Junction Structure to the Pump Inlet Channel appear to have adequate capacity for the ultimate flows delivered by the interceptor system for the 10-year storm event. However, the current pumps only have capacity for the ultimate 2-year event. The influent channel level should be controlled by pumping in order to maintain an elevation in the Influent Junction Structure below 92 feet for the design flow. This will still cause some surcharging in the lower portions of the upstream interceptors, but will not result in overflows.