

# Shoreline Sewage Lift Station Condition and Risk Assessment and Alternative Trunk Sewer Alignment and Constructability Study Project 14-32

January 9, 2015



Proposal by

**Schaaf & Wheeler**  
CONSULTING CIVIL ENGINEERS



## Project Approach and Scope

### Project Understanding

The City has conducted previous studies and assessments to determine the suitability of existing infrastructure serving future planned growth. The City is also in charge of maintaining existing infrastructure in order to provide a level of service acceptable to users and regulating agencies. As part of previous studies, the City has explored the ability to intercept gravity flow from the three major trunk sewers within the North Bayshore Area and bypassing the downstream Shoreline Sewage Lift Station. The goal of this project is twofold: first the City needs to fulfill the requirements of their waste discharge permit by creating a pump station O&M Plan/Program that assesses risk and sets a framework for future repair/replacement priorities; and second the City wishes to determine in greater detail, a cost-benefit analysis of eliminating/downsizing the existing lift station and constructing a gravity interceptor to convey sewage to the PARTWQCP collector main. The City realizes the aging lift station will require considerable repairs and rehabilitation in the coming years to maintain continued reliability; and at the same time understands the reduction in energy usage and mechanical maintenance if the gravity sewerage system can be reconfigured to gravity to the treatment plant and eliminates the need for pumping.

### Project Approach

Schaaf & Wheeler is proposing a parallel path for the two main project components in order to meet the City goal of an August completion deadline. Our engineers are well suited to perform both project components due to previous specialized experience. We have conducted a multitude of pump station assessments for multiple clients to meet prescribed requirements from the State Water Resources Control Board (both discharge permits and Cease-and-Desist Orders), US EPA, and legal settlements with environmental groups. Schaaf & Wheeler engineers were also involved with the development of the North Bayshore Precise Plan, are currently assisting the City on capital project planning tasks involving hydraulic computer modeling, as well as assisting CEQA consultants with utility impact analyses for new development projects within the City. Schaaf & Wheeler plans to use knowledge previously gained as momentum for the proposed project, and in-turn minimizing the time and effort associated with the initiation phase of the project. The following scope of work is formatted to follow the City's requested work items.

### Scope of Services

#### Part A: Basic Engineering Services

##### A: Shoreline Sewage Lift Station Condition and Risk Assessment

###### Task 1a – Project Management

Schaaf & Wheeler will manage sewage lift station evaluation project; which will include management of subconsultants, keeping close track of the schedule and budget, and updating the City on the overall progress of the project. Schaaf & Wheeler will request existing information from the City that may be useful during our inspections. The existing available information will be reviewed and utilized during the evaluations. Meeting time is separated from this task as requested in the request for proposal, but coordination throughout this project via email and telephone is included herein.

###### *Phase I – Preliminary Investigation*

###### Task 2a – Site Inspection and Assessment

Schaaf & Wheeler team members will inspect and complete pump station capacity tests at the station, including our structural engineering subconsultant Biggs Cardoza and Associates. Team members will require assistance from the City's operations and maintenance (O&M) staff to operate the station during capacity tests, and to access the confined space of the station.

Schaaf & Wheeler team members will perform pump station capacity tests at the pump station. The capacity will be determined by performing pump drawdown tests. Schaaf & Wheeler will then calculate the pump station's firm capacity (that is, capacity with the largest pump out of service) and compare it to the influent peak flow to determine if the station has adequate capacity and redundancy.

Schaaf & Wheeler will inspect the observable conditions of the pump station, and will assess the reliability of each station as required by recent orders issued by the State Water Resource Control Board (SWRCB).

The assessment of the station will also include the following:

- Lift station capacity (see capacity test description)
- Visually inspect pump station at accessible locations, and document the condition, type, material, and size.
- Calculation of time to overflow under Peak Dry Weather Flow conditions
- Assessment of the current electrical equipment and motor control center
- Assessment of SCADA control, monitoring, and alarms
- Evaluate the emergency/back up power generation and switching gear. The evaluation will include but not be limited to generator size, fuel storage, power switching equipment, and compliance with applicable regulations.
- Assessment of compliance with all applicable local, State and federal codes and regulations including but not limited to Building Codes, Fire Codes, and NEC
- Assessment of the structural integrity and seismic vulnerability of the pump station
- Assess pump station structures for compliance with safety regulations
- Review City prepared equipment documentation at the station as part of the asset register

All major equipment will be documented and photographed to minimize the need for additional site visits and to provide thorough detail.

#### **Task 3a – Establish Improvements**

Schaaf & Wheeler will compile information collected during inspections and analysis of available data to develop an asset register for all equipment at the station and in-turn develop recommended short-term and long-term improvements for each pump station. Short-term improvements will address pump station reliability and safety issues, and long-term improvements will be developed based on typical pump station rehabilitation and replacement schedules. Schaaf & Wheeler will develop estimates of probable construction costs for each of the identified improvements, and will recommend a pump station improvement schedule.

#### **Task 4a – Pump Station Operations and Maintenance Plan**

Schaaf & Wheeler will review the City's current pump station operation and maintenance procedures. The City's current procedures will be compared to industry standards and manufacturer recommendations. Schaaf & Wheeler will provide a recommended schedule of operation and maintenance procedures to adequately maintain the pump stations and to comply with SWRCB requirements. The recommendations will be based on industry standards and typical manufacturer recommendations. Once draft findings are complete, Schaaf & Wheeler will present City engineering and O&M staff the results of our field assessment.

### ***Phase II – Study and Findings***

#### **Task 5a – Report Preparation**

Schaaf & Wheeler will prepare a written report documenting the assessments, findings, and recommendations which will be submitted to the City at the conclusion of the evaluation. One (1) draft report will be submitted to the City for review and comment. Once all comments have been addressed a final report will be submitted. Review meetings have been accounted for elsewhere in our scope. The report is intended to satisfy the requirements of the City's 2014 SSMP audit and will contain:

- A summary that will contain the assessment and calculation procedures, tables of identified pump station improvements, a priority ranking for each identified improvement, estimated construction costs, and a recommended schedule for completing the improvements.
- Details for the pump station summarizing major equipment, pumping capacity, alarm systems, estimated time to overflow, identified deficiencies, and risk assessment.
- Analysis of long-term operational and maintenance costs for the pump station
- Appendices containing the asset register and recommended initial inspection schedule

## **B: Alternative Trunk Sewer Alignment Analysis**

### **Task 1b – Project Management**

Schaaf & Wheeler will manage trunk sewer alignment analysis project; which will include management of subconsultants, keeping close track of the schedule and budget, and updating the City on the overall progress of the project. Schaaf & Wheeler will request existing information from the City that may be useful during our analysis. The existing available information will be reviewed and utilized during our investigation. Meeting time is separated from this task as requested in the request for proposal, but coordination throughout this project via email and telephone is included herein.

### ***Phase I – Preliminary Investigation***

#### **Task 2b – Gather, Review, Coordinate Background Information**

Schaaf & Wheeler engineers will meet with City staff to gather background information and set project goals. Our engineers will take this opportunity to also conduct a preliminary field visit to get a feel for the landscape and setting of the project area and identify any constraints and presence of major infrastructure. Team members already have a considerable wealth of data and knowledge of the area and wet utility systems from worked previously conducted as part of the North Bayshore Precise Plan and EIR effort, as well as General Plan Update investigation and model updating. As part of the work in this task, our surveying subconsultant (Keir & Wright) will collect property documents and information for the project area and our geotechnical subconsultant (Cornerstone) will collect historical USGS mapping as well as historical soil boring logs to better understand soil and groundwater conditions in the project area. Utility research will also be conducted during this time.

#### **Task 3b – Review Hydraulics - Model/NBPP/NASA/SSPS**

Schaaf & Wheeler engineers will review the hydraulic model and known land use changes will also be reviewed to identify potential impacts to system hydraulics from future changing land use and development.

#### **Task 4b – Prepare Findings for Presentation to City**

Schaaf & Wheeler will collect our findings and prepare several conceptual alternatives to present to the City for review and comment. We intend to have an overall commanding understanding of project constraints both spatially and hydraulically prior to the meeting with City staff in order to efficiently narrow the breadth of alternative alignment configurations for the detailed study.

### ***Phase II – Study and Findings***

#### **Task 5b – Conduct Alignment Study, Hydraulic Analysis and Field Work**

Based upon direction given by City staff in the review meeting at the end of Task 4b, our engineers will begin more detailed analysis of three alignment and system configuration alternatives. City provided GIS basemapping and utility maps will be used as a basis for the project's basemapping and plans. Additional utility information will be added from gather records.

Schaaf & Wheeler engineers will review the hydraulic model and analyze up to three project alternative configurations including gravity interceptor modifications and lift station modifications. The computer modeling will assist our engineers in determining conceptual sewer alignment alternative feasibility prior to more detailed layout analysis.

High-risk and critical utility infrastructure will be potholed along the selected preliminary alignments where utility location has the potential to conflict with the proposed improvements. A total of ten (10) potholes are proposed as part of this scope as requested by the City to be performed by Exaro Technologies.

#### **Task 6b – Prepare Findings**

Schaaf & Wheeler will prepare our findings of the alternatives analysis to provide the City with a thorough comparison of the three alternative configurations including advantages, disadvantages, constraints, risks, and benefits. Conceptual plans will be provided including plan and profile, existing utilities, existing and required rights-of-way or easements. Our subconsultant David J Powers will provide a CEQA checklist for each of the alignments that identifies potential project impacts. Potential construction methods will be discussed including suitable trenchless technologies (provided by our subconsultant Bennett Trenchless) based upon soil conditions identified during our earlier work. A project cost analysis will be prepared to allow the City to compare each alternative to each other as well as to maintaining the existing lift station as-is. Schaaf & Wheeler will present an implementation strategy for the preferred alternative to include timing with planned development in the area, as well as staging of projects if the City constructs the project in phases. One (1) draft report will be submitted to the City for review and comment. Once all comments have been addressed a final report will be submitted. Review meetings have been accounted for elsewhere in our scope.

### *Phase III – Engineering Drawings*

#### **Task 7b – Preliminary Drawings and Exhibits**

Schaaf & Wheeler will prepare preliminary project plans for the three preferred alternatives as discussed in Task 6b. Our engineers will also prepare color exhibits as part of the meetings with City staff that will be available for City use in future presentations.

#### **Part B: Client Meeting Services**

Schaaf & Wheeler is providing scope for a total of three (3) two-hour meetings and six (6) one-hour meetings with City staff. Meeting preparation and follow-up time is included in this scope.

#### **Optional Additional Services**

Schaaf & Wheeler is providing proposed fees for additional meeting time, report submittals, populating the pump station asset register, potholing, and surveying services. The additional meeting time is per-occurrence and is subdivided into a two-hour meeting and one-hour meeting. The additional report submittals is per iteration and is provided for both the pump station assessment and trunk alignment study. Populating the asset register effort is comprised of documenting equipment and components at the pump station. The additional potholing services includes one day of field work and typically includes two (2) potholes and patching of pavement. The additional field surveying services includes one day of field work (2-man crew) and office time for processing data collected.

### Project Cost

Schaaf & Wheeler Date: January 9, 2015		Schedule of Hours and Rates by Task											
		Schaaf & Wheeler				Schaaf & Wheeler Subtotal	Subconsultants						Subtask Cost w/ 5% Sub Markup
		Project Manager	Senior Engineer	Assistant Engineer	Designer		Trenchless Tech, Bennett Trenchless	Surveying, Kier & Wright	Structural, Biggs Cardoso & Assoc	Geotechnical, CamerstoneEarth Group	CEQA, David J Powers	Potholing, Exaro Technologies	
Hourly Rate		\$220	\$195	\$140	\$135								
<b>PART A: Basic Engineering Services</b>		<b>266</b>	<b>68</b>	<b>412</b>	<b>104</b>	<b>\$ 143,500</b>	<b>\$5,670</b>	<b>\$5,100</b>	<b>\$4,000</b>	<b>\$3,000</b>	<b>\$4,600</b>	<b>\$10,650</b>	<b>\$ 178,171</b>
<b>A. Sewage Lift Station Condition and Risk Assessment</b>		<b>74</b>	<b>68</b>	<b>100</b>	<b>0</b>	<b>\$ 43,540</b>	<b>\$0</b>	<b>\$0</b>	<b>\$4,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$ 47,740</b>
TASK 1a	Project Management	48				\$ 10,560							\$ 10,560
TASK 2a	Site Inspection and Assessment	4	8	8		\$ 3,560			\$4,000				\$ 7,760
TASK 3a	Establish Improvements	4	12	24		\$ 6,580							\$ 6,580
TASK 4a	Pump Station Operation and Maintenance Plan	4	16	24		\$ 7,360							\$ 7,360
TASK 5a	Report Preparation (2 Submittals)	14	32	44		\$ 15,480							\$ 15,480
<b>B. Alternative Trunk Sewer Alignment Study</b>		<b>192</b>	<b>0</b>	<b>312</b>	<b>104</b>	<b>\$ 99,960</b>	<b>\$5,670</b>	<b>\$5,100</b>	<b>\$0</b>	<b>\$3,000</b>	<b>\$4,600</b>	<b>\$10,650</b>	<b>\$ 130,431</b>
TASK 1b	Project Management	48				\$ 10,560							\$ 10,560
TASK 2b	Gather/Review/Coordinate Background Information	8		24		\$ 5,120		\$5,100		\$3,000			\$ 13,625
TASK 3b	Review Hydraulics - Model/NBPP/NASA/SSPS	12		16		\$ 4,880							\$ 4,880
TASK 4b	Prepare Findings for Presentation to City	16		40	8	\$ 10,200							\$ 10,200
TASK 5b	Conduct Alignment Study, Hydraulic Analysis and Field Work	40		96		\$ 22,240						\$10,650	\$ 33,423
TASK 6b	Prepare Findings / Report (2 Submittals)	36		72		\$ 18,000	\$5,670			\$4,600			\$ 28,784
TASK 7b	Preliminary Drawings and Exhibits (3 Alignments)	32		64	96	\$ 28,960							\$ 28,960
<b>PART B: Client Meeting Services</b>		<b>33</b>	<b>12</b>	<b>12</b>	<b>0</b>	<b>\$ 11,280</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$ 11,280</b>
	Two-Hour Meetings (Qty: 3)	15	6	6		\$ 5,310							
	One-Hour Meetings (Qty: 6)	18	6	6		\$ 5,970							
<b>TOTAL</b>		<b>299</b>	<b>80</b>	<b>424</b>	<b>104</b>	<b>\$ 154,780</b>	<b>\$5,670</b>	<b>\$5,100</b>	<b>\$4,000</b>	<b>\$3,000</b>	<b>\$4,600</b>	<b>\$10,650</b>	<b>\$ 189,451</b>
<b>Optional Additional Services</b>													
	Field Surveying (One Day)	2				\$ 440		\$4,000					\$ 4,640
	Potholing (One Day, 2 Potholes)	2				\$ 440						\$2,270	\$ 2,824
	Two-Hour Meeting	5	2	2		\$ 1,770							\$ 1,770
	One-Hour Meeting	3	1	1		\$ 995							\$ 995
	Additional Report Submittal Iteration (Task 5a)	4	8	10		\$ 3,840							\$ 3,840
	Additional Report Submittal Iteration (Task 6b)	12		30	16	\$ 9,000							\$ 9,000
	S&W Populates Asset Register (Log Equipment) (Task 2a)		16	24		\$ 6,480							\$ 6,480