Preferred Alternatives

Redwood Sanitary Sewer Service District

Josephine County, Oregon

City of Grants Pass Oregon 1887

JOSEPHINE COUNTY PUBLIC WORKS

Parametrix, Inc.

7. PREFERRED ALTERNATIVE

A description of Treatment Alternative 9B – South River Road is presented in this chapter. This description is divided into the following sections:

- Pump Station Design Criteria
- Force Main Design Criteria
- Related Issues
  - Demolition of the Redwood WWTP
  - Transfer of Redwood WWTP NPDES Permit
  - Easements
- Project Schedule

In addition, a more detailed pre-design level presentation of Alternative 9B is contained in Appendix J and includes a more detailed description of each of the above topics.

7.1 PUMP STATION DESIGN CRITERIA

For Alternative 9B, two pump stations would move the wastewater from the Redwood WWTP to the Grants Pass WRP. A pump station near the existing manhole RI-25 would receive interceptor flow from all sewers east of this pump station plus flow from a smaller pump station (RI-0) to be located at the existing Redwood WWTP.

7.1.1 RI-25 Pump Station

The flow analysis projections presented in Section 5 are the basis of design for the RI-25 pump station. The peak-day design flow would be 4.2 mgd for the year 2020 and the minimum design flow at current conditions would be 0.28 mgd. Because the flow projections cover 21 years of growth, phase construction was considered rather than building a pump station for year 2020 flows at this time. Based on these parameters, the new RI-25 pump station design criteria would be as follows:

- Peak Flow (Phase 2) 4.2 mgd
- Head Based on Dual 12-inch Mains 181 feet
- Peak Flow (Phase 1) 3.1 mgd
- Head Based on Dual 12-inch Mains 130 feet
- Minimum Flow (Existing) 0.28 mgd

Pump selection would be based on the ability to meet high-flow conditions. As indicated in Section 6.3, variable speed drive control is recommended for the pumps. With variable speed drives, the pumps can better match the incoming flow rate. This ensures two things: 1) the pumps will cycle on and off less often (thereby prolonging pump life), and 2) flow pumped to the Grants Pass WRP would be maintained at a fairly uniform flow rate. A uniform flow would make it easier to operate the Grants Pass WRP, particularly during high-flow conditions.

7.1.2 RI-0 Pump Station

Sewer flow generated west of RI-25 would flow through the existing interceptor to the current Redwood WWTP. At this plant, the existing influent pump station would be modified with new pumps. The capacity of these pumps would normally be based on available flow data. However, since there is no wastewater flow measurement data from this area, pump capacity is not yet finalized. The District is currently installing flow monitoring equipment downstream of manhole RI-25 and comparing it to Redwood WWTP influent flow to determine flow contribution between the two points. Accurate design criteria cannot be established until data is available later this year. For this report, however, flow estimates were made based on population and zoning. Design criteria for the RI-0 pump station are shown below:

- Peak flow (Phase 2) — 0.4 mgd
- Head based on one 6-inch main — 72 feet
- Peak flow (Phase 1) — 0.3 mgd
- Head based on one 6-inch main — 40 feet
- Minimum flow (existing) — 0.08 mgd

The existing pump station has two pumps in a dry-well-package-type pump station. The wet well for these pumps is manhole RI-0. A drawing of the existing pump station is included in Appendix K. Converting the existing pump station into a force main pump station would require new pumps, because the existing pumps are not suitable for the new flow and head requirements. The most cost-effective approach to meet the new conditions would be to retrofit the existing pump station and place two new submersible pumps into RI-0. Each pump would be rated for maximum flow. In an extremely high-flow situation, both pumps could then be operated if necessary.

7.2 FORCE MAIN DESIGN

Based on the pump station design criteria presented in the previous Section, the two proposed force main systems to accompany each pump station were evaluated. The criteria for each force main system are as follows:

- Provide a minimum scour velocity of 3.0 feet per second at low flow to minimize solids buildup in the pipeline.

- Reduce total force main hydraulic loss to under 200 feet (ideally 100 feet) at peak-design flow.

7.2.1 RI-25 Pump Station Force Main

The range of flows is predicted to vary from a minimum of 0.28 mgd to a maximum of 4.2 mgd. A force main diameter is selected based on the design velocity limits. For the range of flows anticipated, however, two pipelines would be needed to maintain the flow velocities within the recommended range and the head below 200 feet. As velocities increase, so does the pipeline pressure (head loss). There is an upper practical limit of 150 to 200 feet of head for solids-handling centrifugal pumps.

Based on these two key criteria, a dual force main system would be the best alternative. To provide capacity at peak flow, either a dual 12-inch-diameter force main system could be used or a 12- and 14-inch-diameter system.

A dual 12-inch-force-main system would meet the two key criteria plus have a cost advantage over the 12- and 14-inch-force-main system. Since the greater capacity provided by a 14-inch main would not be needed and the costs for this alternative is greater, it was not further considered.

Based on a minimum pump station RI-25 water surface elevation of 870 and a maximum pipe elevation at the pedestrian bridge of 920, the maximum static head for the system would be 50-feet. During peak flow, the dynamic head loss with both pipes in operation would be approximately 122 feet. Adding the static head loss and loss through fittings would give a total head requirement of approximately 182 feet. Few available wastewater pumps can meet these standards and pass 3-inch solids. For wastewater pumping, this is a relatively high head situation. Pumps that could meet this condition could potentially have problems with rags getting lodged in their 5-inch discharge piping. The best way to avoid this problem is to use Wemco Hidrostal pumps which are not prone to plugging.

For a more detailed summary of pipeline velocity and head loss calculations, refer to Appendix L.

7.2.2 RI-0 Pump Station Force Main

The smaller pump station to be located at the existing wastewater treatment plant would serve less than 15 percent of the existing service area. The maximum estimated flow capacity for year 2020 is 350 gpm. Three force-main sizes were considered for this design flow. Because the head loss created in a 5-inch force main would be in excess of 400 feet, this option was not further considered. An 8-inch force main would require approximately 64 feet of pumping head. The major drawback to this option would be reaching a scour velocity. Scour velocity would require a flow of 470 gpm. This high flow would adversely impact downstream pumping and treatment facilities.

Based on problems with the other alternatives, the 6-inch force main would be the best choice for this installation. A 6-inch force main would require almost 176 feet of pumping head. To provide future flexibility at a minimal increase in capital costs, variable speed drives would also be included with this alternative. The force main would be constructed in the existing interceptor sewer easement.

Bridge Crossing

The preferred alternative includes attaching one 14-inch force main to the proposed pedestrian bridge over the Rogue River. A preliminary drawing of the pedestrian bridge is included in Appendix K. The bridge would be the high point of the entire force main system. The pipe would be placed on one side of the bridge with air release valves located at the high points to release air when the pipe is being filled. To control odor, the air released would pass through carbon filters to scrub the air before it is released.

Interceptor Storage Capacity

The existing interceptor sewer that conveys wastewater from the District to the Redwood WWTP is already used occasionally during high flow events to equalize flow when the influent pump capacity is exceeded. The last 420 feet of interceptor before the Redwood WWTP is 27-inch-diameter pipe. The next 1,080 feet of interceptor is 24-inch pipe. If the last 1,500 feet of this interceptor pipe were used for flow equalization, there would be approximately 38,000 gallons of storage available at RI-0. Based on the projected peak-hour flows for the District, this would not be a significant volume of storage. Future flow conveyed through this pipe, however, will only come from a small portion of the District and this storage capacity could theoretically hold several hours of flow. Selection of the RI-0 pumps will be based on using this volume.

7.3 RELATED ISSUES

There are several issues related to the preferred alternative. Three of these issues are discussed in this Section.

Demolition of the Redwood WWTP

One relatively small cost that should be included with the preferred alternative is the cost of abandoning most of the facilities at the existing Redwood WWTP. The facilities that would be abandoned are:

- Influent pump station
- Headworks
- Aeration basin
- Clarifier
- Chlorine contact chambers
- Aerobic digester
- Paved area at compost facility

The compost building would be dismantled and relocated to a new compost facility planned by the City of Grants Pass.

Although most of the existing facilities would not be used with the preferred alternative, several of the facilities could be. The facilities that would be kept for use with the preferred alternative would include:

- Control building
- Blower/generator building
- Outfall pipeline

The control building would be used to provide a restroom and shower for maintenance staff. The blower/generator building would be used to house the motor control center and instrumentation and controls for the new pumps. The outfall would be used as an emergency outfall to the river in the event of a catastrophic pump station failure. None of the existing facilities will be used for wastewater storage.

Transfer of Redwood WWTP NPDES Permit

The existing Redwood WWTP's NPDES discharge permit includes an allocation for maximum lbs/day BOD and TSS loads to the Rogue River. Because wastewater treatment is being transferred to the Grants Pass WRP, this allocation should be transferred to the Grants Pass WRP. The existing NPDES permit for the Redwood WWTP includes wasteload BOD and TSS limits as shown in Table 7-1.

Table 7-1
Transfer of BOD and TSS Wasteload Capacity (lbs/day)

	Monthly Average	Maximum Week	Maximum Day
May 1 to October 31			
BOD	80	120	160
TSS	80	120	160
November 1 to April 31			
BOD	120	180	240
TSS	120	180	240

These discharge loads should be transferred by ODEQ to the Grants Pass WRP NPDES permit once the preferred alternative is operational. A request for a transfer of mass BOD which follows ODEQ administrative procedures will be made later by the City of Grants Pass.

Property Easements

Before force main final design begins, the final force main route would need to be established. Much of the proposed pipeline route lies within the existing gravity collection interceptor easement.

In general two types of easements are used:

- Permanent easements to house the utility. These allow staff access for operation and maintenance.
- Temporary (construction) easements to provide an area for the construction contractor to conduct work.

The existing (permanent) Redwood Intercepter easement is 20 feet wide. This easement is sufficient for the one force main between Redwood WWTP and RI-25; however, it is just barely sufficient for the anticipated dual force mains needed between RI-25 and the Grants Pass WRP.

For this reason, we evaluated three different approaches to the installation of dual force mains in this area.

A. Limit construction within the 20-foot existing easement. This is the least desirable approach because it will likely cost more money to limit the contractor's work space. There may be short sections of the project, however, that require this approach.

B. Provide a new 20-foot-wide temporary construction easement adjoining the existing permanent easement. This is the preferred approach.

C. Provide a new 10-foot-wide permanent easement to install the new pipelines, plus provide a new 20-foot-wide temporary construction easement adjoining the new permanent easement. This would provide the contractor with the most room to work and allow more room for future access. However, it would be the most costly to the District and disruptive to property owners; therefore, it was not evaluated further.

It was assumed that the existing 20-foot-wide easement cannot alone be used for construction of the new pipelines, and an additional 20-foot-wide temporary construction easement (Approach B) should be provided, where possible, to allow the contractor sufficient room to work, for receipt of deliveries, and for staging equipment and materials.

The cost of easements can be significant. The costs include not only compensation to the owner for the property, but also fees to engineers, surveyors, real estate negotiators, and attorneys to prepare and process needed paperwork.

7.4 PROJECT SCHEDULE

Based on the criteria presented in this section for the preferred alternative, a preliminary project schedule has been prepared and is shown in Figure 7-1. The main tasks included in the project schedule are as follows:

- Submit facility plan to ODEQ for approval
  Request additional SRF funding
- Engineering design
- ODEQ review and approval of design
- Advertise, review bids, and award construction contract
- Complete construction and startup force main

Based on this schedule, the earliest that the new pump stations and force mains could be put into operation would be mid-October 2000. This is also the projected completion date for the pedestrian bridge over the Rogue River.

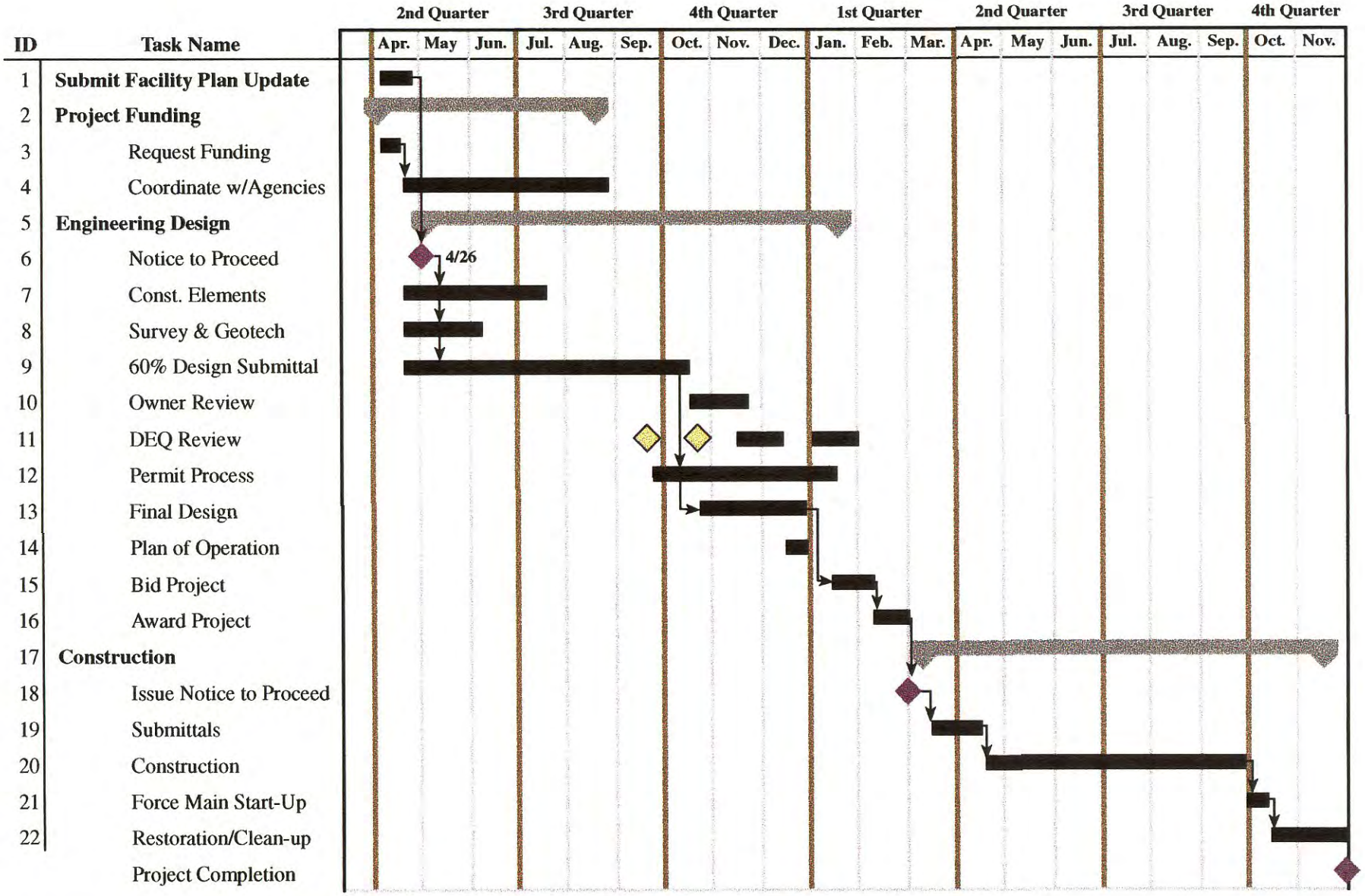
7.4.1 Plant Operation During Construction

The construction process of the preferred alternative should have little or no impact on operation of either the Redwood WWTP or Grants Pass WRP. This is because very little, if any, of the actual construction activities would occur at either site.

The only exception to this may be during two construction procedures:

- When the RI-0 pump station modifications are being built, a temporary pump station to bypass RI-0 will be required. This would consist of installing a temporary submersible pump into manhole RI-1 and using a temporary aboveground force main system to the existing headworks.

- When the dual force mains are connected to the Grants Pass WRP influent pump station, it may require a short-term shutdown of this station to make the final connection



Redwood Waste Water Treatment Plant
#27-2192-05 02/99

Summary · Milestone · Task · ODEQ Submittal of 60% Design

Figure 7-1
Project Implement Schedule