APPENDIX J

CONVEYANCE PREDESIGN REPORT

REDWOOD SANITARY SEWER SERVICE DISTRICT

CONVEYANCE PREDESIGN REPORT

Prepared for:

Redwood Sanitary Sewer Service District
Josephine County

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April 1999

CONVEYANCE PREDESIGN REPORT
CERTIFICATE OF ENGINEER

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

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1.0 INTRODUCTION

1.1 Background

The Redwood Sanitary Sewer Service District (RSSSD) of Josephine County owns and operates a wastewater treatment plant, located adjacent to the Rogue River and near the intersection of Leonard Road and Rounds Avenue. The treatment plant and collection system were built in 1977-1978 by the RSSD/County. These facilities collect, treat, and discharge wastewater to the Rogue River.

In June 1992, the RSSD/County executed an agreement with Parametrix, Inc. to prepare a Wastewater Facilities Plan. The action was prompted by a condition in the RSSD/County's NPDES permit for the treatment plant. In 1994, the Facilities Plan was completed. The Plan recommended that the plant be upgraded. The upgrade included the construction of several new facilities including a new secondary clarifier and new aeration basin. Also, the headworks was to be upgraded and the aeration basin converted to an aerobic digester.

As part of the Facilities Planning process, one of the alternatives investigated was to abandon the existing Redwood Wastewater Treatment Plant (RWWTP) and convey the wastewater to the City of Grants Pass Water Restoration Plant (GPWRP). This alternative was evaluated in a separate report (Parametrix, 1994). This concept was not considered feasible at that time due to its cost compared to the cost to upgrade/expand the RWWTP.

Recent actions have, however, changed the cost to upgrade/expand the RWWTP and it now appears that the preferred alternative may be to abandon the RWWTP and convey all wastewater to the GPWRP. This has been prompted by the demise of the RSSSD/County's on-site composting operations due to litigation. Because, if composting is no longer permitted at the Redwood plant site, the cost of off-site biosolids disposal reversed the original cost advantage of the RWWTP upgrade/expansion. Abandonment of the Redwood plant and conveyance of the wastewater to the GPWRP became the least cost alternative and should be implemented.

1.2 Purpose

The Wastewater Facilities Plan for the RSSSD was updated to include reevaluation of the cost of a conveyance alternative compared to the cost to upgrade/expand the existing plant. The conveyance alternative would be to abandon the existing RWWTP and provide a new wastewater conveyance system to the GPWRP. This system would generally consist of two pump stations and pipelines as originally identified in the 1994 report as Alternative 3D (Parametrix, 1994).

The purpose of the predesign part of the project is to conduct a more detailed study of this conveyance system alternative to identify predesign issues such as potential pump station locations and site layouts, the pipeline size and route, and method and location of a pipeline crossing of the Rogue River.

1.3 Scope

This predesign report addresses the following:

- Basis of Design.
  - Workshops and Design Decisions.
  - Pipeline Corridor.
- Design Criteria.
- Preliminary Conveyance Route(s).
- Preliminary Drawings of layouts, site locations, plans and sections for both Pump Stations.
- Preliminary List of Design Specifications.
- Preliminary List of Engineering Plan Sheets.
- Predesign Construction Cost Opinions.

2.0 BASIS OF DESIGN

2.1 Workshops and Design Decisions

In this section we will summarize the results of meetings and workshops held with staff from the Redwood SSSD and City of Grants Pass. Table 2-1 lists the dates of workshops and meetings and provides an overview of the subjects discussed.

Table 2-1 Workshops and Meetings

September 22, 1998 **Kickoff Meeting**	Reviewed project objectives, data needs, District and City resources, and identified selected design preferences.
October 8, 1998 **Corridor Alternative Workshop**	Conducted preliminary evaluation of numerous pipeline routes and selected three alternatives to evaluate in more detail.
October 29, 1998 **Workshop - Preliminary Costs for Conveyance**	Reviewed three primary alternatives and the three spin-offs, assumptions, and presented preliminary costs.
November 9, 1998 **Design Considerations Workshop**	Presented pump station and pipeline configuration options and preferences. Reviewed issues for easements, need for peak flow data to the RWWTP, and methods of crossing the Rogue River. Refined routes to three alternatives: (1) existing easements to Leonard Road and cross the river on the pedestrian bridge, (2) existing easements to South River Road and cross the river on the pedestrian bridge, and (3) existing easements to Lower River Road and cross the river with a subsurface boring.
December 3, 1998 **Alternative Selection Workshop - Conveyance or Treatment Plant Expansion**	RSSSD and City Staff collectively used selection criteria and matrix to evaluate the conveyance alternatives and treatment plant expansion options. Selected preferred alternative to use existing easements to Leonard Road and cross the river on the pedestrian bridge.
December 14, 1998 **Council Briefing**	Presented findings to City Council. Identified need to finalize financing approach before proceed with predesign.
February 25, 1999 **Predesign Workshop**	Recapped design decisions. Reviewed design flow, pipeline size, and easement requirements. Walked through specific issues for selected route. Presented preliminary design criteria for each pump station.

The meetings started with the assumption that wastewater would be conveyed from the Redwood SSSD wastewater treatment plant (RWWTP) to the Grants Pass Water Restoration Plant (GPWRP), generally picking up from where our report of 1994 ended.

Many design decisions and owner preferences resulted from the workshops and meetings in Table 2-1. A list of the most critical decisions are listed in Table 2-2.

Table 2-2 Design Decisions

1. Replace entire travel lane where pipeline is installed in paved roads. We have assumed this applies to Leonard Road and Schroeder Road. Side streets will be patched.
2. Provide a tracing system to locate the pipeline – tracing wire, paddles, tape in trench, and/or signs.
3. Temporary roads will be needed during winter to access easements.
4. Provide odor control measures at air relief valves (especially on bridge).
5. For pipelines, do all installations now – either single or dual. Do not consider installing a second parallel pipeline in the future.
6. At the RWWTP, provide submersible pump station (called Redwood Pump Station) and utilize existing control/blower building to house electrical gear and the generator set.
7. At the RI-24 pump station, provide conventional wet well/dry well configuration.
8. Pipeline material to be C900 PVC – use ductile iron for fittings and on the bridge.
9. On the southern approach to the pedestrian bridge, it is feasible to follow more direct but steeper slope.
10. The pipeline on the pedestrian bridge is to be designed by OBEC – odor control design is to be by Parametrix.
11. A single pipeline will be used from the pump station at the RWWTP to RI-24.
12. Dual pipelines will be used from the RI-24 pump station to the GPWRP (except over pedestrian bridge).
13. The pedestrian bridge can accommodate only one pipeline for the flows diverted from Redwood SSSD.
14. After interviewing property owners, the larger pump station will actually be located closer to manhole RI-24 (initially it was to be closer to RI-25).

2.2 Pipeline Corridor Alternatives

The alternative routes evaluated are shown in Figure 2-1 were as follows:

- Green Route – follows existing easements for the Redwood Interceptor (RI) to the GPWRP.
- Red Route – follows public streets from Leonard Road to Redwood Avenue.
- Blue Route – crosses the Rogue River north of the RWWTP and follows Lower River Road to the GPWRP.

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LEGEND

- GREEN – ALL EASEMENTS
- RED – ALL PUBLIC ROAD
- BLUE – LOWER RIVER ROAD
- EXISTING SEWER MAIN
- RI-24 GREEN–RED–GREEN – EASEMENTS TO SOUTH RIVER ROAD, LEONARD ROAD, THEN EASEMENTS
- RI-24 GREEN–BLUE – EASEMENTS TO LOWER RIVER ROAD
- AREA TO BE SERVED BY REDWOOD PUMP STATION

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Figure 2-1
Proposed Wastewater Conveyance Alternatives
Redwood WWTP to Grants Pass WRP

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The red route following entirely public roads was eliminated because of the traffic congestion and utilities on Redwood Avenue. In evaluating the other routes, it became apparent that they naturally broke into two sub-routes, with the break occurring at the proposed pump station location between manholes RI-24 and RI-25. This is a likely pump station site because two main sewer interceptors converge at RI-25, allowing the majority of the flow to be collected here and pumped east. The flow not collected here will still flow to the west to the RWWTP site and be pumped from the RWWTP to RI-24. The entire flow will be pumped from RI-24 to the GPWRP.

After workshops with staff, the following additional combinations were also added as shown in Figure 2-1:

- Green – Blue – existing easements to RI-24, then north across the river to Lower River Road to GPWRP.
- Green – Red – Green – existing easements to RI-24, on public roads to Leonard and Dowell, then existing easements to the GPWRP.

2.3 Final Pipeline Route

The final route was selected for the pipelines at the December 3, 1998 workshop: Red – Green – Red. This route uses existing easements from the RWWTP to RI-24, then follows South River Road and Leonard Road to Powell Road, then continues on existing easements to the pedestrian bridge. The final route is shown and discussed in greater detail in Section 3.

2.4 Design Flow

The foundation for design began with flow estimates, from which hydraulic calculations, pipeline diameter, and pump size were based. Maximum flows for the Redwood Pump Station (called the RI-0 pump station in the Facility Plan) were calculated using zoning and future population projections for the area to be served by this pump station (Figure 2-1). A conservative peaking factor was then used to estimate the peak hourly flow. Table 2-3 shows design flows for the Redwood pump station. The existing RWWTP flow meter is undersized and accurate peak flow data is not available. The Redwood SSSD staff are currently monitoring flows using a temporary weir – the results of this monitoring will be used to refine the size of the pumps for this pump station.

Table 2-3 Design Flow – Redwood Pump Station

Description	1998	Buildout
Total Acres Served	195	195
Maximum Density lots/acre	1.0	1.0
Maximum Number of Households	101	195
Persons per Household	2.42	2.42
Population	244	472
Winter Maximum Daily per capita flow	275	275
Buildout Winter Flows, gpd	67,100	129,800
Peak Factor – convert daily to hourly	3.0	3.0
Peak Hourly Flow, gpd	201,300	389,400
Peak Hourly Flow, gpm	140	**270**

Flow projections for the RI-24 pump station were calculated as discussed in the Redwood Wastewater Treatment Plant Facility Plan using a 3.1% growth rate and historical per capita flow rates. Table 2-4 shows the estimated flows for different seasons. The peak hourly flow was estimated based on applying a peaking factor to the average annual flow (Metcalf and Eddy, 1991).

Table 2-4 Design Flow – RI-24 Pump Station

	1998 Actual	2020 Estimated
Average Flow (mgd)		
Summer	0.49	0.88
Winter	0.63	1.22
Annual	0.56	1.05
Maximum Day (mgd)		
Summer	0.77	1.43
Winter	1.79	**3.08**
Minimum Day (mgd)	**0.28**	0.76
Peak Hour to Average Factor		4.0
Peak Hourly Flow, mgd	See text	4.2
Peak Hourly Flow. gpm		2,900

2.5 Construction and the Need for Property Easements

There are in general two types of easements:

- 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) easement for the Redwood Interceptor is 20 feet wide. This easement is sufficient to contain the one pipeline between RWWTP and RI-24 and is just sufficient for the anticipated dual pipelines needed between RI-24 and the GPWRP. The dual pipeline easement width requirements, are illustrated in Figure 2-2.

We reviewed the typical needs and considered three approaches for construction of the new pipelines: A, B, and C, as shown in Figure 2-3.

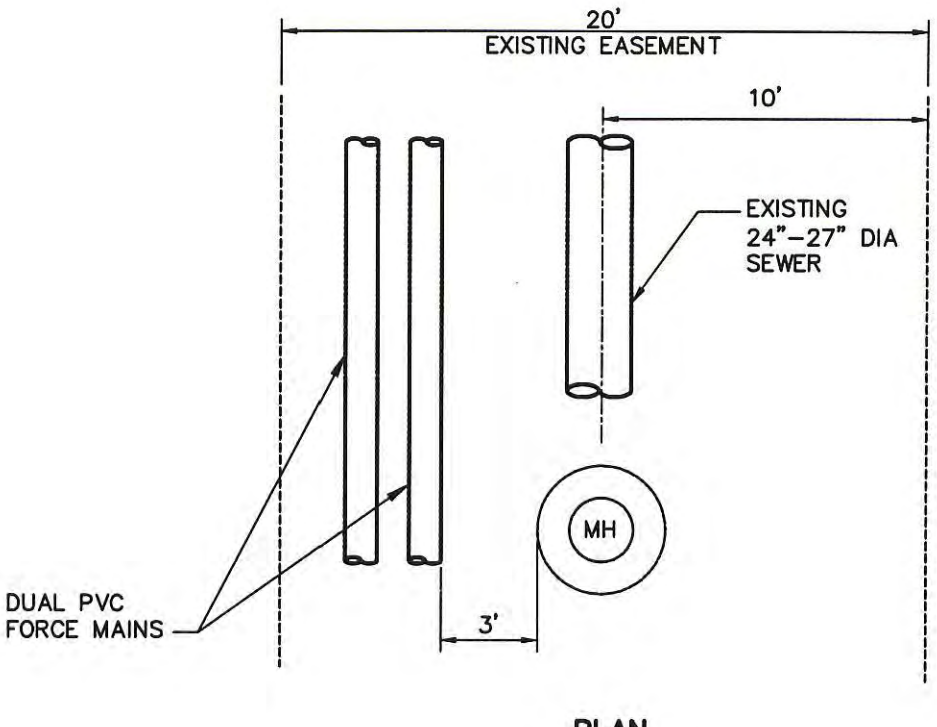
Approach A: Limit construction within the 20' existing easement. This is the least desirable because it will cost a great deal more money to so limit contractor's work space. There may be short sections of the project, however, that require this approach.

Approach B: Provide a new 20' wide temporary construction easement adjoining the existing permanent easement. This is the preferred alternative.

Approach C: Provide a new 10' wide permanent easement along the existing easement to install the new pipelines plus provide a new 20' wide temporary construction easement adjoining the new permanent easement. This would provide the contractor the most room to work and allow more room for future access. However, it would be the most costly to the Owner and disruptive to property owners and so 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) would be provided 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, appraisers, and attorneys to prepare and process needed paperwork.



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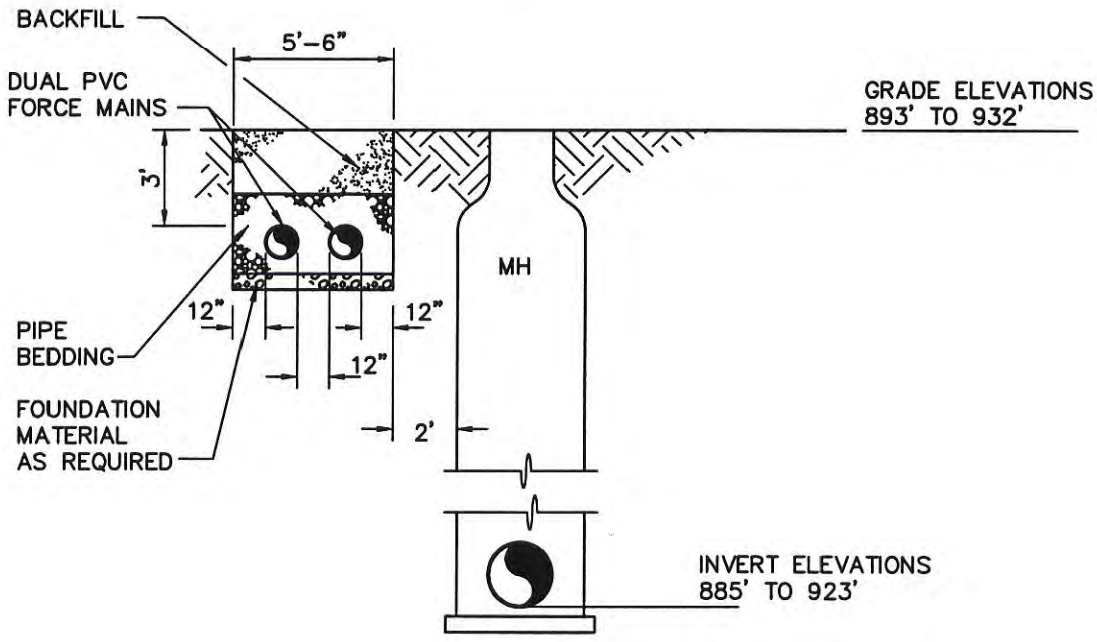

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Figure 2-2
Trench Width In Permanent Easement
REDWOOD SSSD
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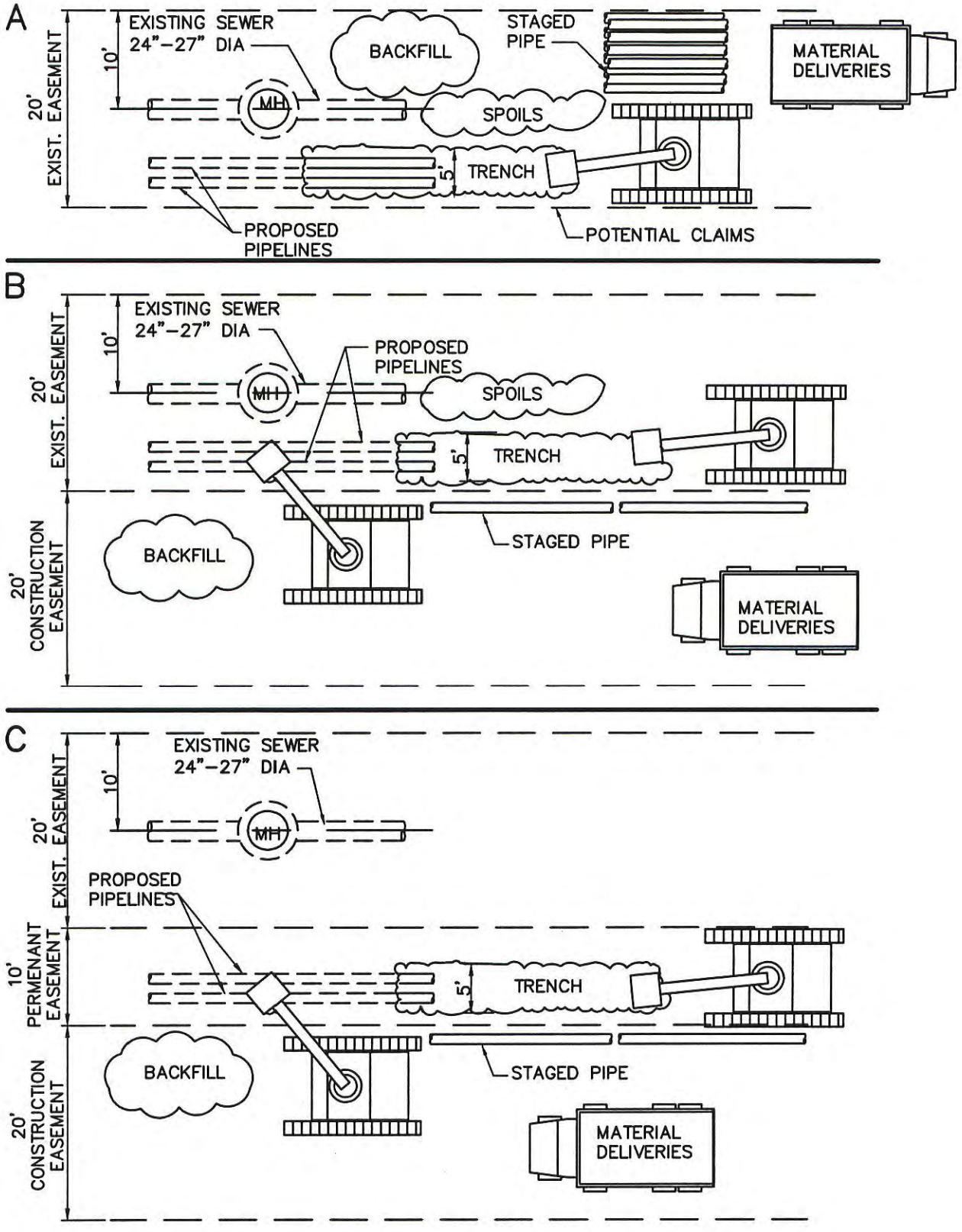

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Figure 2-3
Pipe Installation and Temporary Construction Easements
REDWOOD SSSD
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Three general types of properties are encountered on the proposed force main route: agricultural, residential, and waterfront. There are approximately 64 private properties to be crossed using the proposed force main route. The easement acquisition process is estimated to cost an average of $5,000 per property for paying the owner for the easement, plus the costs for preparing property descriptions, appraisals, negotiation, and legal processing. The estimated total is $320,000. This cost could be higher or lower, depending on the reaction of property owners to the easements and whether or not easements require legal fees and/or condemnation. Note that if property owners agree to the easement(s), they can be obtained in from 1 to 3 months. If condemnation is needed, the process takes from 3 to 6 months.

3.0 DESIGN CRITERIA

3.1 Introduction

The design criteria discussion is divided into a general discussion of elements common to both pump stations and specific discussions of each pump station and proposed force main alignment. As part of the predesign, a preliminary list of drawings and specifications were prepared for each pump station and force main - these are in Appendices A and B, respectively.

3.2 Elements Common to Both Pump Stations and Force Mains

3.2.1 Pipe, Fittings, Valves

Pump Station	Pipe – Ductile Iron Class 52 and 53. Fittings – Restrained ductile iron. Joints – Mechanical for buried service and flanged or grooved-end for exposed service. Isolation valves - Full port plug and resilient seated gate. Check valves - Full port swing check valves.
Force Main	Pipe – PVC C-900. Fittings - Restrained ductile iron. Joints – Push on and mechanical. Isolation valves - Resilient seated gate valves.

3.2.2 Odor Control

Odor control at the pump stations and along the force mains is an important issue because of the proximity to residential housing. Therefore, odor control will be addressed using three primary methods: chemical injection, carbon canisters, and design techniques. Chemical injection adds chemicals to the wastewater to oxidize the odor causing compounds. This is an important tool to be used on long pipelines. Carbon canisters will be used to treat the released air from air relief valves. The following summarizes the design techniques to be used to minimize odors:

- Minimize high points along the pipeline.
- Use variable speed pumps to maintain a more constant liquid level in the wet well.
- Eliminate cascading influent into the wet well.
- Minimize solids deposition in wet well.
- Minimize wet well venting by providing gasketed hatches.
- Providing parallel force mains to minimize detention time, improves scour velocities, and reduces solids build-up.
- Chemical injection ports will be provided at pump stations.
- Carbon canisters will be provided at all air release valves and wet wells.

3.2.3 Hydraulic Analysis

A steady-state hydraulic analysis was performed on the proposed systems to determine the optimum size of the force mains to GPWRP and for preliminary pump selection. Hydraulic grade lines were developed for each pump station and pipeline. The pipeline profile was estimated from existing sewer interceptor as-built plans. The total dynamic head was calculated for the maximum flow conditions. A 6-inch force main was assumed from Redwood to RI-24. Dual 12-inch force mains were assumed from RI-24 to the GPWRP. Based on projected flows over time, a better pairing for dual force mains may be a 10" and a 14" or a 12" and a 14". These combinations provide better velocity at low flows and/or less head loss at higher flows. Final determination will be made during the detailed design phase. Based on the various flow requirements, system head curves were also developed for each pipeline. Using these curves, preliminary pump sizes were selected. Hydraulic calculations, pump and system curves, and hydraulic grade lines are included in Appendix C. During design phase, these hydraulic calculations will be updated. A transient analysis will also be conducted to evaluate the impacts of pressure transients and modify the design if required to prevent problems.

3.3 Redwood Pump Station

The existing treatment plant pump station will be retrofitted for diversion from the RWWTP to RI-24. Submersible pumps will be installed in the existing wet well. The existing pump chamber was not used because it is too small for the larger pumps needed. To maintain treatment plant operations during pump station construction, two bypass configurations were initially considered: A temporary bypass pump installed in manhole RI-1 with temporary piping provided to the plant headworks. The advantage of this is the relative ease of installation of the bypass pumps. The disadvantage is the long length of discharge pipe required. The second choice is to install a new manhole to house the bypass pumps near the influent pump station. This alternative has the advantage of proximity to the influent pump station and headworks and shorter discharge piping. The disadvantage is the cost to install the temporary manhole and greater complexity of installing the manhole while maintaining plant flows. In any case, the construction contractor will be required to maintain the bypass, provide redundant pumps, and provide instrumentation and controls to monitor conditions and satisfactory operation.

Preliminary design layout for the Redwood pump station is in table shown in Figures 3-1 through 3-4. These illustrate the force main and temporary piping on the RWWTP site (Figure 3-1), plan and section views of the proposed pump station (Figures 3-2 and 3-3), and two alternative configurations to retrofit the existing blower building to accommodate the generator (Figure 3-4). It is potentially possible to re-use the existing RWWTP generator and this will be evaluated during design.

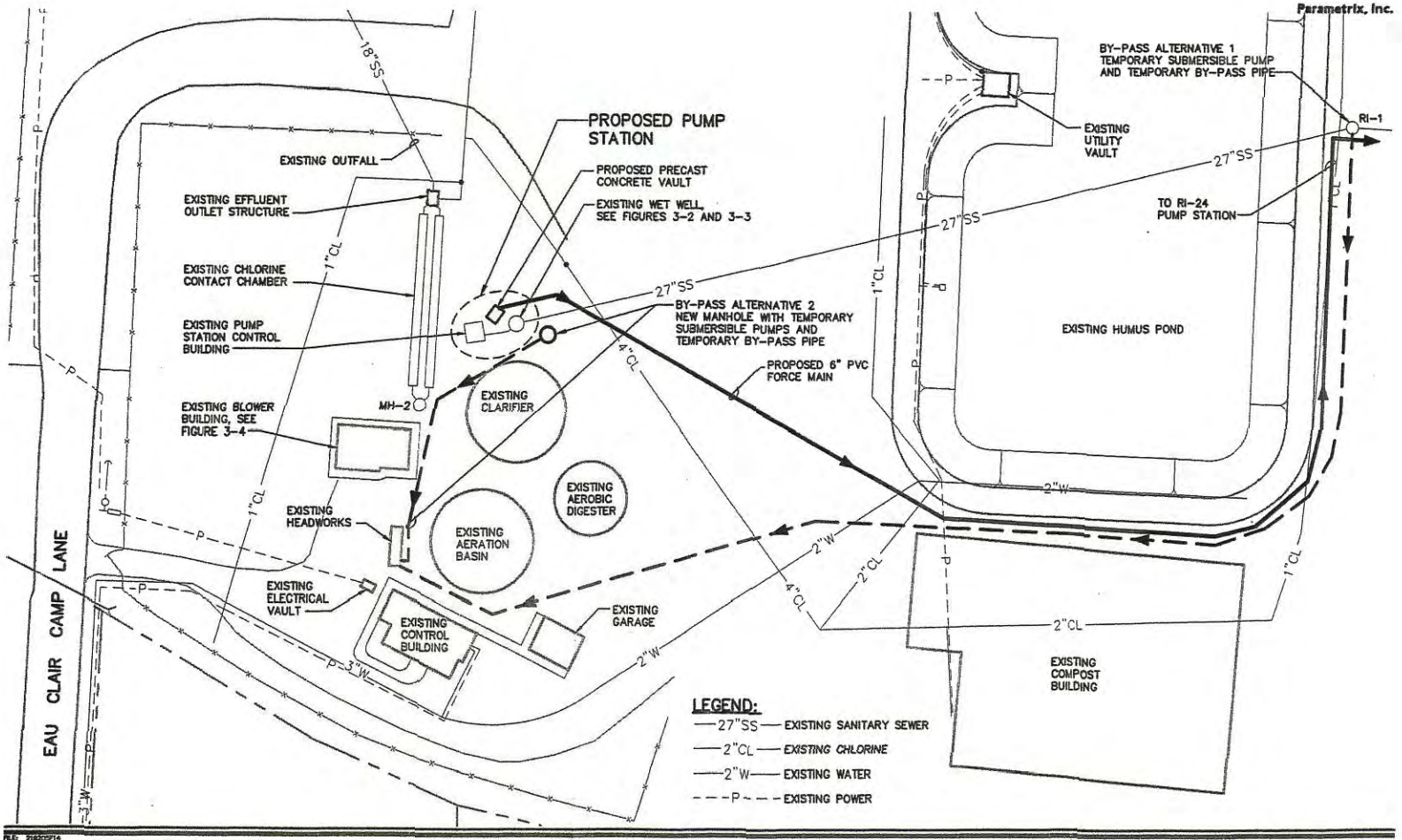

Figure 3-1
Redwood Pump Station Site Plan
REDWOOD SSSD
CONVEYANCE PRE DESIGN REPORT

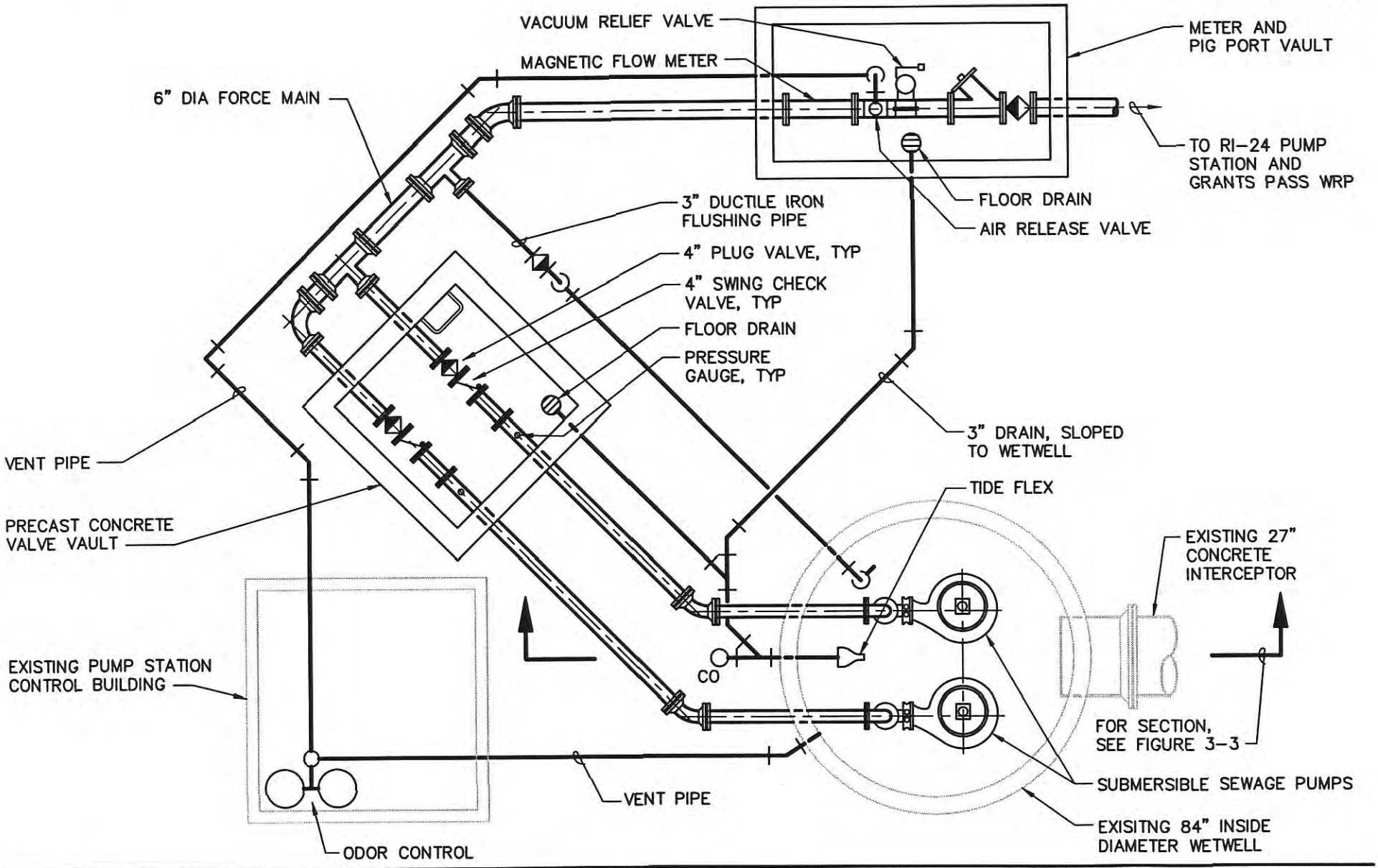

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Figure 3-2
Redwood Pump Station Plan
REDWOOD SSSD
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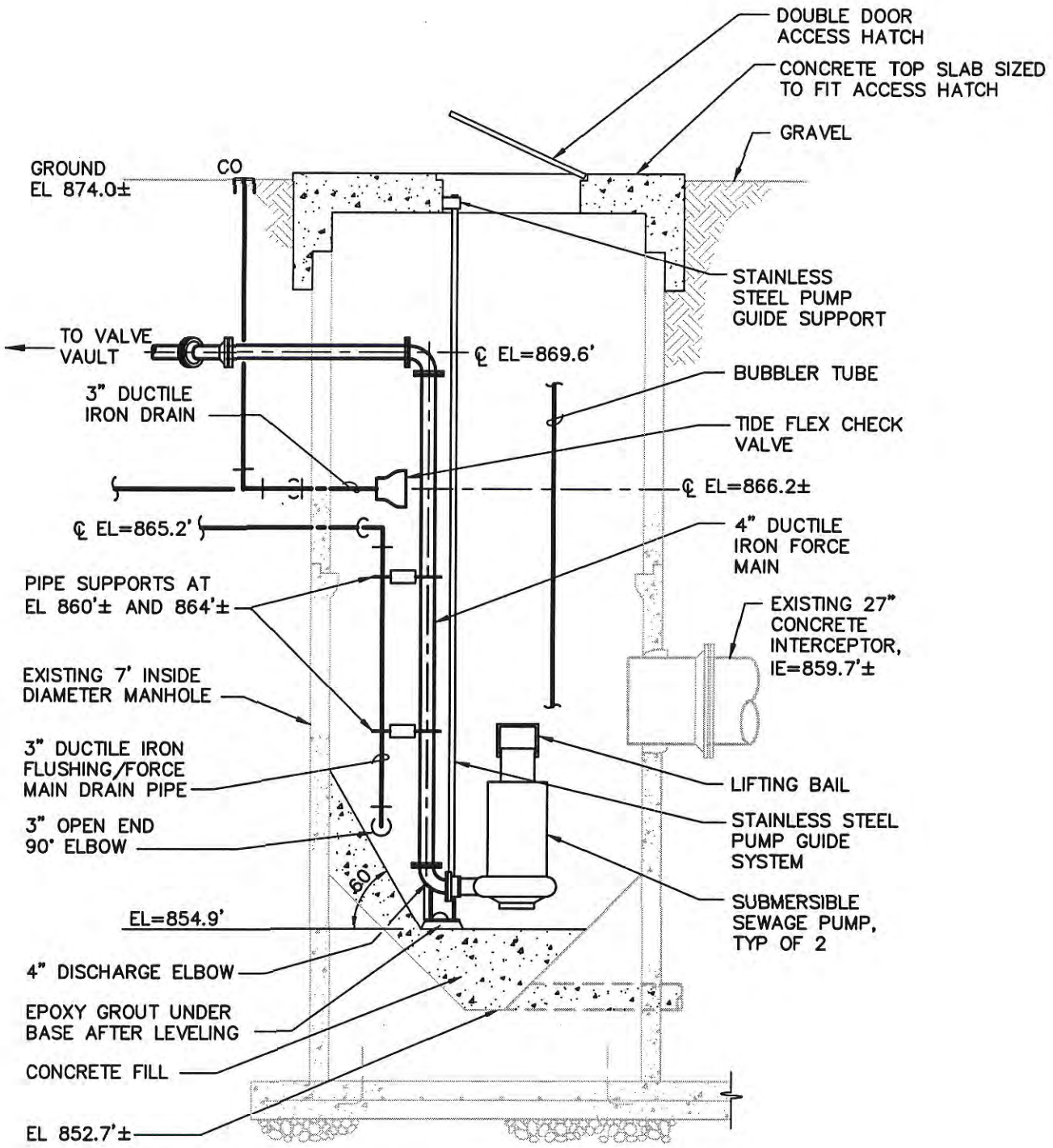

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Figure 3-3
Redwood Pump Station
Wet Well Section
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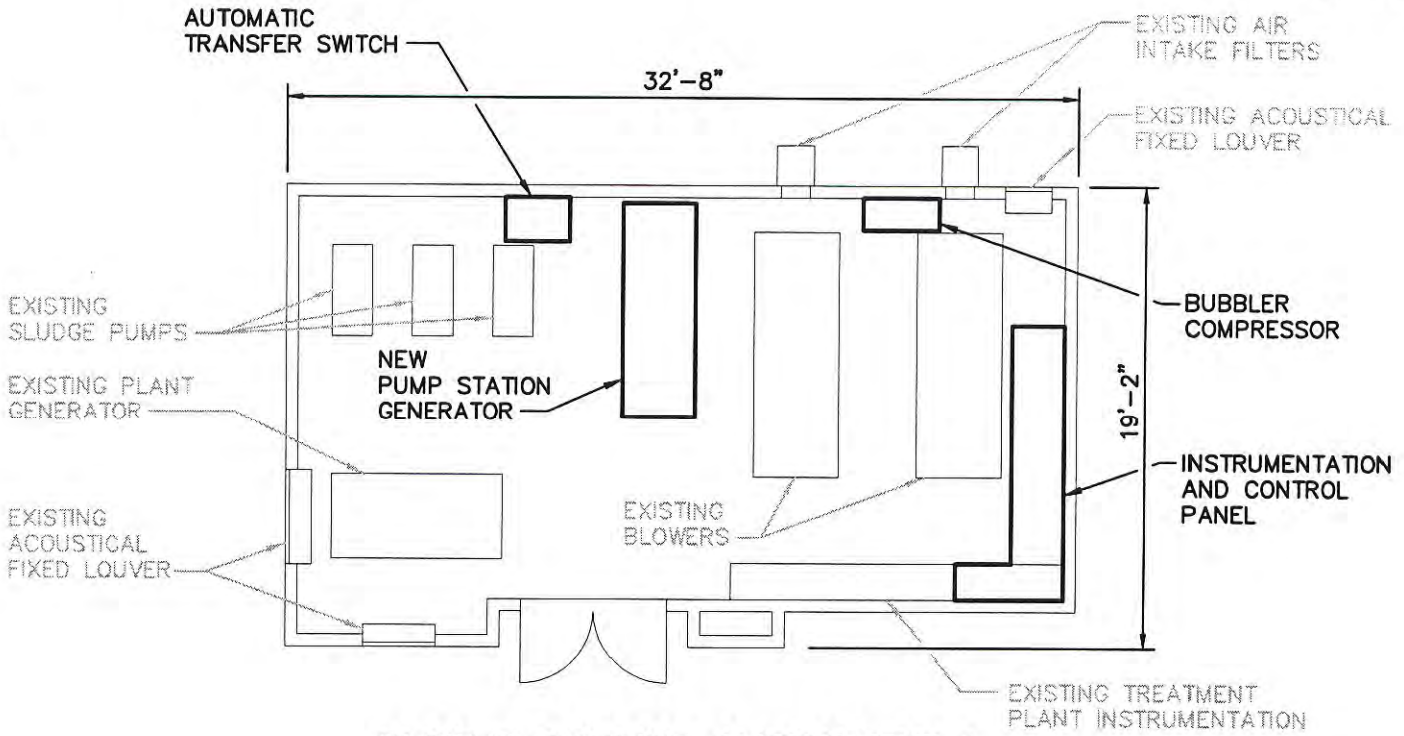
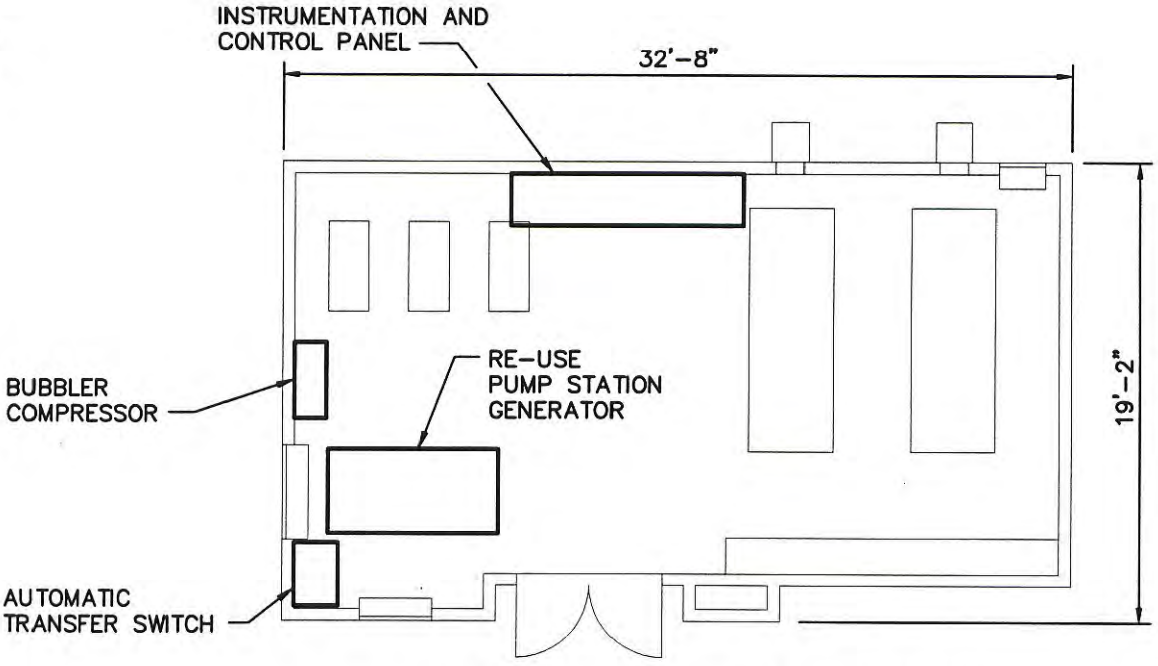
CONVEYANCE PRE DESIGN REPORT



BLOWER BUILDING ALTERNATIVE 1
NEW GENERATOR SET



BLOWER BUILDING ALTERNATIVE 2
REUSE EXISTING GENERATOR SET

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Figure 3-4
Blower Building Alternatives
REDWOOD SSSD
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A summary of proposed improvements to the Redwood Pump Station are listed below:

- Install two submersible pumps in the existing wet well to provide a firm capacity of 300 gpm to the RI-24 pump station, even if one pump is off-line.
- Provide variable frequency drive for each pump.
- Provide magnetic flow meter and "pigging" station.
- Utilize the existing blower building to house the emergency generator, variable frequency drives, and controls.

A six-inch force main will be installed from the Redwood pump station to the RI-24 pump station. The pipeline will parallel the existing Redwood Interceptor, using existing easements. Specifics on the route are covered later in this report.

Table 3-1 shows the preliminary design criteria for the Redwood Pump Station and force main, shown in the DEQ recommended format.

Table 3-1 Design Criteria – Redwood Pump Station and Force Main

Pump Station	
Location	Redwood SSSD WWTP
Pump Station Type	Diversion pump station with force main to RI-24
Pump Type	Duplex submersible non-clog
Drive Type	Variable frequency drives on each pump
Capacity of each Pump	200 gpm at 60' TDH to 300 gpm at 112' TDH *
Firm Capacity of Pump Station	0.29 to 0.43 mgd*
Pump HP	10-15 HP
Level Control	Bubbler with duplex compressor
Overflow Point	None (Rim of wet well)
Auxiliary Power Type	Diesel 25 KW generator
Location	Onsite, in building
Fuel Capacity (Approx.)	24 hours
Transfer Switch	Automatic
Telemetry	Telephone modem
Force Main Drain Valves	4" plug valves (backdrainage)
Wet Well Flushing	4" plug valves
EPA Reliability Class	I
Flow Meters	4" or 6" magnetic flow meter at pump station
Force Main	
Length	9,200 ft of 6" PVC
Profile	Ascending, stationed west to east
Air Release Valves	Estimated at 4
Vacuum Release Valves	Estimated at 5
Detention Time	46 minutes at 0.43 mgd
Odor / Sulfide Control	Wet well flushing pipe, flushing of force main, allowance for future chemical injection at pump station, carbon canisters at air release valves.

* Capacity to be confirmed after receipt of daily and hourly flow data from RSSSD.

3.4 RI-24 Pump Station

The RI-24 Pump Station is located at the junction of the two main county sewer interceptors near Darnielle Road (See figure 3-5). During initial discussions about providing a diversion pump station, the location near manhole RI-25 was identified. Later in the predesign phase, the pump station was moved nearer manhole RI-24 to better accommodate wishes of the property owner. The exact location of the RI-24 pump station needs to be determined. Factors to consider in siting it are the property owner's wishes, nearness to Darnielle Creek, and access road configuration.

The pump station building plan layout is shown in Figure 3-6. The floor plan provides the following features:

- Generator.
- Motor Control Center.
- Bathroom.
- Chemical Storage Room.

These features can be accommodated in numerous styles of architectures to blend with the surrounding residential housing. The material and color preferences should be decided as soon as possible. Some options are listed for discussion purposes in Table 3-2.

Table 3-2 Pump Station Building Construction Considerations

Type of structure
- CMU
- Stud frame

Siding
- Concrete block (smooth, split face, veneer)
- Wood (plywood, lap)
- Stucco

Natural Lighting
- Glass block
- Skylights
- Windows

Doors
- Personnel only (single, double)
- Roll up

Roof
- Metal (color)
- Wood shake
- Composition
- Tile

Security
- Fencing
- Alarm

The pump station will have three variable speed vertical non-clog dry pit pumps with extended shafts to the motors at an upper level. The pumps will be sized and controlled to cover the range of expected raw sewage flows while minimizing sewage detention in the wet well. Preliminary design criteria for the RI-24 pump station is listed in Table 3-3.

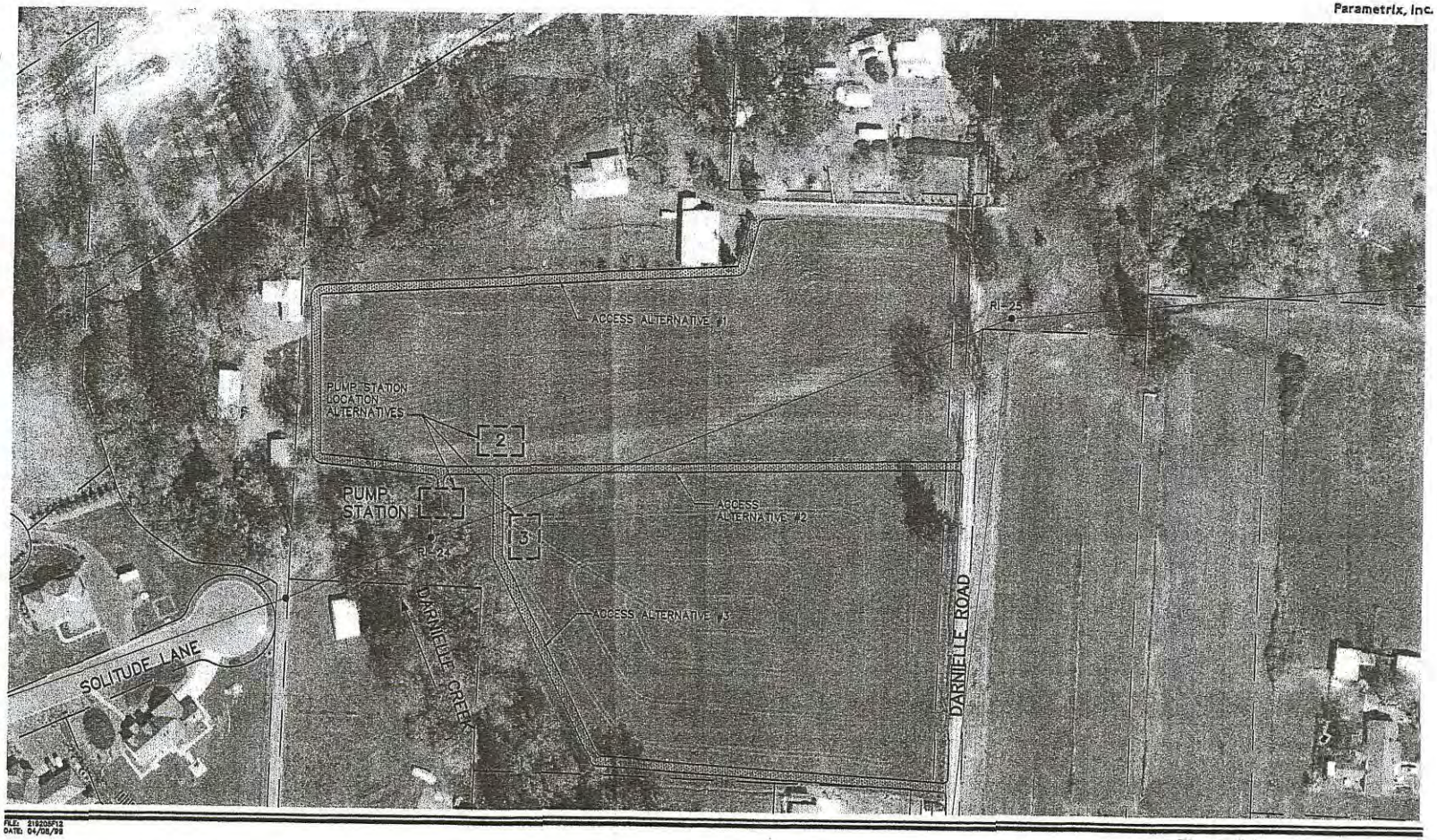

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Figure 3-5
RI-24 Pump Station Site Plan and Access Alternatives
REDWOOD SSSD
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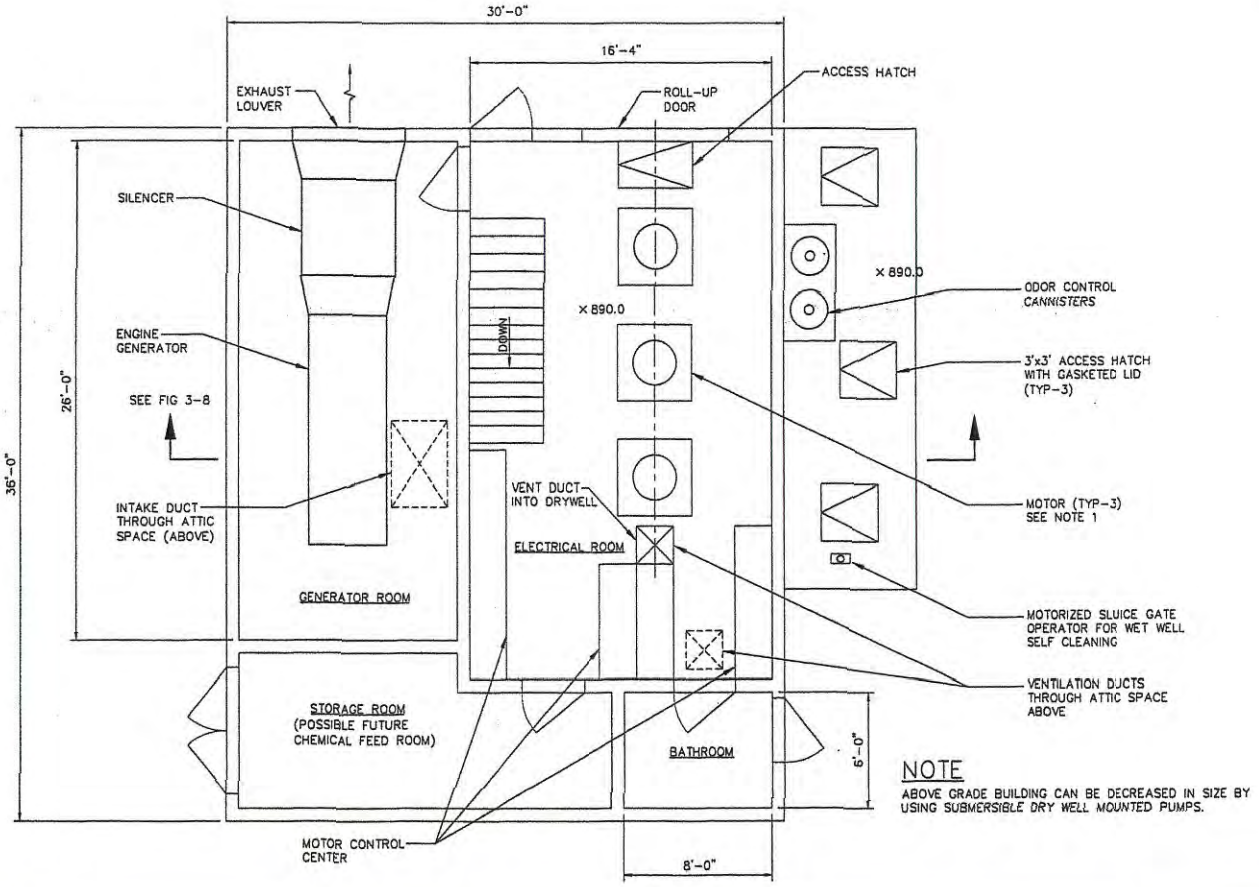

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Figure 3-6
RI-24 Pump Station
Building Plan (at Grade)
REDWOOD SSSD
CONVEYANCE PREDESIGN REPORT

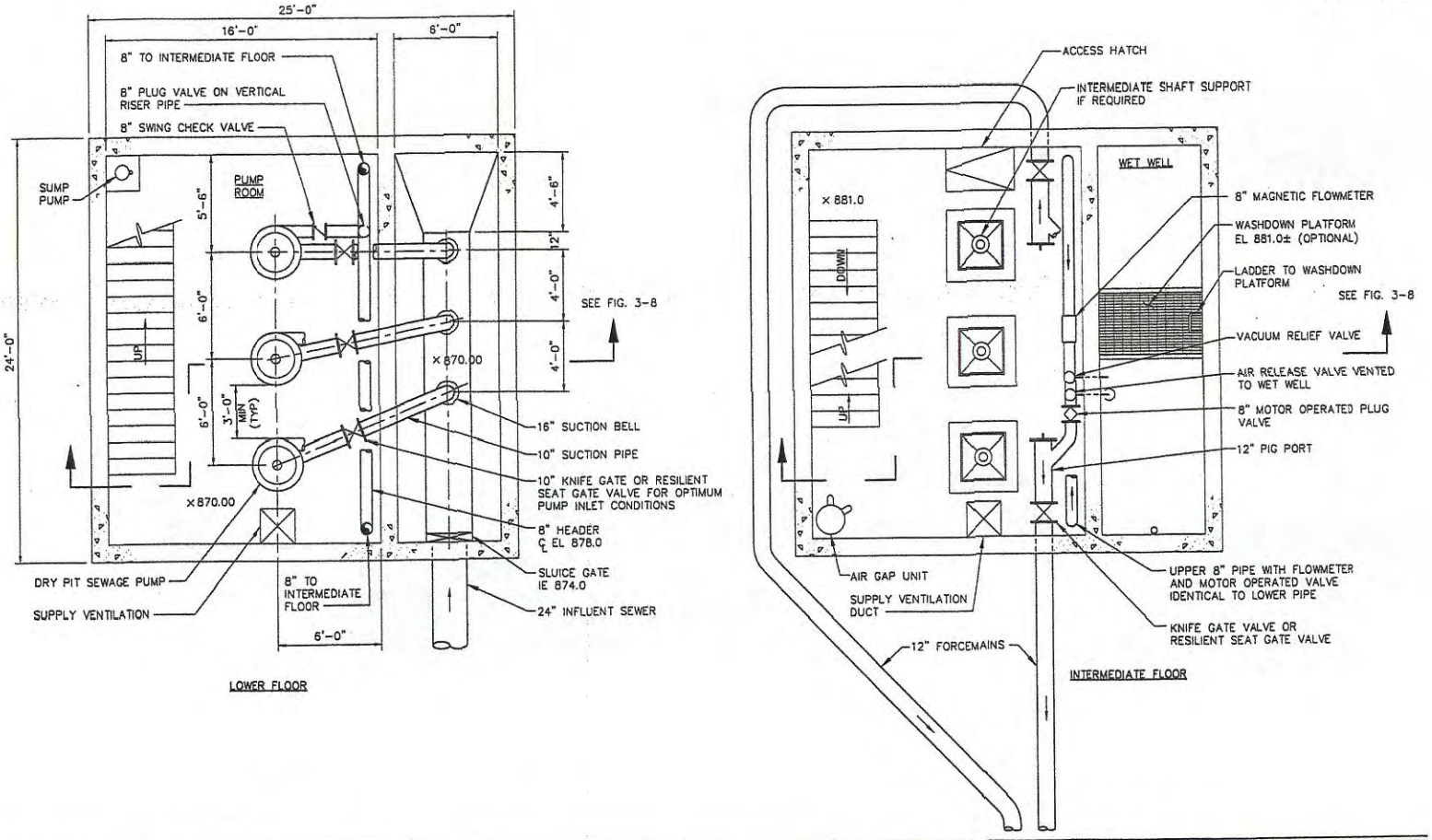
Table 3-3 Design Criteria – RI-24 Pump Station

Pump Station	
Location	Darnielle Road north of South River Road
Pump Station Type	Wet well / drywell pump station with force mains to Grants Pass WRP
Pump Type	Triplex non-clog
Drive Type	*Variable frequency drives on each pump*
Capacity of each Pump	Phase 1: 1,050 gpm at 100' TDH; Phase 2: 1,400 gpm at 140' TDH
Firm Capacity of Pump Station	Phase 1: 3.0 mgd, Phase 2: 4.2 mgd
Each Pump HP,	100 -125 HP
Level Control	Bubbler with duplex compressor
Overflow Point	*None (Rim of wet well)*
Auxiliary Power Type	Diesel 300 KW generator (size to be confirmed during design)
Location	Onsite, in building
Fuel Capacity (Approx.)	24 hours at 4.2 MGD
Transfer Switch	Automatic
Telemetry	Telephone modem
Force Main Drain Valves	10" plug valves (backdrainage)
EPA Reliability Class	I
Flow Meters	Two 8" magnetic flow meters at pump station (see Figure 3-7).
Force Main	
Length	19,300 ft of dual 12" PVC, 700 ft of 14" DI *
Profile	Generally ascending, stationed west to east
Air Release Valves	Estimated at 6
Vacuum Release Valves	Estimated at 4 (To be determined by transient analysis during design)
Detention Time	82 minutes at 4.2 mgd
Flexibility	3 to 4 valved cross-over connections will be provided to interconnect the dual force mains for flexibility and maintenance.
Odor / Sulfide Control	Flushing of force main, allowance for future chemical injection at pump station, carbon canisters at air release valves

* Final sizes of force-main to be determined during detailed design.

The pump station and piping will be sized to meet the ultimate flow requirements. The pumps, however, will be initially provided to serve only through about the year 2010. They will then be upgraded to meet ultimate flow requirements. This phased approach will more efficiently match the actual flows and not over size the pumps in their early years of operation. This could be achieved by replacement of the pumps in 2010 or of just the pump impeller. The variations in headloss and horsepower draw over the range of anticipated flows are shown in the spreadsheets and system curves in Appendix C.

One pump will be provided for standby in accordance with DEQ Guidelines. Figures 3-7 through 3-8 show preliminary plan views of the lower level and a section of the pump station. Magnetic flow meters and motorized valves will monitor and control the flow in the two force mains. A pigging station will also be included to maintain and clean the pipelines.



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DATE: 04/09/98

SCALE: 3/16"=1'-0"

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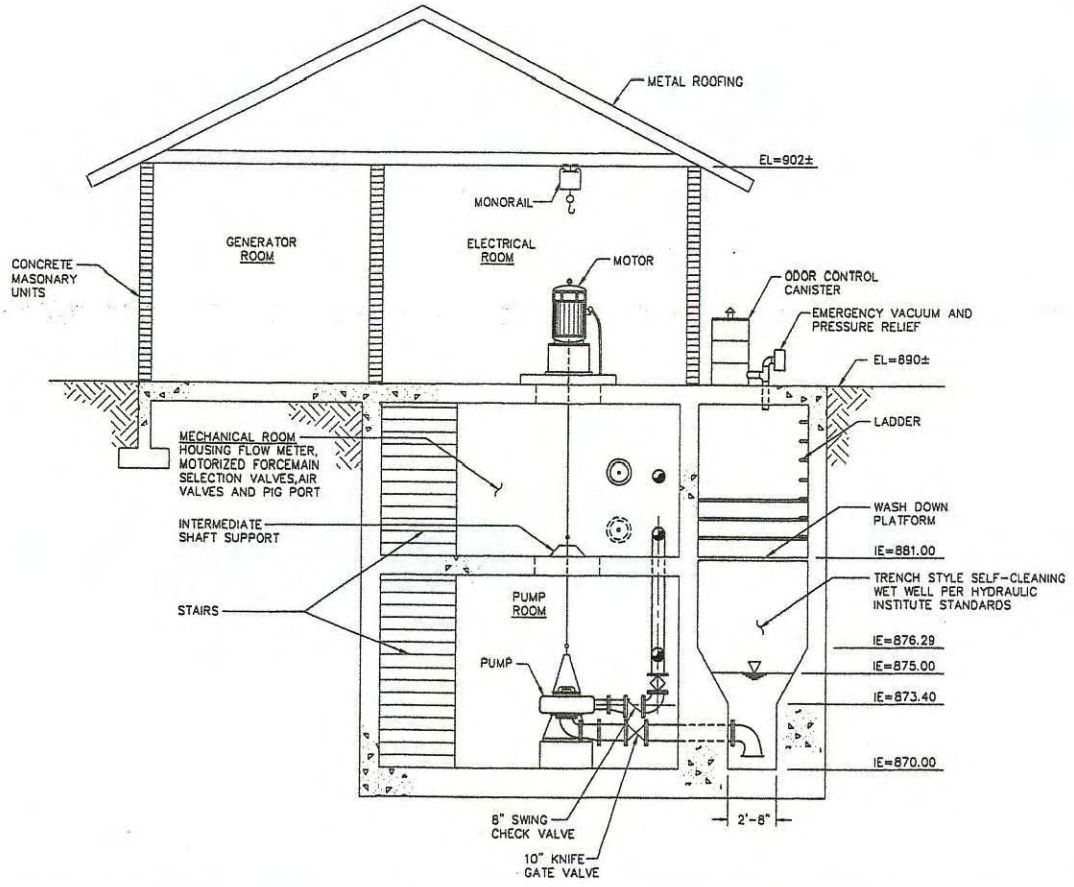
Figure 3-7
RI-24 Pump Station
Lower And Intermediate Floor Plans
REDWOOD SSSD
CONVEYANCE PREDESIGN REPORT



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DATE: 04/09/99

SCALE: 3/16"=1'-0"

Figure 3-8
RI-24 Pump Station-Section
REDWOOD SSSD
CONVEYANCE PREDESIGN REPORT

3.5 Proposed Force Main Alignment

Figure 3-9 shows an overview of the proposed alignment for the force mains from the Redwood WWTP the GPWRP. Figures 3-10 through 3-21 show more detailed alignments on aerial photographs. The aerial views also show approximate property and right of way lines, the locations of the existing RSSSD pipelines, and existing utility information compiled from various record drawings (where available).

Figures 3-10, 3-11, 3-12, and 3-13 begin at the Redwood WWTP, generally follow the existing sewer easements for the RSSSD's main interceptor, and progress to manhole RI-24, located at the north end of Darnielle Lane. This is the route of the 6" force main. The RI-24 Pump Station will be on Figure 3-13 and the subsequent figures follow the route of the dual force mains.

Figures 3-13, 3-14, 3-15, and 3-16 then show a shift in the proposed alignment to the public right of way, as the route follows Darnielle Lane south to South River Road, east over both South River Road and existing easements to Schroeder Lane, and south down Schroeder to Leonard Road

In Figures 3-16, 3-17, 3-18, and 3-19, the proposed alignment returns to following existing RSSSD easements. The easements generally follow an easterly path from the intersection of Leonard Road and Dowell Road, crossing Annabelle Lane, travels east through Molly Lane and Redwood Circle, and passing through the northern ends of Daisy, Flower, and Pansy Lanes.

These figures show several alternate sub-routes (A - D). The existing easement route in this section is very close to homes and crosses residents' yards. The alternative sub-routes are attractive because they minimize disruptions to residents and may ease negotiations for temporary easements. This is discussed in more detail in the subsequent section.

Figures 3-19, 3-20, and 3-21 show the final section of the proposed alignment. The route travels north and east of the Josephine County Fairgrounds, switches to West Park Drive, crosses the Rogue River over the Pedestrian Bridge, parallels an existing irrigation canal, south of All Sports Park, and then follows Spruce Street to the GPWRP. This section also contains alternative sub-route E.

3.5.1 Force Main Alternative Sub-Routes

The proposed force main alignment primarily follows the existing County owned sewer easement for the Redwood Interceptor or public roads. Some areas of the existing sewer easement pose specific construction challenges. Often structures, such as houses and fences, are encroaching or are very close to the proposed pipeline. This will cause disturbance of private property during construction, make construction access difficult, and inhibit future access for maintenance.

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LEGEND

AREA TO BE SERVED BY REDWOOD PUMP STATION

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DATE: 04/08/99

0 800 1600
SCALE IN FEET

N

Figure 3-9
Selected Wastewater Conveyance Alternatives
Redwood WWTP to Grants Pass WRP

REDWOOD SSSD
CONVEYANCE PRE DESIGN REPORT

LEGEND

- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

TWO INCHES AT FULL SCALE IF NOT SCALE ACCORDINGLY

SCALE 1"=100'

DATE MARCH 1999

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FIGURE 3-10
REDWOOD SSSD WWTP TO
WEST OF BREEZY LANE

LEGEND

- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

0 1/2" 1"
THIS INCHES AT FULL SCALE
IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
DATE MARCH 1999

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FIGURE 3-11
BREEZY LANE TO WESTWOOD DRIVE

LEGEND

- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
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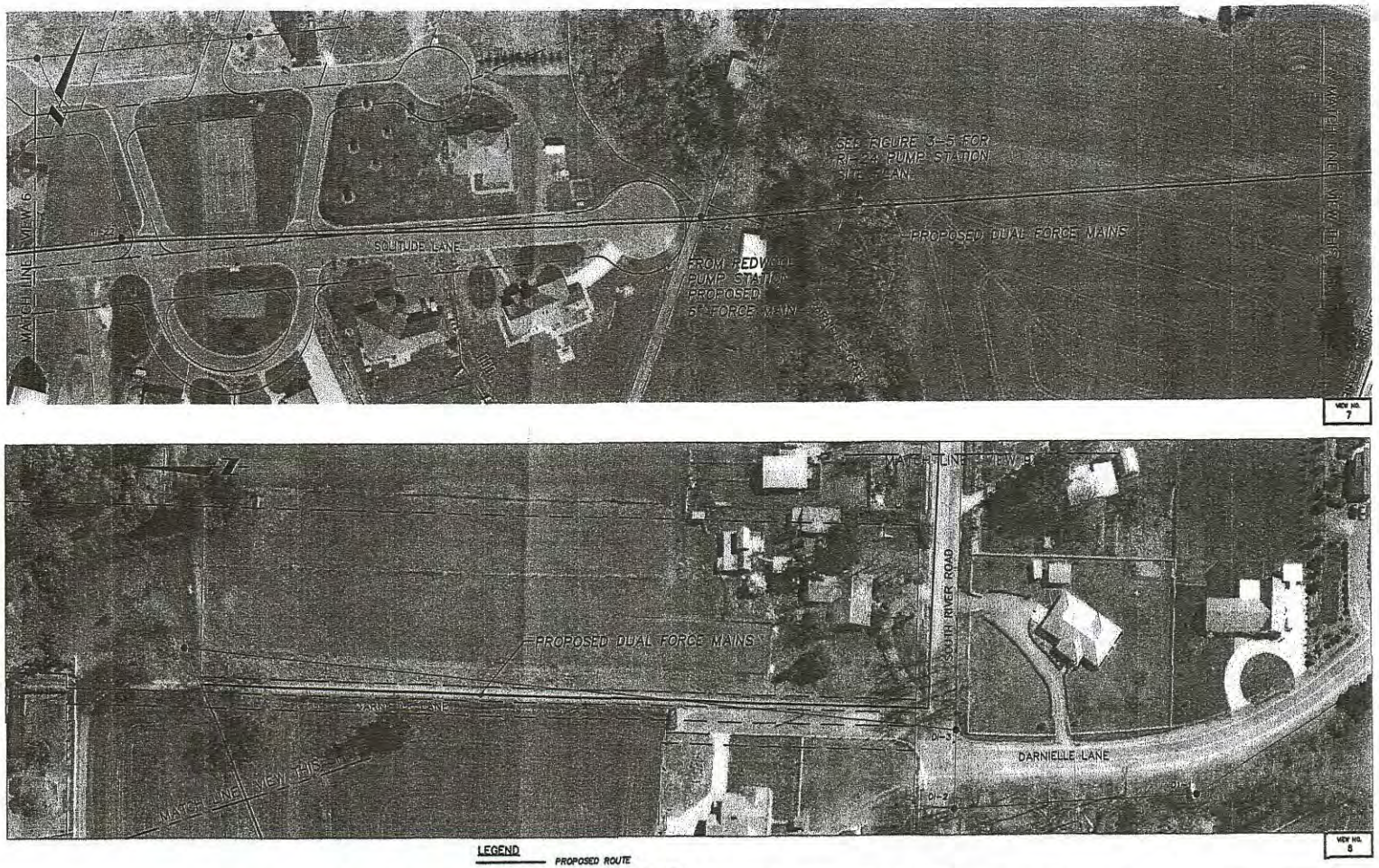
FIGURE 3-12
WESTWOOD DRIVE TO SOLITUDE LANE



LEGEND

- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

TWO INCHES AT FULL SCALE
IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
DATE MARCH 1999

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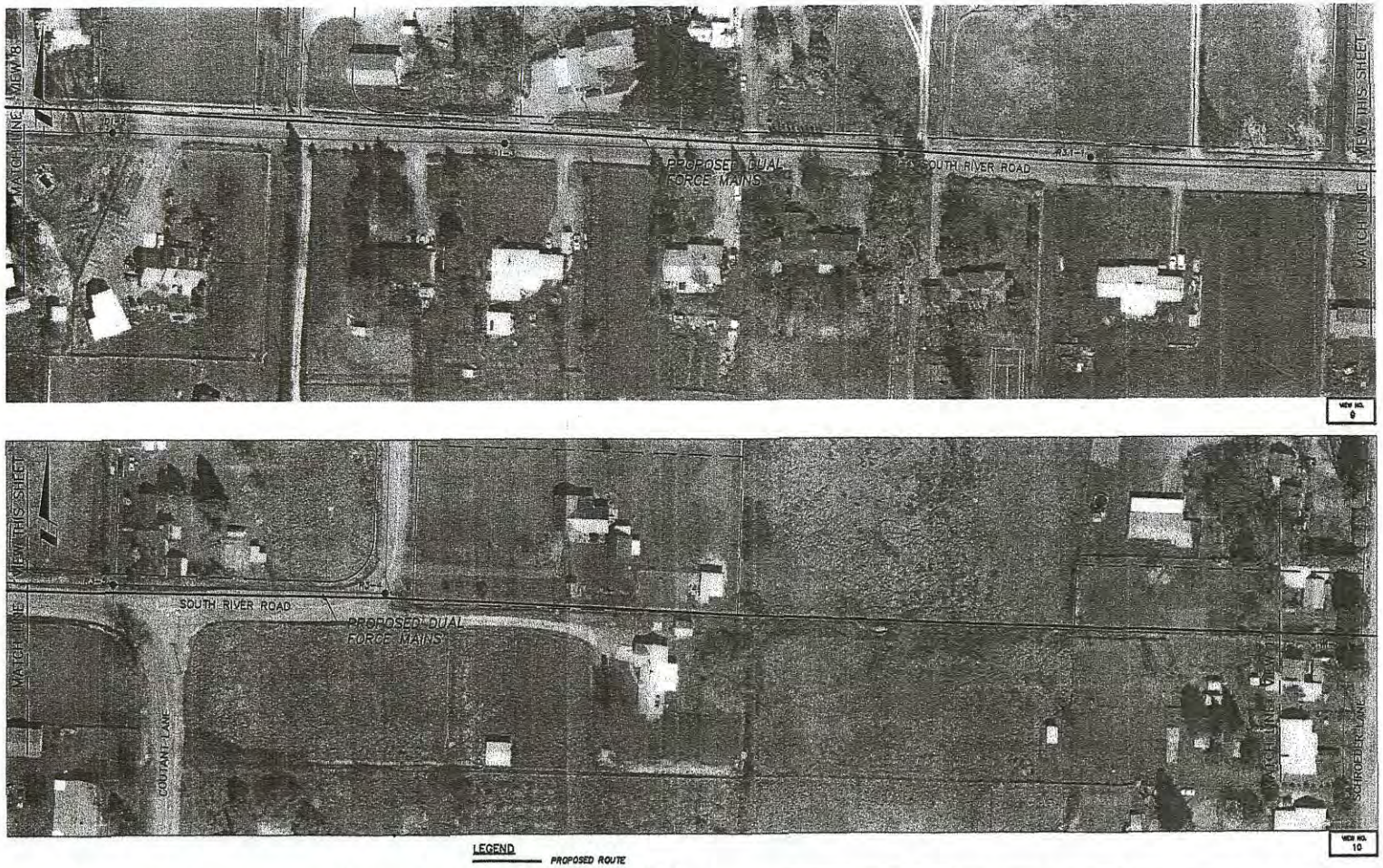
FIGURE 3-13
SOLITUDE LANE TO SOUTH RIVER ROAD



LEGEND

- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

NO.	REVISIONS	DATE	BY
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0 1/2" 1"
TWO INCHES AT FULL SCALE
IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
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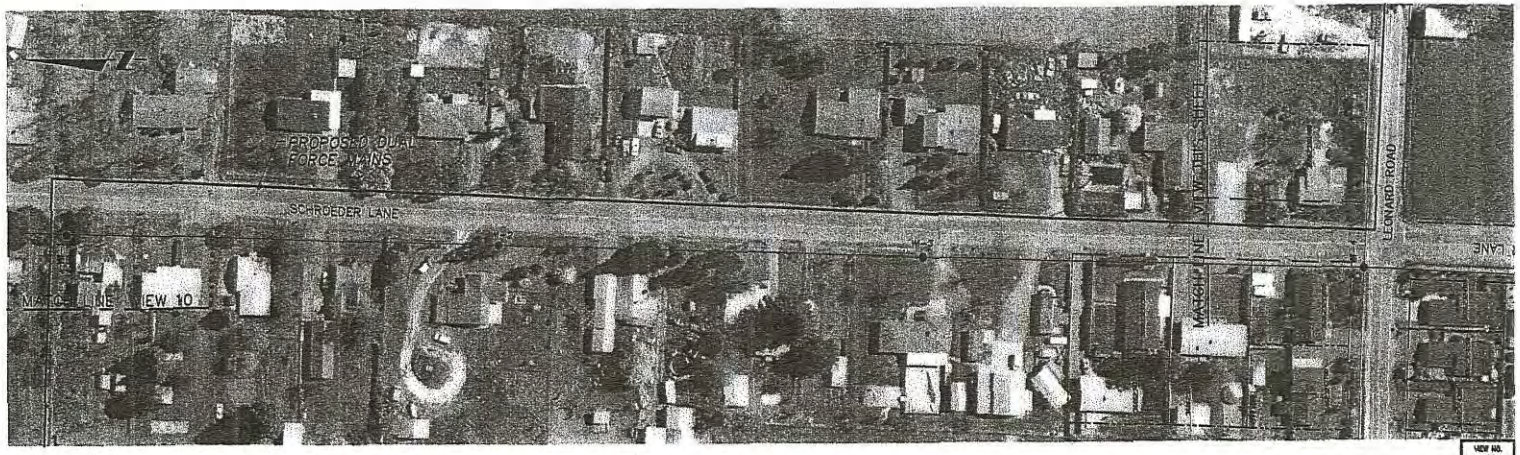
FIGURE 3-14
SOUTH RIVER ROAD
TO SCHROEDER LANE



LEGEND

- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

0 1/8" 1"
TWO INCHES AT FULL SCALE IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
DATE MARCH 1999

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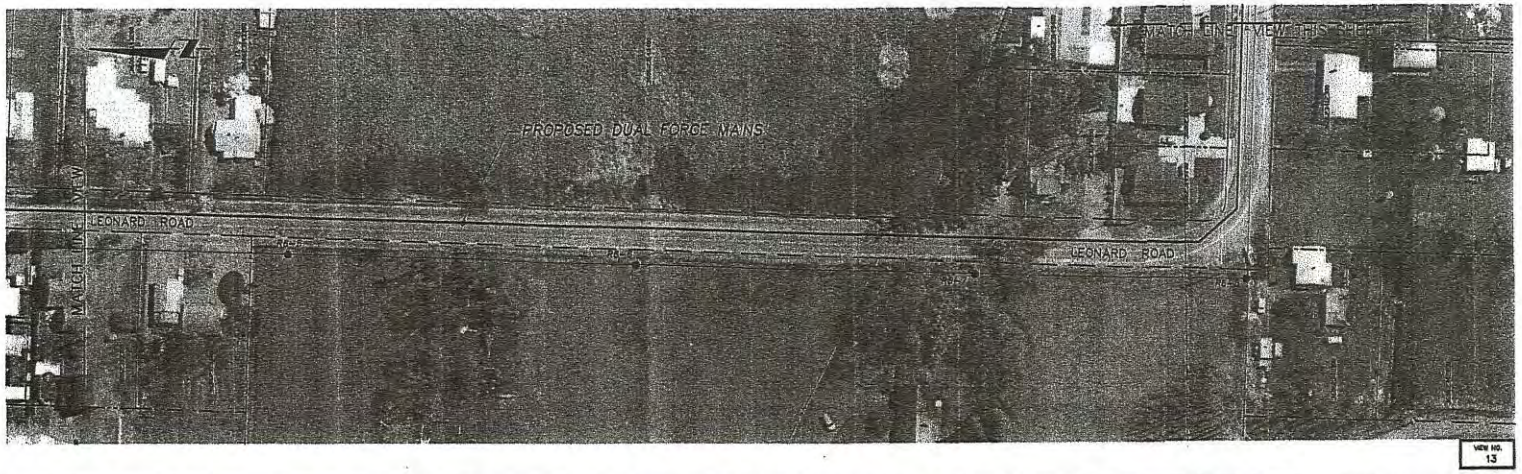
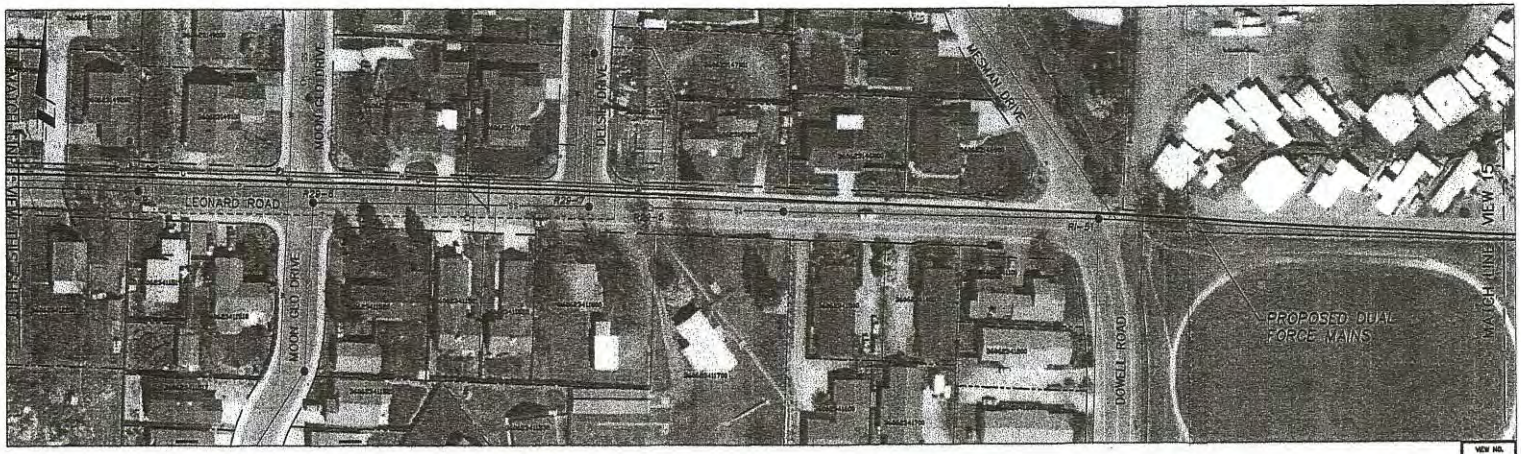
FIGURE 3-15
SCHROEDER LANE TO LEONARD ROAD





LEGEND

- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

0 1/2" 1"
TWO INCHES AT FULL SCALE
IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
DATE MARCH 1999

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FIGURE 3-16
LEONARD ROAD
TO END OF DOWELL ROAD

NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

0 1/8" 1"
TWO INCHES AT FULL SCALE
IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
DATE MARCH 1999

LEGEND
- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

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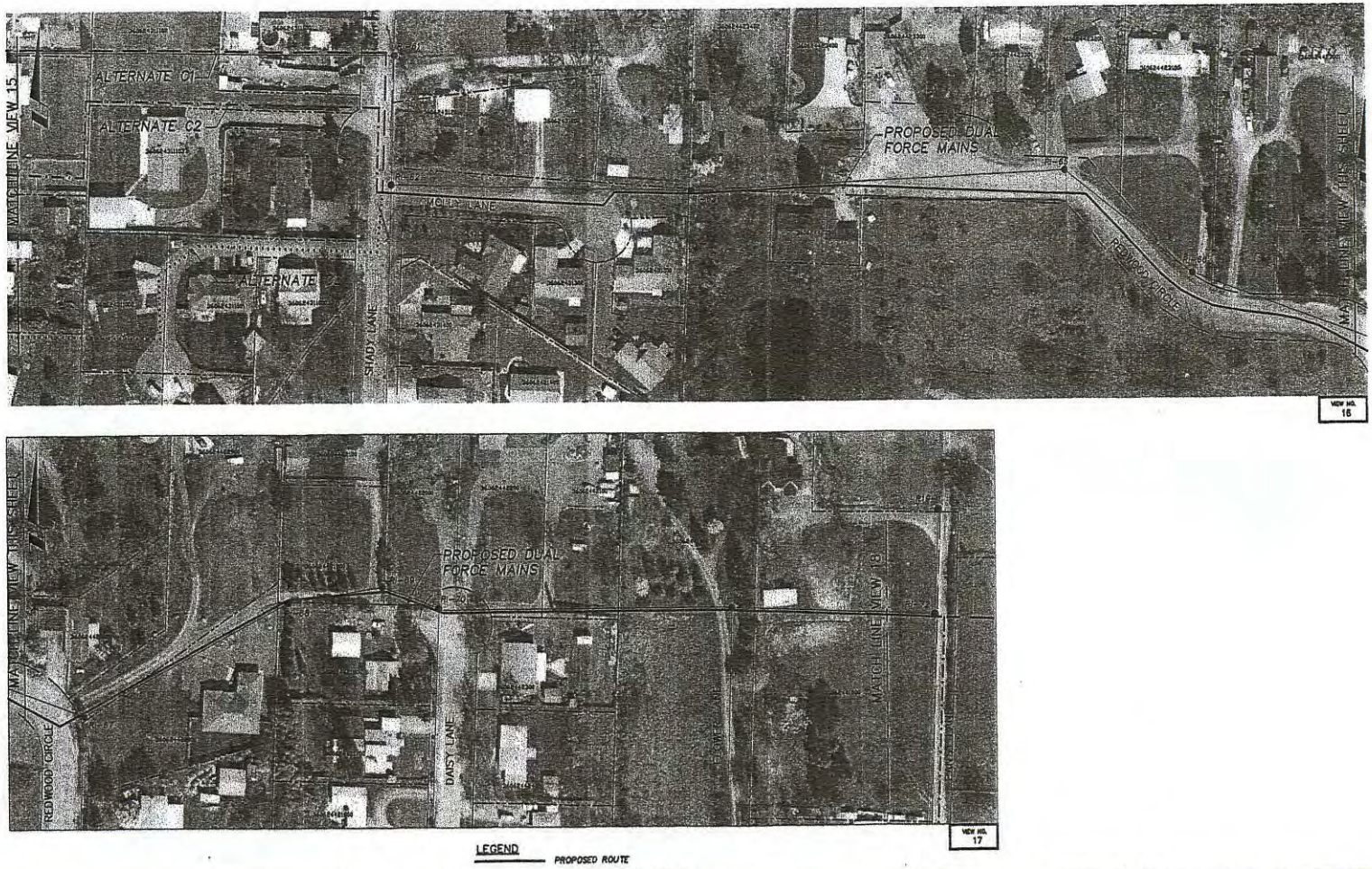
FIGURE 3-17
END OF DOWELL ROAD
TO EAST OF WINETEER LANE

VIEW NO. 17



LEGEND

- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

0 1/8" 1"
TWO INCHES AT FULL SCALE
IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
DATE MARCH 1999

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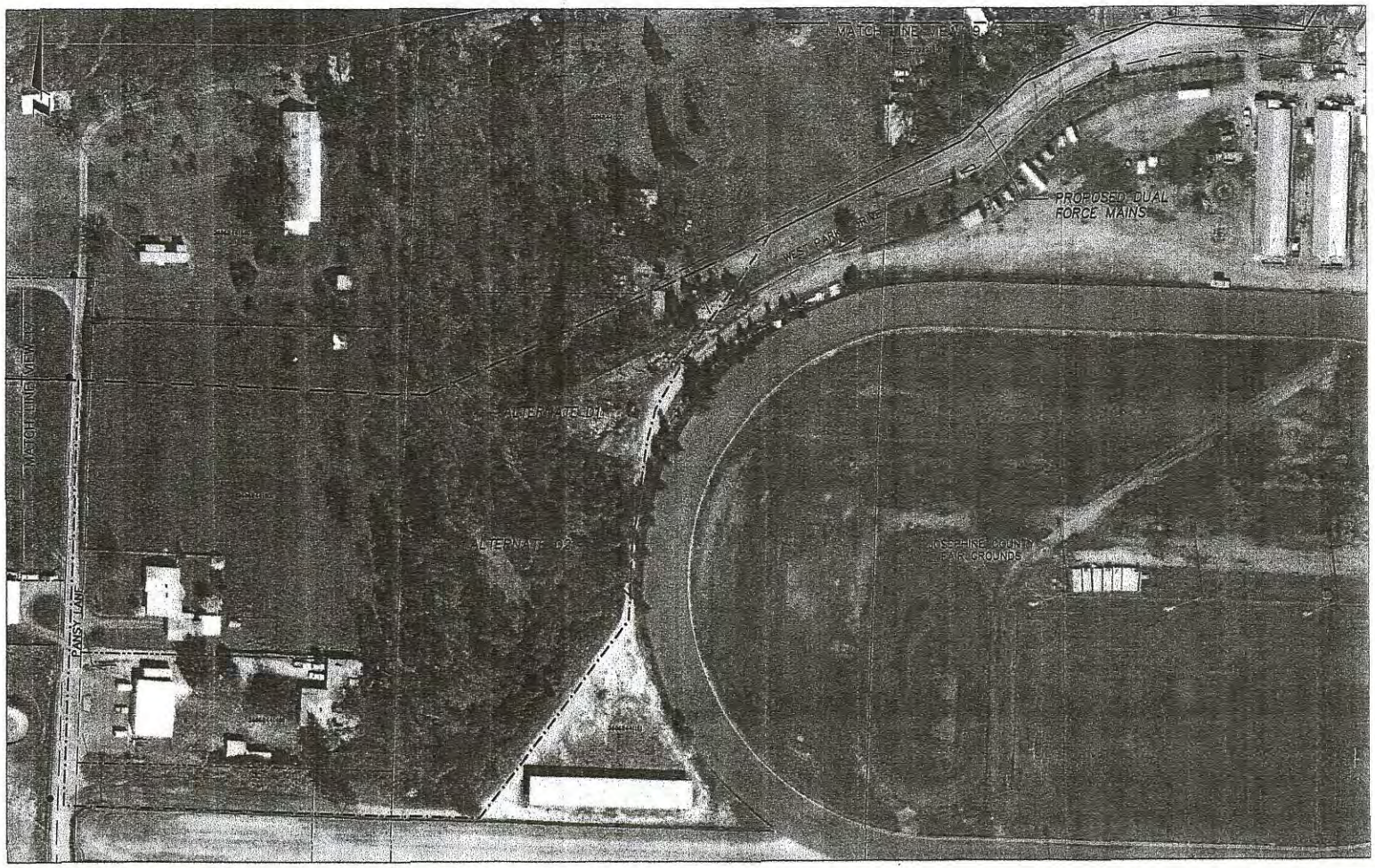
FIGURE 3-18
EAST OF WINETEER LANE
TO PANSY LANE



NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

0 1/2" 1"
TWO INCHES AT FULL SCALE
IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
DATE MARCH 1999

LEGEND
PROPOSED ROUTE
FIRST ALIGNMENT ALTERNATIVE
SECOND ALTERNATIVE
THIRD ALTERNATIVE
FOURTH ALTERNATIVE

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FIGURE 3-19
PANSY LANE TO
WEST PARK DRIVE

VIEW NO. 16

NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
				CHECKED
				APPROVED

0 1/2" 1"
TWO INCHES AT FULL SCALE IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
DATE MARCH 1999

LEGEND
- PROPOSED ROUTE
- FIRST ALIGNMENT ALTERNATIVE
- SECOND ALTERNATIVE
- THIRD ALTERNATIVE
- FOURTH ALTERNATIVE

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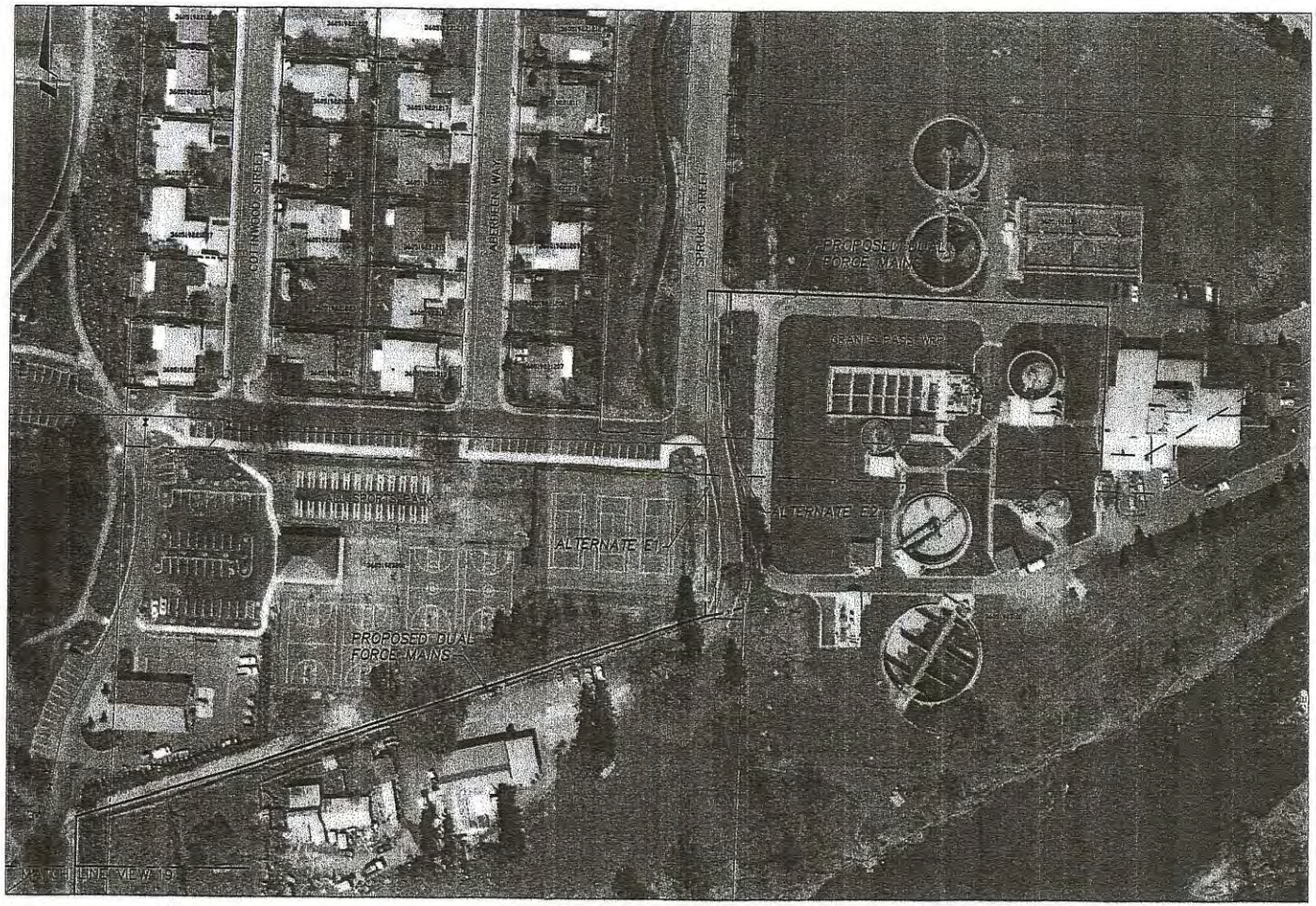
VIEW NO. 19

FIGURE 3-20
WEST PARK DRIVE RIVER CROSSING



NO.	REVISIONS	DATE	BY	DESIGNED
				DRAWN
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				APPROVED

0 1/2" 1"
TWO INCHES AT FULL SCALE IF NOT SCALE ACCORDINGLY
SCALE 1"=100'
DATE MARCH 1999

LEGEND
PROPOSED ROUTE
FIRST ALIGNMENT ALTERNATIVE
SECOND ALTERNATIVE
THIRD ALTERNATIVE
FOURTH ALTERNATIVE

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PROJECT NAME
REDWOOD SSSD
CONVEYANCE PRE DESIGN
REPORT
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FIGURE 3-21
RIVER CROSSING
TO GRANTS PASS WRP

VICK NO. 20

In these areas, installing the force main(s) outside of the existing easement is attractive. Alternative "sub-routes" were developed in these areas, as described in Table 3-4 and shown on the indicated figures.

Table 3-4 Alternate Sub-Routes

A. North of Sparrow Hawk Creek and Leonard Road (See Figure 3-11)
   - A1 – Generally follows existing easements west from manhole RI –10 to RI-9.
   - A2 – Loops south between RI-10 and RI-9 to avoid existing houses.

B. Wineteer Lane to Annabelle Lane (See Figure 3-18)
   - B1 – Follows existing easements across Wineteer Creek from the cul-de-sac, then generally north west to Annabelle Lane.
   - B2 – Crosses Wineteer Creek, then travels southwest to a private driveway, moving west to public right of way and north on Annabelle Lane to RI-53.
   - B3 – Avoids crossing Wineteer Creek by traveling south on Wineteer Lane, northwest through driveways to public right of way, and north on Annabelle Lane.
   - B4 – Avoids crossing Wineteer Creek by traveling south on Wineteer Lane, then west through commercial property, and north on Annabelle Lane to RI-53.

C. Shady Lane to Wineteer Lane (See Figure 3-18)
   - C1 – Follows existing easements generally west.
   - C2 – Parallels existing easements through the properties immediately south.
   - C3 – Travels south and west through a cul-de-sac, then west through adjacent property.

D. West Park Drive to Pansy Lane (See Figure 3-19)
   - D1 – Travels east and slightly south from West Park Drive's end to Pansy Lane.
   - D2 – Travels south and then east parallel to the County Fairground's track, then north on Pansy Lane to existing easements.

E. GPWRP to Irrigation Channel (See figure 3-21)
   - E1 – From the GPWRP's exit, follows Spruce south.
   - E2 – From the GPWRP's exit, parallels Spruce south, on GPWRP's property.

Selecting a route through these neighborhoods should take a balanced approach which considers not only technical issues but is sensitive to residents concerns. These include: construction, access, traffic control, noise, disruption and restoration of property, and safety.

Table 3-5 presents a recommended approach for final selection of the force main routing in neighborhoods.

Table 3-5 Proposed Approach to Select Pipeline Route Through Neighborhoods

1. Meet with District and City Staff to identify preferences or other issues.
2. Contract with property appraiser to initially assess the likely range of costs for easements on the alternative sub-routes.
3. Research property records to identify any other constraints. This should include a regulatory record review for potential contamination.
4. Develop a public notification plan and public participation program and begin implementing.
5. Contact selected property owners to discuss alternative sub-routes.

3.6 Opinion of Probable Construction Cost

The preliminary opinion of construction cost was developed for both pump stations and the force mains. These costs are summarized in Table 3-6 and more details are in Appendix D.

Note that these costs vary somewhat from those developed in the facility plan. This is because the route has been refined and the unit prices were developed from manufacturer's quotes, cost estimating guides, and previous, similar construction projects' contractor bid prices. The quantities were calculated based on the preliminary design drawings.

It must be recognized that the opinions of probable construction cost presented in this report cannot account for current and projected labor costs, attitudes of proposed contractors regarding their need for work at the time of construction bidding, availability of materials, climate and seasonal factors, local site conditions, and other variables which affect actual construction costs.

The contingency covers unknown factors such as subsurface conditions, unknown utilities, potential contamination, permitting delays, or other unanticipated conditions. The costs shown for easements are approximate, and may vary greatly depending upon real estate values, acceptability of easements to individual property owners, the actual sub-route selected, and potential legal fees.

Assumptions used in developing the costs were that a 6" diameter pipeline is used from RWWTP to RI-24 and a dual 12" pipeline is used from RI-24 to GPWRP. The pipe on the pedestrian bridge includes a single ductile iron 14" pipe, installation, and odor control, but not any bridge modifications. The assumed sub-routes used were A1, B2, C1, D1, and E2.

Table 3-6 Preliminary Opinion of Construction Cost

Item	Cost ($1,000)
Redwood Pump Station	$209
RI-25 Pump Station	$1,238
Force Mains	$2,708
Contingency at 25%	$1,039
Subtotal	$5,194
Engineering and Administration at 25%	$1,298
Easements	$320
Total	$6,812

4.0 ADDITIONAL NEEDS FOR DESIGN

To complete design, some issues need to be clarified. A list of these issues which require either additional evaluation or input from the District and the City are as follows:

Force Main:

- Whether to bore under streams or open-cut trench along the pipeline route.[1]
- Connection point at GPWRP.
- Selection of alternative sub-routes (A-E) which are most acceptable to the community.

Pump Stations:

- Siting and access to RI-24 pump station.
- Water supply for RI-24 pump station.
- RI-24 pump station building architecture options.
- Provisions for chemical injection.
- Method of bypassing wastewater during construction of both pump stations.
- Layout for the blower building at Redwood pump station.
- Ability to re-use the existing generator at Redwood WWTP.

[1] There are three or four stream crossings, depending upon the sub-route selected. We have assumed that the pipeline(s) would cross streams by jacking and boring. This is more expensive, but requires very little natural resource permitting. If open-cut trench methods are used, the project schedule will need to accommodate 3-6 months of permitting, most of which can be concurrent with other activities. Open-cut construction may also trigger the need for a "Biological Assessment", especially considering the sensitivity of the Rogue River.

5.0 REFERENCES

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2. 1998 Site Work and Landscape Cost Data, 17th Annual Edition, RS Means®.

3. Record Drawings, Plans for Construction of Sewage Collection and Treatment Facilities, Redwood Sanitary Sewer Service District, Josephine County, Oregon, May 1978, prepared by CH2M Hill.

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8. Water Restoration Plant Facilities Plan, City of Grants Pass, January 1999, prepared by Brown and Caldwell, Eugene, Oregon.