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CONSULTING ENGINEERS
CH2MHILL

TECHNICAL MEMORANDUM

Implementation Options

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DATE:	November 12, 2007

Background and Purpose

The Santa Rosa Urban Reuse Project (SRURP) would provide recycled water to customers within the Santa Rosa Urban Growth Boundary. The Feasibility Study for the SRURP identified potential user demands up to 1,500 million gallons per year (MGY), but recommended a 1,000 MGY project as the most economical for implementation at this time. The SRURP project described in this technical memorandum (TM) is for the 1,000 MGY project, which is expandable to 1,500 MGY. It is envisioned that the project would be constructed in phases.

The SRURP project includes transmission and distribution piping, service connections and on-site retrofits, pump station upgrades, recycled water distribution storage tanks, pressure reducing stations and algae removal facilities. The purpose of this TM is to summarize the SRURP facilities and costs, and describe two alternative implementation plans for the first of several implementation phases. The first phase could provide service to the West region or alternatively to the South region. Updated estimates of probable project cost are also provided for the Phase 1 options and the 1,000-MG SRURP.

This TM includes the following sections:

- Conclusions and Recommendations
- SRURP Facilities and Costs
- Phase 1 Implementation Options

The facilities required for the 1,000 MGY Santa Rosa Urban Reuse Project are described in detail in the following technical memoranda:

- *Recycled Water User's Guide, November 2007*
- *Recycled Water Standards, October 2007*
- *Hydraulic Analysis, November 2007*
- *Supply vs. Demand Analysis, November 2007*
- *Water Quality and Treatment, October 2007*
- *Transmission/Distribution Piping Routing Analysis, November 2007*
- *Pump Station Upgrades/Pressure-reducing Stations, November 2007*
- *Storage Tank Siting Evaluation, November 2007*
- *Pilot Project, November 2007*
- *Preliminary Pipeline Drawings, November 2007*

Conclusions and Recommendations

The Santa Rosa Urban Reuse Project is designed to serve approximately 1,000 MGY of user demands. It is anticipated that the facilities would be constructed in four phases, each serving approximately 250 MGY of user demands. The first phase would need to extend from an existing Subregional System water reuse facility, which would include the Geysers Pipeline (GPL) or the Low Pressure Water Reuse Line from the west or the Rohnert Park Urban Reuse System (RPURS) from the south.

Selection of the preferred Phase 1 option should consider capital cost and the timeframe in which the potential customers are connected and using the recycled water. (Establishing a preference for the Phase 1 option – either South or West – is only intended to determine which phase should be constructed first. The SRURP is proposed to eventually include both phases.)

Converting existing users to recycled water would provide immediate potable water offset benefits and provide a source of revenue to help finance the operation and maintenance of the facilities, and the administration of the new utility. Connection of potential future users would be driven by new development occurring within the distribution area served by the Phase 1 facilities and would ultimately provide potable water offset benefits and revenue, but the timing of when the facilities are fully utilized is less certain. Table 1 provides a summary of the estimated demands by user category and estimated project costs for the Phase 1 options.

TABLE 1
Phase 1 Costs and Demands
IRWP Santa Rosa Urban Reuse Project – Implementation Options

SRURP Phase	Existing Demand (MGY)	Future Demand (MGY)	Total Demand (MGY)	Estimated Project Cost[a] (x $1000)
Phase 1 West	204	44	248	$36,655[b]
Phase 1 South	77	170	247	$36,355[b]
Future Phases	255	219	474	$82,760
Total SRURP	**536**	**433**	**969**	**$152,400[b]**

[a] Includes 15% construction contingency and 25% engineering and administration allowance; ENRCCI = 9100.

[b] Pilot project cost included in both Phase 1 options, but is only included once for total SRURP cost.

MGY = Million gallons per year

It is envisioned that both Phase 1 options would be constructed under several contracts. In both options, the first contract completed is anticipated to be the Pilot Project at the West College Utilities Facility. The implementation schedule for the Phase 1 contracts should be updated yearly based on the Subregional System's disposal requirements, the projected demand for the recycled water in the areas served by each subsequent construction contract, and financial considerations.

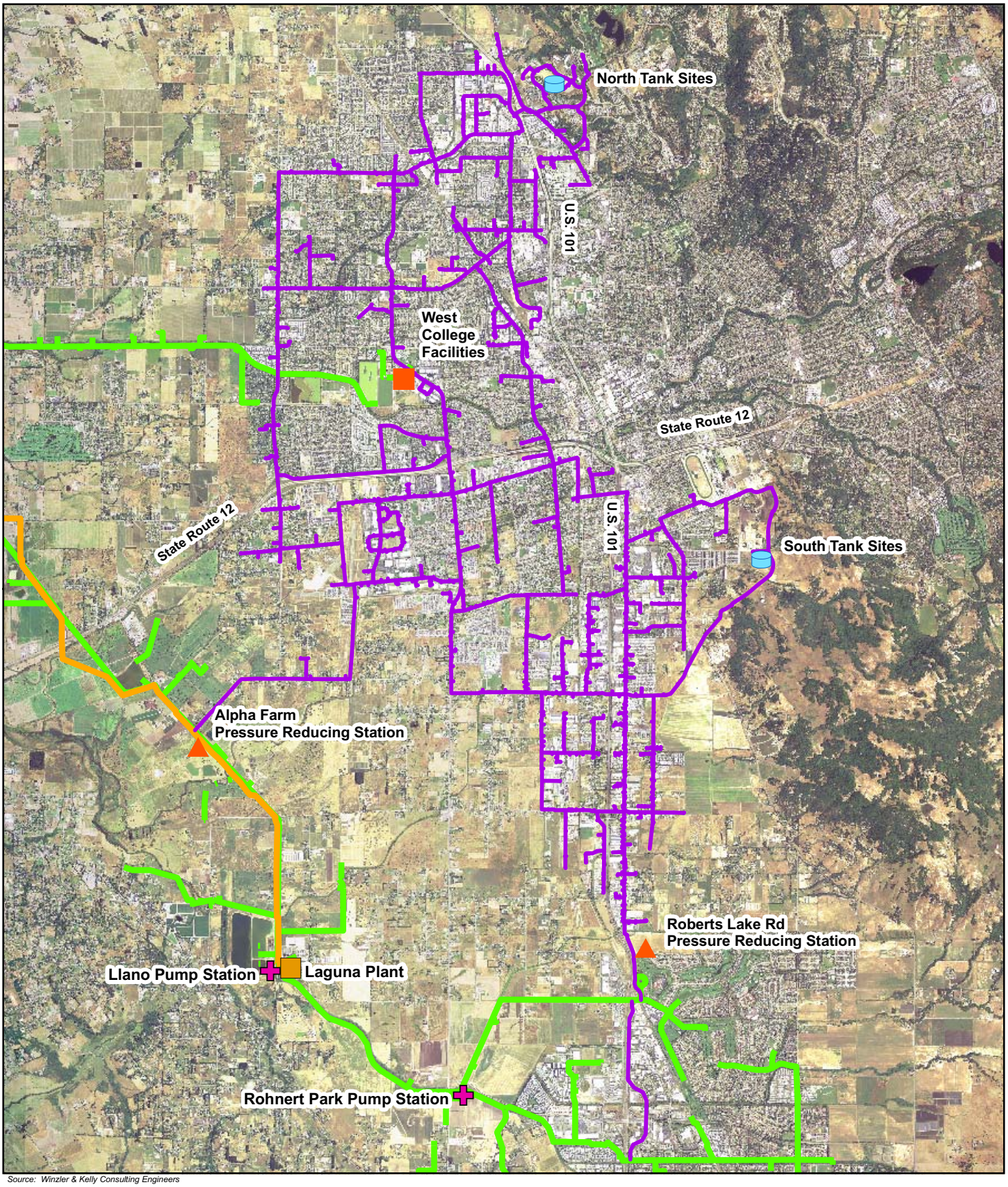
SRURP Facilities and Costs

The preliminary design of the Santa Rosa Urban Reuse Project includes transmission and distribution mains, service connections, on-site retrofits, pump station upgrades, pressure reducing stations, operational storage tanks, and algae removal facilities. The locations of the SRURP facilities are shown in Figure 1. These facilities are described in detail in other TMs and are summarized below.

Piping and Services

Alignments for the transmission and distribution mains were evaluated, selected and refined as described in the TM *Transmission/Distribution Pipeline Routing Analysis, November 2007*. Transmission mains convey water between the Laguna Plant and operational storage tanks located in the Santa Rosa hills. Transmission mains are generally between 18 and 36 inches diameter. Distribution mains extend off of the transmission mains to serve areas with potential users and provide "loops" to improve system hydraulics and reliability. Distribution mains are generally between 8 and 30 inches diameter.

Additional pipelines, classified as distribution "sub-mains", were identified to provide service to individual users that are not located along the alignments of the transmission and distribution mains. Distribution sub-main pipe diameter sizes range from 4 to 12 inches. The recycled water distribution sub-main total length is approximately 160,000 lineal feet. This is in addition to the 258,000 lineal feet of transmission and distribution



Source: Winzler & Kelly Consulting Engineers

Legend

- SRURP Pipelines
- Geysers Pipeline
- Existing Water Reuse System
- Proposed Storage Tank Sites

0 2,500 5,000 Feet

FIGURE 1
SRURP FACILITIES

IRWP MASTER PLAN
Urban Reuse

City of Santa Rosa IRWP
Sonoma County, California

November 2007

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mains, totaling 418,000 lineal feet of new pipeline in the system and ranging in size from 4 to 36 inches diameter.

After the alignments for the transmission and distribution pipelines were finalized, the pipe diameters were optimized using a hydraulic model. The hydraulic modeling criteria and results are presented in the TM *Hydraulic Analysis, November 2007*. The hydraulic analysis also identified the need for a new 18-inch diameter transmission main in Commerce Boulevard in Rohnert Park, between the Rohnert Park Expressway and Golf Course Drive. This connector pipe provides for improved conveyance of peak flows from the Rohnert Park Pump Station into the southern part of the SRURP. If the Rohnert Park urban reuse system is expanded, this pipeline would become a shared facility benefiting both Santa Rosa and Rohnert Park.

Potential users not fronting a transmission or distribution main alignment need to be served by extending a distribution sub-main to their service connection. During this predesign evaluation, determination of whether or not to extend service to an identified potential user was based on a guideline of 2,000 lineal feet maximum per million gallon of annual demand. This guideline was developed from the average cost of pipelines to serve the 1,000 MGY demand and converted to an 8-inch diameter pipe. During the design phase, these assumptions need to be revisited to verify the cost-effectiveness of connecting a remote service and to develop the appropriate cost share between the City and the customer (if appropriate).

Service connections to potential users were located based on where the properties currently receive their potable water service. Undeveloped properties were assumed to receive service from the nearest major street. Service connections range in size from 1 to 8 inches diameter based on estimated demand, and the size would need to be verified during the design phase. Where services connect to pipelines that are ductile iron or concrete cylinder pipe, turnouts would be provided at regular intervals so that future services that have yet to be identified can be connected without tapping the transmission main. Pipelines and services would be designed in conformance with the latest edition of the City's *Recycled Water Standards, November 2007.*

On-site retrofits for existing customers being converted from potable to recycled water would be paid for by the City up to a reasonable cost to be determined by the City. The detailed requirements of each on-site retrofit are beyond the scope of this preliminary design phase and would need to be determined during the detailed design phase. On-site retrofits would be designed in conformance with the latest edition of the *Recycled Water User's Guide*. A nominal cost for the retrofits has been included for planning purposes.

Pump Station Upgrades

The 1,000 MGY SRURP would require capacity expansion at the Llano and Rohnert Park pump stations, as described in the TM *Pump Station Upgrades/Pressure-reducing Stations, November 2007*. Both facilities were designed to accommodate expansion and can be retrofitted for the project requirements.

The Llano Pump Station is currently being retrofitted for the Geysers Expansion Project to a reliable capacity of 19 MGD. The SRURP would require an additional 14 MGD of

capacity for the project bringing the total capacity of the facility to 29 MGD. The Llano Pump Station was designed to accommodate expansion to 40 MGD capacity. Another option is to utilize the Low Pressure Water Reuse Line that is parallel to the GPL and construct a booster pump station at the Alpha Farm turnout rather than a power generation/pressure reducing station. The capital cost of the two options are very close and additional evaluation should be completed during the detailed design phase.

The Rohnert Park Pump Station has a capacity of 8 MG and was designed to allow for doubling the capacity. An additional 2 MGD of capacity is required for the SRURP with the storage assumptions noted above. Additional capacity at the Rohnert Park Pump Station could require the addition of surge tanks at the "E" Pump Station and the Rohnert Park Pump Station, but this would be verified during the detailed design phase.

The Llano Pump Station upgrade or the Alpha Farm booster pump station is needed only for the Phase 1 West option, and the Rohnert Park Pump Station upgrade is needed only for the Phase 1 South option. The pump station upgrades would be required as part of the first transmission main contract.

Pressure Reducing Stations

Pressure reducing stations would be required on the transmission mains feeding the SRURP from the existing water reuse facilities, as described in the TM *Pump Station Upgrades/Pressure-reducing Stations, November 2007*. The hydraulic grade line in the Rohnert Park Water Reuse System would be higher than the hydraulic grade line in the SRURP after storage is constructed in Rohnert Park and a pressure-reducing valve in a below-grade vault would be needed. This vault would be located on the transmission main in Roberts Lake Road between the Rohnert Park connection and the first service connection in Santa Rosa. The pressure reducing valve would not be required until after storage is constructed in the Rohnert Park Water Reuse System. A similar pressure reducing valve is required on the existing pipeline serving the Rohnert Park golf course, but this valve would be required for the Phase 1 South option regardless of the existence of storage in Rohnert Park.

The GPL has a hydraulic grade line higher than the SRURP hydraulic grade. The pressure differential between the GPL and the SRURP is great enough at some times to allow for energy recovery through a turbine. At other times, the pressure differential is not great enough and pressure-reducing valves would be utilized. These facilities are larger and generate more noise than the Rohnert Park pressure reducing stations, and would be housed in a building above ground at the City's Alpha Farm. The power generation facilities would not provide payback within the anticipated useful life of the equipment, but capturing this energy offsets greenhouse gas emissions of the project. A more detailed cost/benefit analysis should be completed during the detailed design phase of this facility.

An option to using the GPL to convey water for the SRURP is to utilize the existing Low Pressure Water Reuse Line that parallels the GPL. A turnout would be provided at Alpha Farm and a booster pump station would be needed instead of a power generation/pressure reducing station.

The Roberts Lake Road pressure reducing station and the Rohnert Park golf course pressure reducing station would be needed only for the Phase 1 South option, and the Alpha Farm pressure-reducing station is needed only for the Phase 1 West option. The pressure reducing facilities would be required as part of the first transmission main contract.

Distribution Storage Tanks

Distribution storage is needed to optimize the SRURP facilities for delivering the ultimate peak hour flows at the lowest facilities cost. Optimization of the facilities and sizing of the operational storage tanks is described in the TMs *Hydraulic Analysis, November 2007*, and *Water Quality and Treatment, November 2007*. Fifteen potential tank sites were identified in the Santa Rosa hills including the north and south tank site areas. A detailed siting analysis is provided in the TM *Storage Tank Siting Evaluation, November 2007*.

The Santa Rosa hill storage tank sites provide for 2.5 MG of storage at each of the two locations. The sites have been designed to accommodate one 1.5 MG tank and one 1.0 MG tank at each location, for a total storage capacity of 5.0 MG in Santa Rosa. However, the facilities optimization analysis described in the TM *Water Quality and Treatment, November 2007* concludes that the optimal facilities would include 3.0 MG of storage in Santa Rosa for the 1,000 MGY SRURP, with an additional 2.0 MG of storage needed if the system were to be expanded to 1,500 MGY. The hydraulic analysis of the SRURP, summarized in the TM *Hydraulic Analysis, November 2007*, concludes that storage is not needed for the SRURP until demands exceed 500 MGY.

Although storage is not required for the Phase 1 project, the Subregional System should attempt to acquire the property as early as possible to ensure its availability when the storage needs to be constructed for future phases of the SRURP.

Storage in Rohnert Park is also recommended for the inter-connected urban reuse systems in Santa Rosa and Rohnert Park to improve operations and reliability in both systems. This shared facility is not required for the 1,000 MGY SRURP but is recommended if expansion of the Rohnert Park urban reuse system is implemented.

Algae Removal Facilities

A detailed analysis of water quality issues and recommended algae removal facilities for the SRURP is provided in the TM *Water Quality and Treatment, November 2007*. This analysis concludes that polishing filtration should be provided for water from seasonal storage ponds to minimize clogging of irrigation systems. These mechanical filters would be similar to the filters currently in use at the Rohnert Park Pump Station. The analysis also concludes that chlorination of the water in the SRURP would inhibit re-growth in the pipelines and appurtenant facilities and is therefore recommended for the SRURP.

Filtration would be located at the City's Alpha Farm, with backwash discharging to the existing seasonal storage pond. The existing filters at the Rohnert Park Pump Station would also be expanded to accommodate the capacity upgrades, with the backwash

discharging to the sewer as it does currently. The recommended filtration facilities are shown in the TM *Pump Station Upgrades/Pressure-reducing Stations, November 2007*.

Chlorination facilities include tank storage of sodium hypochlorite with double-containment and metering pumps for injection into the recycled water pipeline. The rate of chlorination would be based on maintaining a residual in the water that is high enough to inhibit re-growth but not high enough to cause damage to facilities or landscaping of recycled water customers. The dosing rate would change as the system is built and the user demand increases, with higher dosing rates needed initially.

Chlorination facilities currently exist at the Rohnert Park Pump Station and would remain in operation. Chlorination facilities would also be installed at the City's Alpha Farm. For Phase 1, chlorination sites have also been identified along the transmission mains in the event that more chlorination is beneficial during the initial phases of the SRURP.

Filtration and chlorination facilities are required for both Phase 1 options.

Pilot Project

The existing Santa Rosa Water Reuse Facilities includes a pump station and filtration at the West College Utilities Facility that serves three urban reuse customers. The Pilot Project would upgrade these existing facilities and expand the service to 15 additional customers along Stony Point Road. The pipeline in Stony Point Road would be an 18-inch diameter transmission main sized for the full SRURP project. In addition to this pipeline, the Pilot Project includes 15 on-site retrofits to connect the existing users. The Pilot Project facilities are described in the TM *Pilot Project, November 2007*.

It is anticipated that the Pilot Project would be the first contract completed for the Phase 1 SRURP project, whether it is Phase 1 West or Phase 1 South that is selected as the first phase. It would need to be a stand-alone project until the Phase 1 West project is completed. The existing pump station and filters would be upgraded to meet the additional demands and relocated to improve the layout options for the West College Utilities Facility Phase II Improvements. Chlorination facilities would also be provided.

Estimate of Probable Cost

Estimates of probable cost were developed for all of the SRURP facilities and include a 15 percent construction contingency and 25 percent for engineering and administration allowance. Land costs are not included. The costs are in 2007 dollars at an Engineering News Record construction cost index of 9100 for the San Francisco area. A breakdown of the estimated costs for the various facilities is provided in Table 2. A detailed description of the basis for costs developed for the pipelines is provided in Attachment 1.

TABLE 2
SRURP Facilities Costs
IRWP Santa Rosa Urban Reuse Project – Implementation Options

Facility Description	Estimated Cost[a] (x $1,000)
Pipelines and services	$123,000
On-site retrofits	$3,750
Llano Pump Station upgrade (includes weir in wet well)	$850
Rohnert Park Pump Station upgrade (includes filters)	$700
Pressure reducing station at Alpha Farm	$3,350
Pressure reducing station in Roberts Lake Road	$250
Rohnert Park connector piping	$2,700 [b]
Storage tank at SR North Site (1.5 MG)	$2,800
Storage tank at SR South Site (1.5 MG)	$2,800
Storage tank w/ pipeline in Rohnert Park (2.5 MG)	$9,000[c]
Filters and Cl_2 facilities at Alpha Farm	$1,100
Cl_2 facilities in distribution system (3 locations)	$600
Filters, Cl_2 facilities and pump station at West College	$1,500
Total SRURP Facilities	**$152,400**

a Includes 15% construction contingency and 25% engineering/administration allowance; ENRCCI = 9100.

b The connector pipe is required for the SRURP, but Rohnert Park would also benefit if the RPURS is expanded.

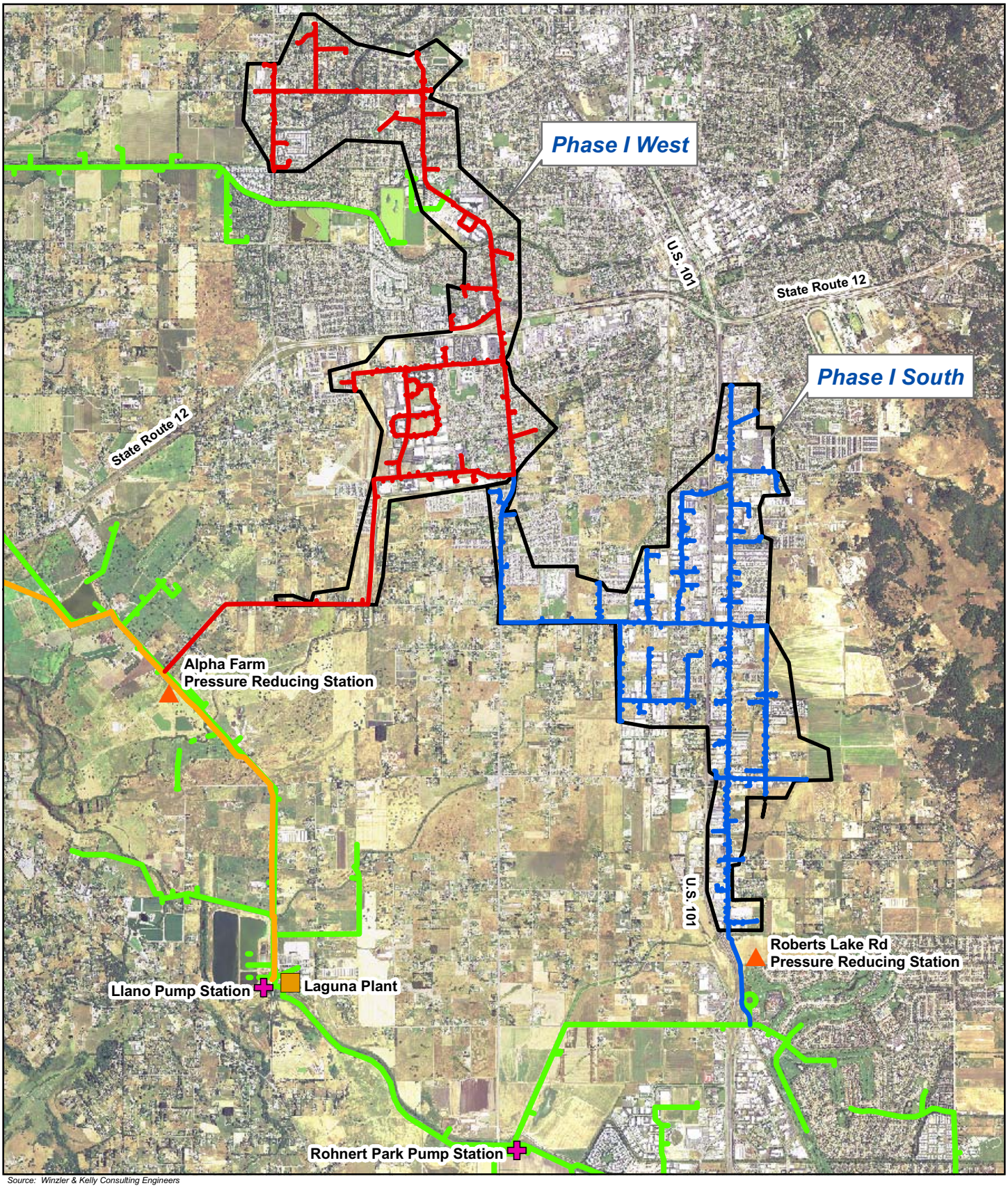
c Storage in Rohnert Park would benefit operation of the SRURP, but is not required without expansion of RPURS.

Preliminary Design Drawings

Preliminary design drawings are provided under separate cover showing the pipelines and services for the 1,000 MGY Santa Rosa Urban Reuse Project in plan view. The drawings include ortho-rectified aerial photos (2005), and utility information from electric, gas and communication utilities as well the City's GIS maps (sewer, water, storm sewer). The new pipelines are shown in general alignments and include isolation valves, blowoffs, air vacuum/relief valves and water sampling locations. The pipe alignments and appurtenance locations would need to be verified during the detailed design phase of the project.

Phase 1 Implementation Options

The SRURP facilities are expected to be constructed in four phases, with the first phase serving the West region from the GPL or parallel Low Pressure Water Reuse Line, or alternatively, serving the South region from the RPURS. Figure 2 illustrates the ultimate SRURP facilities and identifies the service areas for the two Phase 1 options. A summary of the facilities required for each of the Phase 1 options and the ultimate system is provided in Table 3.



Source: Winzler & Kelly Consulting Engineers

Legend

- Phase I West Pipelines
- Phase I South Pipelines
- Geysers Pipeline
- Existing Water Reuse System
- Phase I Options

0 2,500 5,000 Feet

FIGURE 2
Phase 1 Options

IRWP MASTER PLAN
Urban Reuse

City of Santa Rosa IRWP
Sonoma County, California

November 2007

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TABLE 3
SRURP Facility Requirements
IRWP Santa Rosa Urban Reuse Project – Implementation Options

Facilities Required	Phase 1 West	Phase 1 South	Total System
Transmission Mains (18" – 36")	33,478 LF	26,955 LF	86,080 LF
Distribution Mains (8" – 30")	21,897 LF	33,212 LF	172,385 LF
Distribution Sub-mains (4" – 12")	22,830 LF	26,735 LF	159,610 LF
Services (1" – 8")	153 EA	343 EA	986 EA
On-site Retrofits	112 EA	76 EA	536 EA
Upgrade Llano Pump Station	Yes	No	Yes
Pressure Reducing Station at Alpha Farm[a]	Yes	No	Yes
Storage Tanks at North Site	No	No	Yes
Upgrade Rohnert Park Pump Station	No	Yes	Yes
PRV Vault in Roberts Lake Road	No	Yes	Yes
Storage Tanks at South Site	No	No	Yes
Storage Tanks in Rohnert Park	No	No	Yes
Algae removal:			
Filtration at Alpha Farm	Yes	No	Yes
Chlorination at Alpha Farm	Yes	No	Yes
Filtration at Rohnert Park PS	No	Yes	Yes
Chlorination at Rohnert Park PS	No	Yes	Yes
Chlorination in Distribution System	Yes	Yes	Yes

a Includes 15% construction contingency and 25% engineering/administration allowance; ENRCCI = 9100.

LF = Lineal Feet

EA = Each

Selection of the preferred Phase 1 option should consider capital cost and the timeframe in which the potential customers are connected and using the recycled water. Converting existing irrigation customers to recycled water would provide immediate potable water offset benefits and provide a source of revenue to help finance the operation and maintenance of the facilities. Connection of potential future users would be driven by new development occurring within the area served by the Phase 1 facilities and would ultimately provide potable water offset benefits and revenue, but the timing of when the facilities are fully utilized is less certain. Table 4 provides a summary of the estimated demands by user category and estimated project costs for the Phase 1 options.

TABLE 4
Phase 1 Costs and Demands
IRWP Santa Rosa Urban Reuse Project – Implementation Options

SRURP Phase	Existing Demand (MGY)	Future Demand (MGY)	Total Demand (MGY)	Estimated Project Cost[a]
Phase 1 West	204	44	248	$36,655[b]
Phase 1 South	77	170	247	$36,355[b]
Future Phases	255	219	474	$82,760
Total SRURP	**536**	**433**	**969**	**$152,400[b]**

a Includes 15% construction contingency and 25% engineering and administration allowance; ENRCCI = 9100.

[b] Pilot project cost included in both Phase 1 options, but is only included once for total SRURP cost.

MGY = Million gallons per year

Both Phase 1 options would be constructed under several contracts. In each case, it is anticipated that the first contract completed would be the Pilot Project. Contracts are set up to take advantage of contractor specialization, to limit the area of impact at any given time during construction, and to maximize service connections as the transmission mains are extended into the area served. Figures 3 and 4 provide illustration of the individual construction contracts for both of the Phase 1 options. Tables 5 and 6 provide summaries of the project costs and user demands, including engineering, administration and construction, for each contract for the two Phase 1 options.

TABLE 5
Phase 1 West Construction Contracts
IRWP Santa Rosa Urban Reuse Project – Implementation Options

Phase 1 West Contract Description	Existing Demand (MGY)	Future Demand (MGY)	Total Demand (MGY)	Estimated Cost[a] (x 1,000)
1. Pilot Project at West College[b]	20	0	20	$3,370
1W. Ludwig Transmission Main[c]	48	2	50	$15,105
2W. Corporate Center Distribution	32	24	56	$4,200
3W. Northpoint/Stony Point Transmission Main	58	11	69	$7,800
4W. Guerneville Road Distribution	46	7	53	$5,500
On-site Retrofits[d]	n/a	n/a	n/a	$680
Total Phase 1 West	**204**	**44**	**248**	**$36,655**

[a] Includes 15% construction contingency and 25% engineering and administration allowance; ENRCCI = 9100.

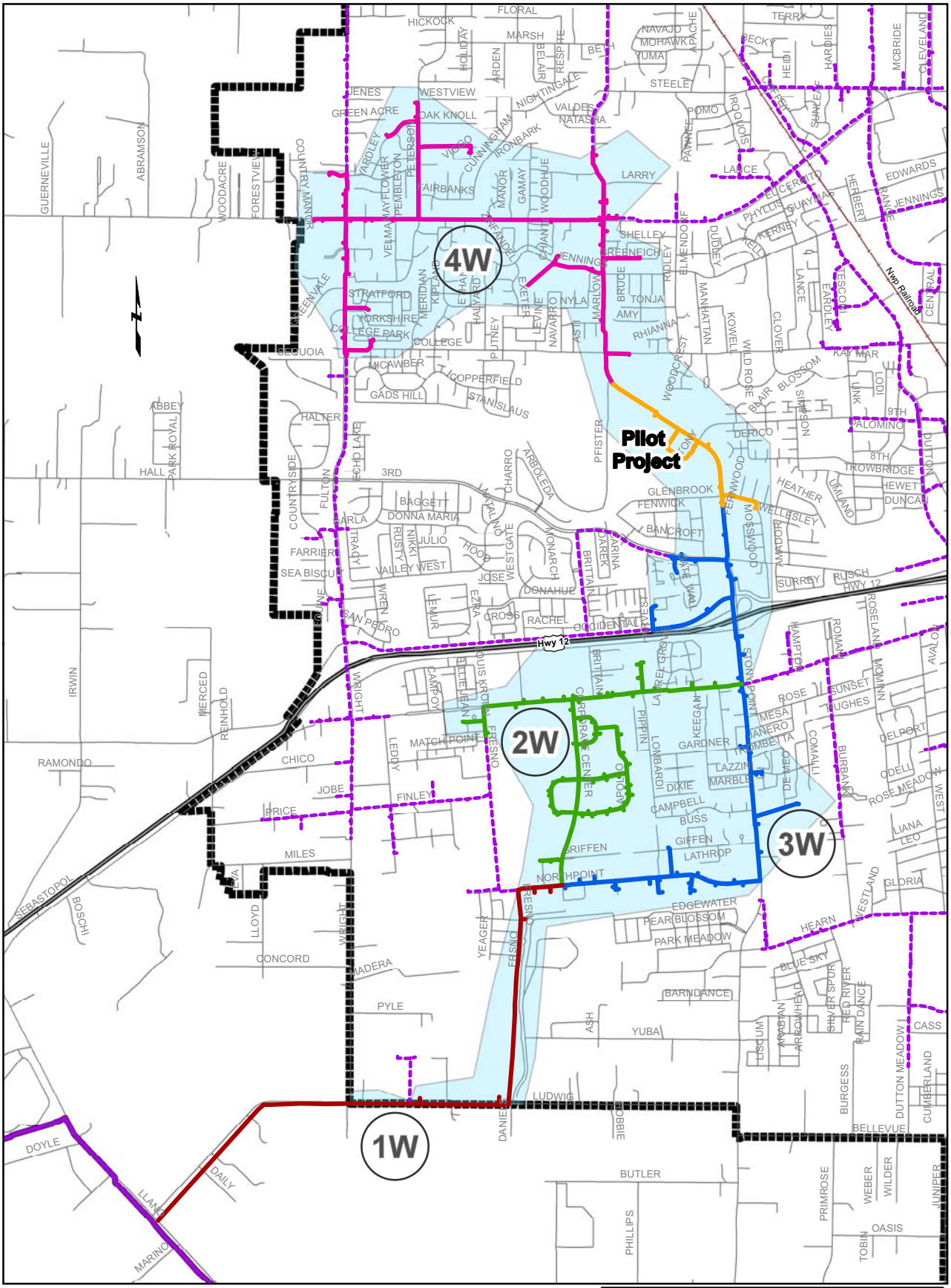
[b] The Pilot Project is the first contract for both Phase 1 options.

[c] The Ludwig Transmission Main includes the pump station improvements, pressure reducing station, and algae removal facilities.

[d] The on-site retrofits would be completed under their own contract over the course of all Phase 1 West contracts.

MGY = Million gallons per year

n/a = Not applicable



Source: Winzler & Kelly Consulting Engineers

Legend

- Contract 1 - Pilot Project
- Contract 1W - Ludwig Transmission Main
- Contract 2W - Corporate Center Distribution
- Contract 3W - Northpoint/Stony Point Transmission Main
- Contract 4W - Guerneville Road Distribution
- Future Phases
- Geysers Pipeline
- Phase I West
- Urban Growth Boundary

0 1,500 3,000 Feet

FIGURE 3
Phase I West Pipeline Contracts

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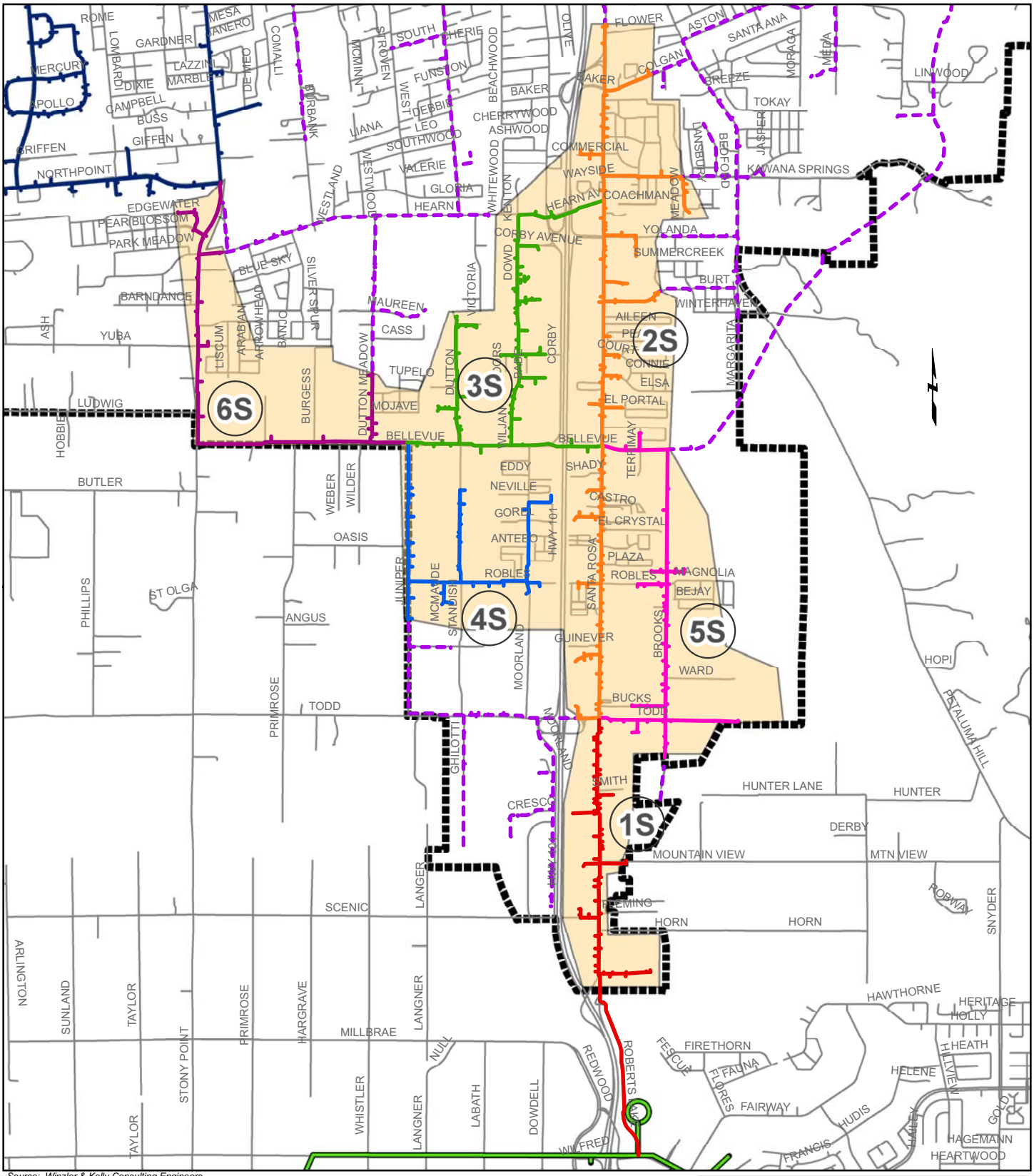

Source: Winzler & Kelly Consulting Engineers

Legend

- Contract 1 - Pilot Project (See Fig.3)
- Contract 1S - SR Ave (South) Transmission Main
- Contract 2S - SR Ave (North) Transmission Main
- Contract 3S - Bellvue/Dowd Distribution
- Contract 4S - Robles/Juniper Distribution
- Contract 5S - Southwest Distribution
- Contract 6S - Bellevue/Stony Point Distribution
- Future Phases
- Phase I West Pipelines
- Rohnert Park Water Reuse System
- Phase I South
- Urban Growth Boundary

0 1,500 3,000 Feet

FIGURE 4
Phase I South Pipeline Contracts

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TABLE 6
Phase 1 South Construction Contracts
IRWP Santa Rosa Urban Reuse Project – Implementation Options

Phase 1 South Contract Description	Existing Demand (MGY)	Future Demand (MGY)	Total Demand (MGY)	Estimated Cost[a] (x 1,000)
1. Pilot Project at West College[b]	20	0	20	$3,370
1S. Santa Rosa Avenue (South) Transmission Main[c]	0	35	35	$10,555
2S. Santa Rosa Avenue (North) Transmission Main	39	53	92	$7,400
3S. Bellevue/Dowd Distribution	23	16	39	$4,300
4S. Robles/Juniper Distribution	7	11	18	$2,000
5S. Southeast Distribution	1	38	39	$2,900
6S. Bellevue/Stony Point Distribution	7	17	24	$5,300
On-site Retrofits[d]	n/a	n/a	n/a	$530
Total Phase 1 South	**77**	**170**	**247**	**$36,355**

[a] Includes 15% construction contingency and 25% engineering and administration costs; ENRCCI = 9100.

[b] The Pilot Project is the first contract for both Phase 1 options.

[c] The Santa Rosa Avenue (South) Transmission Main includes upgrades at the Rohnert Park Pump Station.

[d] The on-site retrofits would be completed under its own contract over the course of all Phase 1 South contracts.

MGY = Million gallons per year

n/a = Not applicable

The implementation schedule for the Phase 1 contracts should be updated yearly based on the Subregional System's disposal requirements and the projected demand for the water in the areas served by each subsequent construction contract.

Phase 1 West Contracts

Delineation of contracts was generally driven by the objective to service as many existing users as possible from the GPL to the proposed north storage tank site. The first contract is the Pilot Project located at the West College Utilities Facility. The following phases are based on geographic area with the second contract starting with the connection to the GPL and the last contract terminating near the proposed tank site. Potential contracts are described below for implementation of Phase 1 West and they can be revised as the project is implemented to better suite the demand for water, disturbance to the community, and financial constraints associated with the work.

Contract 1 – Pilot Project

Contract 1 has approximately 5,800 feet of 18- and 4-inch pipelines that are located near the West College Utilities Facility located on Stony Point Road. The City's Pilot Project located at the West College Facility Project would occur first before the City implements the other Urban Reuse Projects. This segment of piping has one crossing (Santa Rosa

Creek). Additional facilities include upgrade and relocation of a pump station, filters, and chlorination at the City's West College Utilities Facility.

Contract 1W – Ludwig Transmission Main

Contract 1W has approximately 13,400 feet of 36-inch transmission pipe from the GPL, runs northeast on Ludwig Avenue, north on Fresno Avenue, east on Northpoint Parkway and ends at the intersection of Northpoint Parkway and Corporate Center Parkway. This segment of piping has no crossings, but is located in environmentally sensitive areas.

Contract 2W – Corporate Center Distribution

Contract 2W has approximately 18,000 feet of 18-, 8-, 6-, and 4-inch distribution and distribution sub-main pipes. The pipes are generally located near the Northpoint Business Park in the southwest quadrant of the City. This segment of piping has no crossings.

Contract 3W – Northpoint/Stony Point Transmission Main

Contract 3W has approximately 18,200 feet of 36-, 30-, 24-, 18-, 8-, and 4-inch transmission, distribution, and distribution sub-main pipes. The transmission pipes are located on Northpoint Parkway from Corporate Center Parkway to Stony Point Road and on Stony Point Road from Northpoint Parkway to Glenbrook Drive. This segment of piping crosses State Route 12.

Contract 4W – Guerneville Road Distribution

Contract 4W has approximately 23,000 feet of 18-, 8-, 6-, and 4-inch transmission, distribution, and distribution sub-main pipes that are generally located in the northwest quadrant of the City. The transmission pipes are located on Stony Point Road and Marlow Road. There are five creek crossings in West Contract 5.

Phase 1 South Contracts

Similar to the Phase I West contracts, development of Phase I South contracts was generally driven from the objective to service as many existing users as possible from the system's connection to the RPURS in the south to the Kawana Springs storage tank area. Sections with little, if any, existing demand were considered a lower priority and are included in later phases. Potential contracts are described below for implementation of Phase 1 South and they can be revised as the project is implemented to better suite the demand for water, disturbance to the community, and financial constraints associated with the work.

Contract 1 – Pilot Project at West College

The Pilot Project would be the first contract completed for both Phase 1 West and Phase 1 South. Refer to the description under Phase 1 West.

Contract 1S – Santa Rosa Avenue (South) Transmission Main

Contract 1S has approximately 11,300 feet of 24- and 4-inch transmission and distribution sub-main pipes. The transmission pipe connects to the Rohnert Park Water Reuse System, runs north on Roberts Lake Road to Santa Rosa Avenue and ends at Todd

Road. This segment of piping has two creek crossings and is located in environmentally sensitive areas.

Contract 2S - Santa Rosa Avenue (North) Transmission Main

Contract 2S has approximately 23,400 feet of 18-, 8-, 6-, 4-inch transmission, distribution, and distribution sub-main pipes that are located in the northeast quadrant of the City. The transmission pipe is mainly located on Santa Rosa Avenue from Todd Road to Flower Avenue and along Colgan Avenue from Santa Rosa Avenue to Aston Way. This segment of piping crosses Colgan Creek.

Contract 3S – Bellevue/Dowd Distribution

Contract 3S has approximately 16,000 feet of 18-, 8-, and 4-inch transmission, distribution, and distribution sub-main pipes. The transmission pipe is located on Bellevue Avenue from Santa Rosa Avenue to Juniper Avenue. The distribution and distribution sub-main pipes are generally located west of Santa Rosa Avenue and north of Bellevue Avenue. This segment of piping crosses U.S. 101 twice and the railroad tracks.

Contract 4S – Robles/Juniper Distribution

Contract 4S has approximately 10,600 feet of 8- and 4-inch distribution and distribution sub-main pipes that are located west of U.S. 101 and south of Bellevue Avenue. This segment of piping crosses the railroad tracks.

Contract 5S – Southeast Distribution

Contract 5S has approximately 13,500 feet of 8- and 4-inch distribution and distribution sub-main pipes that are located east of Santa Rosa Avenue and generally between Todd Road and Bellevue Avenue in the southeast quadrant of the City. This segment of piping has six creek crossings.

Contract 6S – Bellevue/Stony Point Distribution

Contract 6S has approximately 12,400 feet of 18-, 8-, 6- and 4-inch transmission, distribution, and distribution sub-main pipes. The transmission pipe is located on Bellevue Avenue from Juniper Avenue to Dutton Meadow. The 18-inch distribution pipe is located on Stony Point Road from Bellevue Avenue to Northpoint Parkway at which point it connects to the transmission pipe of Phase I West (Contract 4W). This segment of piping has three creek crossings and is located in environmentally sensitive areas.

Implementation Schedule

The selected Phase 1 option will be implemented over several years. The first contract in either case is anticipated to be the Pilot Project which would require one year for design and permitting and a second year for construction and customer connections. The first contract other than the Pilot Project would include connection to existing water reuse facilities and construction of a transmission main into the City of Santa Rosa. This contract would take three years for design, permitting and construction and could overlap the Pilot Project if desired. Pump station upgrades, pressure reducing stations, and algae removal facilities would also be included in this contract.

Subsequent contracts could be staged for sequential construction with one contract completed each year, or the schedule could be protracted based on the need for disposal, the need for potable water offsets, and/or financial considerations. Likewise, the size of the contracts completed could be reduced or increased as desired for the same reasons. The implementation schedule for the Phase 1 contracts should be updated yearly based on the Subregional System's disposal requirements, the projected demand for the recycled water in the areas served by each subsequent construction contract, and financial considerations.

Attachment 1 Basis of Costs for Pipelines

Basis of Costs for Pipelines

Cost estimation is determined from pipeline alignments and associated appurtenances from the pre-design activity. The cost estimate is based on a bid item format. Pre-design drawings were utilized to quantify pipeline diameter, length, and locations of system high and low points. The Design Standards assisted in determining pipe material, surface restoration quantities, and number of valves, fittings and other associated appurtenances.

In consulting the Design Standards, the following assumptions were utilized:

- 4-inch, 6-inch, and 8-inch diameter pipelines would have a minimum of 36-inches of cover;
- 12-inch diameter pipelines would have a minimum of 42-inches of cover;
- 16-inch or larger diameter pipelines would have a minimum of 48-inches of cover;
- 4-inch, 6-inch, 8-inch and 12-inch diameter mains would be PVC Pressure Class 150;
- 18-inch and 24-inch diameter mains would be DIP per AWWA C151;
- 30-inch and 36-inch diameter mains would be Concrete Cylinder Pipe per AWWA Standard C303;
- Trench widths shall comply with City Standard 215;
- Bedding, Backfill and Drain Rock shall comply with City Standard 215;
- Recycled water would have a minimum of 10 feet of horizontal separation from any water main;
- Recycled water would have a minimum of 4 feet of horizontal separation from any other utility main,
- A minimum of two valves are required at “T” intersections;
- A minimum of three valves are required for cross sections;
- Blow-off valves on transmission and distribution lines were located in topographical low spots and at major utility crossings;
- Blow-off valves were located within 150 feet of a sanitary sewer manhole;
- On 18-inch diameter and greater diameter pipelines, blow-off valves were located with maximum 3,000 foot spacing;
- On pipelines with less than 18-in in diameter, blow-off valves were located with maximum 5,000 foot spacing;
- Air release valves on transmission and distribution lines were located in topographical high spots and at major utility crossings;

- On 18-inch diameter and greater diameter pipelines, air release valves were located with maximum 5,000 foot spacing;
- On pipelines with less than 18-inch in diameter, air release valves were located with maximum 8,000 foot spacing;
- Water sampling stations were located before the first customer from GPL and the RPURS; and
- Water sampling stations were located every mile for transmission mains greater than 12-inch and every 2,500 feet for smaller mains.

Cost estimates were prepared for the complete pipe network of the SRURP, for Phase I West and Phase I South, and further into contracts for Phase I West and Phase I South. Construction costs were itemized into general bid items. Major bid item categories include pipe materials, trenchless crossing, appurtenances, and road surface restoration, along with environmental mitigation costs. Mobilization/demobilization, traffic control, sheeting and shoring, construction contingency, construction management, engineering, and permitting costs are also included in the cost estimates.

The complete pipe network of the SRURP has approximately 418,000 feet of transmission, distribution, and distribution sub-main pipes. Pipes sizes range from 4-inch to 36-inch in diameter. Approximately 12,000 feet of pipeline alignment involves crossing creek, highways, and railroad tracks. There are approximately 990 service laterals ranging from 1-inch to 8-inch. A detail of the SRURP piping cost estimate is provided at the end of this attachment.

For Phase I West, there is approximately 78,000 feet of piping and about 1,400 feet is for crossing creeks and State Route 12. Pipe sizes range from 4-inch to 36-inch in diameter. There are about 3 acres of environmental mitigation area included in the cost estimate. The piping cost detail of Phase I West is included at the end of this attachment.

For Phase I South, there is 9,000 more feet of piping than Phase I West. As a result, the cost of appurtenances and surface restoration is more for Phase I South than Phase I West. However, pipe sizes for the Phase I South are significantly smaller (4-inch to 24-inch) than for the Phase I West, which reduces the pipe material cost significantly. Purchase of approximately 4.5 acres of environmental mitigation area is included in the Phase I South cost estimate. The piping cost detail of Phase I South is included at the end of this attachment.

West Contract 1W Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	13,392	LF	$325	$4,352,400
2	30" CCP C303	0	LF	$300	$0
3	24" DIP C151	0	LF	$275	$0
4	18" DIP C151	0	LF	$175	$0
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	0	LF	$105	$0
7	6" PVC C900	0	LF	$75	$0
8	4" PVC C900	0	LF	$45	$0
	TOTAL	**13,392**	LF		**$4,352,400**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	0	LF	$800	$0
12	Steel Casing for 18" DIP C151	0	LF	$650	$0
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	0	LF	$350	$0
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	0	LF	$200	$0
	TOTAL	**0**	LF		**$0**
	Appurtenances				
17	General Connection	5	EA	$2,750	$13,750
18	8" Service Lateral	1	EA	$5,000	$5,000
19	6" Service Lateral	0	EA	$4,500	$0
20	4" Service Lateral	1	EA	$4,000	$4,000
21	2" Service Lateral	1	EA	$3,500	$3,500
22	1" Service Lateral	2	EA	$2,500	$5,000
23	Water Sampling Stations	2	EA	$2,500	$5,000
24	6" Blowoff Valve	4	EA	$2,500	$10,000
25	4" Blowoff Valve	0	EA	$1,200	$0
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	2	EA	$5,000	$10,000
28	2" Air Release Valve Assembly & Vault	0	EA	$4,500	$0
29	1" Air Release Valve Assembly & Vault	0	EA	$4,000	$0
30	Fittings for 36" CCP C303	7	EA	$7,500	$52,500
31	Fittings for 30" CCP C303	0	EA	$6,500	$0
32	Fittings for 24" DIP C151	0	EA	$5,500	$0
33	Fittings for 18" DIP C151	0	EA	$4,000	$0
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	0	EA	$1,200	$0
36	Fittings for 6" PVC C900	0	EA	$800	$0
37	Fittings for 4" PVC C900	0	EA	$500	$0
38	36" Butterfly Valve C509	5	EA	$13,100	$65,500
39	30" Butterfly Valve C509	0	EA	$9,500	$0
40	24" Butterfly Valve C509	0	EA	$5,700	$0
41	18" Butterfly Valve C509	0	EA	$3,200	$0
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	0	EA	$1,300	$0
44	6" Gate Valve C509	0	EA	$750	$0
45	4" Gate Valve C509	0	EA	$650	$0
	TOTAL				**$174,250**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	5	EA	$150	$750
47	Asphalt Paving	13,392	LF	$10.00	$133,920
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	0	LF	$16.00	$0
50	Environmental	3	Acres	$400,000.00	$1,200,000
	TOTAL				**$1,334,670**

Construction Base Cost:		$5,861,320
Miscellaneous:		
7%	Mobilization/Demobilization	$410,292
8%	Traffic Control	$468,906
7%	Sheeting and Shoring	$410,292
Total:		**$7,150,810**
15%	Construction Contingency	$879,198
Construction Subtotal:		**$8,030,008**
15%	Construction Mgmnt.	$879,198
10%	Engineering	$586,132
1%	Permitting	$58,613
Contract Total:		**$9,553,952**
CALL		**$ 10,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.

West Contract 2W Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	0	LF	$325	$0
2	30" CCP C303	0	LF	$300	$0
3	24" DIP C151	0	LF	$275	$0
4	18" DIP C151	7,276	LF	$175	$1,273,353
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	2,400	LF	$105	$252,032
7	6" PVC C900	2,707	LF	$75	$203,025
8	4" PVC C900	5,329	LF	$45	$239,805
	TOTAL	**17,713**	LF		**$1,968,214**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	0	LF	$800	$0
12	Steel Casing for 18" DIP C151	0	LF	$650	$0
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	0	LF	$350	$0
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	0	LF	$200	$0
	TOTAL	**0**	LF		**$0**
	Appurtenances				
17	General Connection	54	EA	$2,750	$148,500
18	8" Service Lateral	0	EA	$5,000	$0
19	6" Service Lateral	0	EA	$4,500	$0
20	4" Service Lateral	2	EA	$4,000	$8,000
21	2" Service Lateral	27	EA	$3,500	$94,500
22	1" Service Lateral	25	EA	$2,500	$62,500
23	Water Sampling Stations	0	EA	$2,500	$0
24	6" Blowoff Valve	1	EA	$2,500	$2,500
25	4" Blowoff Valve	0	EA	$1,200	$0
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	0	EA	$5,000	$0
28	2" Air Release Valve Assembly & Vault	0	EA	$4,500	$0
29	1" Air Release Valve Assembly & Vault	1	EA	$4,000	$4,000
30	Fittings for 36" CCP C303	0	EA	$7,500	$0
31	Fittings for 30" CCP C303	0	EA	$6,500	$0
32	Fittings for 24" DIP C151	0	EA	$5,500	$0
33	Fittings for 18" DIP C151	13	EA	$4,000	$52,000
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	4	EA	$1,200	$4,800
36	Fittings for 6" PVC C900	7	EA	$800	$5,600
37	Fittings for 4" PVC C900	14	EA	$500	$7,000
38	36" Butterfly Valve C509	0	EA	$13,100	$0
39	30" Butterfly Valve C509	0	EA	$9,500	$0
40	24" Butterfly Valve C509	0	EA	$5,700	$0
41	18" Butterfly Valve C509	9	EA	$3,200	$28,800
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	2	EA	$1,300	$2,600
44	6" Gate Valve C509	3	EA	$750	$2,250
45	4" Gate Valve C509	10	EA	$650	$6,500
	TOTAL				**$429,550**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	54	EA	$150	$8,100
47	Asphalt Paving	17,713	LF	$10.00	$177,126
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	0	LF	$16.00	$0
50	Environmental	0	Acres	$400,000.00	$0
	TOTAL				**$185,226**

Construction Base Cost:		$2,582,990
Miscellaneous:		
7%	Mobilization/Demobilization	$180,809
8%	Traffic Control	$206,639
7%	Sheeting and Shoring	$180,809
Total:		**$3,151,248**
15%	Construction Contingency	$387,449
Construction Subtotal:		**$3,538,696**
15%	Construction Mgmnt.	$387,449
10%	Engineering	$258,299
1%	Permitting	$25,830
Contract Total:		**$4,210,274**
CALL		**$ 5,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.

West Contract 3W Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	4,042	LF	$325	$1,313,650
2	30" CCP C303	4,003	LF	$300	$1,200,900
3	24" DIP C151	2,536	LF	$275	$697,400
4	18" DIP C151	1,123	LF	$175	$196,525
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	2,931	LF	$105	$307,776
7	6" PVC C900	0	LF	$75	$0
8	4" PVC C900	3,214	LF	$45	$144,630
	TOTAL	**17,849**	LF		**$3,860,881**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	280	LF	$800	$224,000
12	Steel Casing for 18" DIP C151	0	LF	$650	$0
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	0	LF	$350	$0
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	0	LF	$200	$0
	TOTAL	**280**	LF		**$224,000**
	Appurtenances				
17	General Connection	41	EA	$2,750	$112,750
18	8" Service Lateral	0	EA	$5,000	$0
19	6" Service Lateral	1	EA	$4,500	$4,500
20	4" Service Lateral	5	EA	$4,000	$20,000
21	2" Service Lateral	18	EA	$3,500	$63,000
22	1" Service Lateral	17	EA	$2,500	$42,500
23	Water Sampling Stations	2	EA	$2,500	$5,000
24	6" Blowoff Valve	4	EA	$2,500	$10,000
25	4" Blowoff Valve	0	EA	$1,200	$0
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	3	EA	$5,000	$15,000
28	2" Air Release Valve Assembly & Vault	0	EA	$4,500	$0
29	1" Air Release Valve Assembly & Vault	0	EA	$4,000	$0
30	Fittings for 36" CCP C303	6	EA	$7,500	$45,000
31	Fittings for 30" CCP C303	10	EA	$6,500	$65,000
32	Fittings for 24" DIP C151	4	EA	$5,500	$22,000
33	Fittings for 18" DIP C151	0	EA	$4,000	$0
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	1	EA	$1,200	$1,200
36	Fittings for 6" PVC C900	0	EA	$800	$0
37	Fittings for 4" PVC C900	0	EA	$500	$0
38	36" Butterfly Valve C509	5	EA	$13,100	$65,500
39	30" Butterfly Valve C509	4	EA	$9,500	$38,000
40	24" Butterfly Valve C509	2	EA	$5,700	$11,400
41	18" Butterfly Valve C509	1	EA	$3,200	$3,200
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	2	EA	$1,300	$2,600
44	6" Gate Valve C509	0	EA	$750	$0
45	4" Gate Valve C509	9	EA	$650	$5,850
	TOTAL				**$532,500**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	41	EA	$150	$6,150
47	Asphalt Paving	17,849	LF	$10.00	$178,492
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	0	LF	$16.00	$0
50	Environmental	0	Acres	$400,000.00	$0
	TOTAL				**$184,642**

Construction Base Cost:		$4,802,023
Miscellaneous:		
7%	Mobilization/Demobilization	$336,142
8%	Traffic Control	$384,162
7%	Sheeting and Shoring	$336,142
Total:		**$5,858,468**
15%	Construction Contingency	$720,303
Construction Subtotal:		**$6,578,772**
15%	Construction Mgmnt.	$720,303
10%	Engineering	$480,202
1%	Permitting	$48,020
Contract Total:		**$7,827,297**
CALL		**$ 8,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.

West Contract 4W Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	0	LF	$325	$0
2	30" CCP C303	0	LF	$300	$0
3	24" DIP C151	0	LF	$275	$0
4	18" DIP C151	4,824	LF	$175	$844,218
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	10,749	LF	$105	$1,128,645
7	6" PVC C900	2,450	LF	$75	$183,773
8	4" PVC C900	4,684	LF	$45	$210,780
	TOTAL	**22,707**	LF		**$2,367,415**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	0	LF	$800	$0
12	Steel Casing for 18" DIP C151	300	LF	$650	$195,000
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	420	LF	$350	$147,000
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	150	LF	$200	$30,000
	TOTAL	**870**	LF		**$372,000**
	Appurtenances				
17	General Connection	40	EA	$2,750	$110,000
18	8" Service Lateral	0	EA	$5,000	$0
19	6" Service Lateral	0	EA	$4,500	$0
20	4" Service Lateral	5	EA	$4,000	$20,000
21	2" Service Lateral	16	EA	$3,500	$56,000
22	1" Service Lateral	19	EA	$2,500	$47,500
23	Water Sampling Stations	3	EA	$2,500	$7,500
24	6" Blowoff Valve	2	EA	$2,500	$5,000
25	4" Blowoff Valve	2	EA	$1,200	$2,400
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	0	EA	$5,000	$0
28	2" Air Release Valve Assembly & Vault	2	EA	$4,500	$9,000
29	1" Air Release Valve Assembly & Vault	6	EA	$4,000	$24,000
30	Fittings for 36" CCP C303	0	EA	$7,500	$0
31	Fittings for 30" CCP C303	0	EA	$6,500	$0
32	Fittings for 24" DIP C151	0	EA	$5,500	$0
33	Fittings for 18" DIP C151	15	EA	$4,000	$60,000
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	16	EA	$1,200	$19,200
36	Fittings for 6" PVC C900	1	EA	$800	$800
37	Fittings for 4" PVC C900	8	EA	$500	$4,000
38	36" Butterfly Valve C509	0	EA	$13,100	$0
39	30" Butterfly Valve C509	0	EA	$9,500	$0
40	24" Butterfly Valve C509	0	EA	$5,700	$0
41	18" Butterfly Valve C509	4	EA	$3,200	$12,800
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	10	EA	$1,300	$13,000
44	6" Gate Valve C509	3	EA	$750	$2,250
45	4" Gate Valve C509	8	EA	$650	$5,200
	TOTAL				**$398,650**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	40	EA	$150	$6,000
47	Asphalt Paving	22,707	LF	$10.00	$227,074
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	0	LF	$16.00	$0
50	Environmental	0	Acres	$400,000.00	$0
	TOTAL				**$233,074**

Construction Base Cost:		$3,371,139
Miscellaneous:		
7%	Mobilization/Demobilization	$235,980
8%	Traffic Control	$269,691
7%	Sheeting and Shoring	$235,980
Total:		**$4,112,790**
15%	Construction Contingency	$505,671
Construction Subtotal:		**$4,618,460**
15%	Construction Mgmnt.	$505,671
10%	Engineering	$337,114
1%	Permitting	$33,711
Contract Total:		**$5,494,957**
CALL		**$ 6,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.

South Contract 1S Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	0	LF	$325	$0
2	30" CCP C303	0	LF	$300	$0
3	24" DIP C151	8,886	LF	$275	$2,443,650
4	18" DIP C151	0	LF	$175	$0
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	0	LF	$105	$0
7	6" PVC C900	0	LF	$75	$0
8	4" PVC C900	2,202	LF	$45	$99,090
	TOTAL	**11,088**	LF		**$2,542,740**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	270	LF	$800	$216,000
12	Steel Casing for 18" DIP C151	0	LF	$650	$0
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	0	LF	$350	$0
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	0	LF	$200	$0
	TOTAL	**270**	LF		**$216,000**
	Appurtenances				
17	General Connection	53	EA	$2,750	$145,750
18	8" Service Lateral	0	EA	$5,000	$0
19	6" Service Lateral	0	EA	$4,500	$0
20	4" Service Lateral	2	EA	$4,000	$8,000
21	2" Service Lateral	15	EA	$3,500	$52,500
22	1" Service Lateral	36	EA	$2,500	$90,000
23	Water Sampling Stations	2	EA	$2,500	$5,000
24	6" Blowoff Valve	3	EA	$2,500	$7,500
25	4" Blowoff Valve	0	EA	$1,200	$0
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	5	EA	$5,000	$25,000
28	2" Air Release Valve Assembly & Vault	0	EA	$4,500	$0
29	1" Air Release Valve Assembly & Vault	1	EA	$4,000	$4,000
30	Fittings for 36" CCP C303	0	EA	$7,500	$0
31	Fittings for 30" CCP C303	0	EA	$6,500	$0
32	Fittings for 24" DIP C151	20	EA	$5,500	$110,000
33	Fittings for 18" DIP C151	0	EA	$4,000	$0
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	0	EA	$1,200	$0
36	Fittings for 6" PVC C900	0	EA	$800	$0
37	Fittings for 4" PVC C900	1	EA	$500	$500
38	36" Butterfly Valve C509	0	EA	$13,100	$0
39	30" Butterfly Valve C509	0	EA	$9,500	$0
40	24" Butterfly Valve C509	5	EA	$5,700	$28,500
41	18" Butterfly Valve C509	0	EA	$3,200	$0
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	0	EA	$1,300	$0
44	6" Gate Valve C509	0	EA	$750	$0
45	4" Gate Valve C509	4	EA	$650	$2,600
	TOTAL				**$479,350**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	53	EA	$150	$7,950
47	Asphalt Paving	5,088	LF	$10.00	$50,880
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	6,000	LF	$16.00	$96,000
50	Environmental	3	Acres	$400,000.00	$1,200,000
	TOTAL				**$1,354,830**

Construction Base Cost:		$4,592,920
Miscellaneous:		
7%	Mobilization/Demobilization	$321,504
8%	Traffic Control	$367,434
7%	Sheeting and Shoring	$321,504
Total:		**$5,603,362**
15%	Construction Contingency	$688,938
Construction Subtotal:		**$6,292,300**
15%	Construction Mgmnt.	$688,938
10%	Engineering	$459,292
1%	Permitting	$45,929
Contract Total:		**$7,486,460**
CALL		**$ 8,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.

South Contract 2S Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	0	LF	$325	$0
2	30" CCP C303	0	LF	$300	$0
3	24" DIP C151	0	LF	$275	$0
4	18" DIP C151	14,752	LF	$175	$2,581,600
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	1,581	LF	$105	$166,016
7	6" PVC C900	1,553	LF	$75	$116,475
8	4" PVC C900	5,151	LF	$45	$231,795
	TOTAL	**23,037**	LF		**$3,095,886**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	0	LF	$800	$0
12	Steel Casing for 18" DIP C151	100	LF	$650	$65,000
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	0	LF	$350	$0
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	0	LF	$200	$0
	TOTAL	**100**	LF		**$65,000**
	Appurtenances				
17	General Connection	124	EA	$2,750	$341,000
18	8" Service Lateral	0	EA	$5,000	$0
19	6" Service Lateral	0	EA	$4,500	$0
20	4" Service Lateral	5	EA	$4,000	$20,000
21	2" Service Lateral	36	EA	$3,500	$126,000
22	1" Service Lateral	83	EA	$2,500	$207,500
23	Water Sampling Stations	2	EA	$2,500	$5,000
24	6" Blowoff Valve	4	EA	$2,500	$10,000
25	4" Blowoff Valve	0	EA	$1,200	$0
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	0	EA	$5,000	$0
28	2" Air Release Valve Assembly & Vault	4	EA	$4,500	$18,000
29	1" Air Release Valve Assembly & Vault	1	EA	$4,000	$4,000
30	Fittings for 36" CCP C303	0	EA	$7,500	$0
31	Fittings for 30" CCP C303	0	EA	$6,500	$0
32	Fittings for 24" DIP C151	0	EA	$5,500	$0
33	Fittings for 18" DIP C151	25	EA	$4,000	$100,000
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	1	EA	$1,200	$1,200
36	Fittings for 6" PVC C900	3	EA	$800	$2,400
37	Fittings for 4" PVC C900	7	EA	$500	$3,500
38	36" Butterfly Valve C509	0	EA	$13,100	$0
39	30" Butterfly Valve C509	0	EA	$9,500	$0
40	24" Butterfly Valve C509	0	EA	$5,700	$0
41	18" Butterfly Valve C509	18	EA	$3,200	$57,600
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	2	EA	$1,300	$2,600
44	6" Gate Valve C509	1	EA	$750	$750
45	4" Gate Valve C509	12	EA	$650	$7,800
	TOTAL				**$907,350**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	124	EA	$150	$18,600
47	Asphalt Paving	12,037	LF	$10.00	$120,371
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	11,000	LF	$16.00	$176,000
50	Environmental	0	Acres	$400,000.00	$0
	TOTAL				**$314,971**

Construction Base Cost:		$4,383,207
Miscellaneous:		
7%	Mobilization/Demobilization	$306,824
8%	Traffic Control	$350,657
7%	Sheeting and Shoring	$306,824
Total:		**$5,347,512**
15%	Construction Contingency	$657,481
Construction Subtotal:		**$6,004,993**
15%	Construction Mgmnt.	$657,481
10%	Engineering	$438,321
1%	Permitting	$43,832
Contract Total:		**$7,144,627**
CALL		**$ 8,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.

South Contract 3S Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	0	LF	$325	$0
2	30" CCP C303	0	LF	$300	$0
3	24" DIP C151	0	LF	$275	$0
4	18" DIP C151	3,906	LF	$175	$683,498
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	6,408	LF	$105	$672,840
7	6" PVC C900	0	LF	$75	$0
8	4" PVC C900	5,424	LF	$45	$244,080
	TOTAL	**15,738**	LF		**$1,600,418**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	0	LF	$800	$0
12	Steel Casing for 18" DIP C151	330	LF	$650	$214,500
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	470	LF	$350	$164,500
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	0	LF	$200	$0
	TOTAL	**800**	LF		**$379,000**
	Appurtenances				
17	General Connection	64	EA	$2,750	$176,000
18	8" Service Lateral	0	EA	$5,000	$0
19	6" Service Lateral	0	EA	$4,500	$0
20	4" Service Lateral	1	EA	$4,000	$4,000
21	2" Service Lateral	14	EA	$3,500	$49,000
22	1" Service Lateral	49	EA	$2,500	$122,500
23	Water Sampling Stations	1	EA	$2,500	$2,500
24	6" Blowoff Valve	1	EA	$2,500	$2,500
25	4" Blowoff Valve	1	EA	$1,200	$1,200
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	0	EA	$5,000	$0
28	2" Air Release Valve Assembly & Vault	2	EA	$4,500	$9,000
29	1" Air Release Valve Assembly & Vault	2	EA	$4,000	$8,000
30	Fittings for 36" CCP C303	0	EA	$7,500	$0
31	Fittings for 30" CCP C303	0	EA	$6,500	$0
32	Fittings for 24" DIP C151	0	EA	$5,500	$0
33	Fittings for 18" DIP C151	11	EA	$4,000	$44,000
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	16	EA	$1,200	$19,200
36	Fittings for 6" PVC C900	0	EA	$800	$0
37	Fittings for 4" PVC C900	12	EA	$500	$6,000
38	36" Butterfly Valve C509	0	EA	$13,100	$0
39	30" Butterfly Valve C509	0	EA	$9,500	$0
40	24" Butterfly Valve C509	0	EA	$5,700	$0
41	18" Butterfly Valve C509	4	EA	$3,200	$12,800
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	7	EA	$1,300	$9,100
44	6" Gate Valve C509	0	EA	$750	$0
45	4" Gate Valve C509	11	EA	$650	$7,150
	TOTAL				**$472,950**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	64	EA	$150	$9,600
47	Asphalt Paving	15,738	LF	$10.00	$157,377
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	0	LF	$16.00	$0
50	Environmental	0	Acres	$400,000.00	$0
	TOTAL				**$166,977**

Construction Base Cost:		$2,619,345
Miscellaneous:		
7%	Mobilization/Demobilization	$183,354
8%	Traffic Control	$209,548
7%	Sheeting and Shoring	$183,354
Total:		**$3,195,600**
15%	Construction Contingency	$392,902
Construction Subtotal:		**$3,588,502**
15%	Construction Mgmnt.	$392,902
10%	Engineering	$261,934
1%	Permitting	$26,193
Contract Total:		**$4,269,532**
CALL		**$ 5,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.

South Contract 4S Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	0	LF	$325	$0
2	30" CCP C303	0	LF	$300	$0
3	24" DIP C151	0	LF	$275	$0
4	18" DIP C151	0	LF	$175	$0
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	5,842	LF	$105	$613,389
7	6" PVC C900	0	LF	$75	$0
8	4" PVC C900	4,711	LF	$45	$211,973
	TOTAL	**10,552**	LF		**$825,362**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	0	LF	$800	$0
12	Steel Casing for 18" DIP C151	0	LF	$650	$0
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	240	LF	$350	$84,000
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	0	LF	$200	$0
	TOTAL	**240**	LF		**$84,000**
	Appurtenances				
17	General Connection	29	EA	$2,750	$79,750
18	8" Service Lateral	0	EA	$5,000	$0
19	6" Service Lateral	0	EA	$4,500	$0
20	4" Service Lateral	0	EA	$4,000	$0
21	2" Service Lateral	8	EA	$3,500	$28,000
22	1" Service Lateral	21	EA	$2,500	$52,500
23	Water Sampling Stations	2	EA	$2,500	$5,000
24	6" Blowoff Valve	0	EA	$2,500	$0
25	4" Blowoff Valve	1	EA	$1,200	$1,200
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	0	EA	$5,000	$0
28	2" Air Release Valve Assembly & Vault	0	EA	$4,500	$0
29	1" Air Release Valve Assembly & Vault	3	EA	$4,000	$12,000
30	Fittings for 36" CCP C303	0	EA	$7,500	$0
31	Fittings for 30" CCP C303	0	EA	$6,500	$0
32	Fittings for 24" DIP C151	0	EA	$5,500	$0
33	Fittings for 18" DIP C151	0	EA	$4,000	$0
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	12	EA	$1,200	$14,400
36	Fittings for 6" PVC C900	0	EA	$800	$0
37	Fittings for 4" PVC C900	8	EA	$500	$4,000
38	36" Butterfly Valve C509	0	EA	$13,100	$0
39	30" Butterfly Valve C509	0	EA	$9,500	$0
40	24" Butterfly Valve C509	0	EA	$5,700	$0
41	18" Butterfly Valve C509	0	EA	$3,200	$0
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	6	EA	$1,300	$7,800
44	6" Gate Valve C509	0	EA	$750	$0
45	4" Gate Valve C509	6	EA	$650	$3,900
	TOTAL				**$208,550**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	29	EA	$150	$4,350
47	Asphalt Paving	10,552	LF	$10.00	$105,523
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	0	LF	$16.00	$0
50	Environmental	0	Acres	$400,000.00	$0
	TOTAL				**$109,873**

Construction Base Cost:		$1,227,785
Miscellaneous:		
7%	Mobilization/Demobilization	$85,945
8%	Traffic Control	$98,223
7%	Sheeting and Shoring	$85,945
Total:		**$1,497,897**
15%	Construction Contingency	$184,168
Construction Subtotal:		**$1,682,065**
15%	Construction Mgmnt.	$184,168
10%	Engineering	$122,778
1%	Permitting	$12,278
Contract Total:		**$2,001,289**
CALL		**$ 3,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.

South Contract 5S Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	0	LF	$325	$0
2	30" CCP C303	0	LF	$300	$0
3	24" DIP C151	0	LF	$275	$0
4	18" DIP C151	0	LF	$175	$0
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	7,975	LF	$105	$837,407
7	6" PVC C900	0	LF	$75	$0
8	4" PVC C900	5,422	LF	$45	$243,990
	TOTAL	**13,397**	LF		**$1,081,397**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	0	LF	$800	$0
12	Steel Casing for 18" DIP C151	0	LF	$650	$0
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	460	LF	$350	$161,000
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	310	LF	$200	$62,000
	TOTAL	**770**	LF		**$223,000**
	Appurtenances				
17	General Connection	49	EA	$2,750	$134,750
18	8" Service Lateral	0	EA	$5,000	$0
19	6" Service Lateral	0	EA	$4,500	$0
20	4" Service Lateral	2	EA	$4,000	$8,000
21	2" Service Lateral	8	EA	$3,500	$28,000
22	1" Service Lateral	39	EA	$2,500	$97,500
23	Water Sampling Stations	0	EA	$2,500	$0
24	6" Blowoff Valve	0	EA	$2,500	$0
25	4" Blowoff Valve	1	EA	$1,200	$1,200
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	0	EA	$5,000	$0
28	2" Air Release Valve Assembly & Vault	0	EA	$4,500	$0
29	1" Air Release Valve Assembly & Vault	4	EA	$4,000	$16,000
30	Fittings for 36" CCP C303	0	EA	$7,500	$0
31	Fittings for 30" CCP C303	0	EA	$6,500	$0
32	Fittings for 24" DIP C151	0	EA	$5,500	$0
33	Fittings for 18" DIP C151	0	EA	$4,000	$0
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	10	EA	$1,200	$12,000
36	Fittings for 6" PVC C900	0	EA	$800	$0
37	Fittings for 4" PVC C900	0	EA	$500	$0
38	36" Butterfly Valve C509	0	EA	$13,100	$0
39	30" Butterfly Valve C509	0	EA	$9,500	$0
40	24" Butterfly Valve C509	0	EA	$5,700	$0
41	18" Butterfly Valve C509	0	EA	$3,200	$0
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	10	EA	$1,300	$13,000
44	6" Gate Valve C509	0	EA	$750	$0
45	4" Gate Valve C509	8	EA	$650	$5,200
	TOTAL				**$315,650**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	49	EA	$150	$7,350
47	Asphalt Paving	13,397	LF	$10.00	$133,973
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	0	LF	$16.00	$0
50	Environmental	0	Acres	$400,000.00	$0
	TOTAL				**$141,323**

Construction Base Cost:		$1,761,370
Miscellaneous:		
7%	Mobilization/Demobilization	$123,296
8%	Traffic Control	$140,910
7%	Sheeting and Shoring	$123,296
Total:		**$2,148,871**
15%	Construction Contingency	$264,205
Construction Subtotal:		**$2,413,076**
15%	Construction Mgmnt.	$264,205
10%	Engineering	$176,137
1%	Permitting	$17,614
Contract Total:		**$2,871,032**
CALL		**$ 3,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.

South Contract 6S Cost Estimate

Item No.	Bid Item	Quantity	Units	Unit Cost	Total Cost
	Recycled Water Pipes*				
1	36" CCP C303	0	LF	$325	$0
2	30" CCP C303	0	LF	$300	$0
3	24" DIP C151	0	LF	$275	$0
4	18" DIP C151	9,443	LF	$175	$1,652,508
5	12" PVC C900	0	LF	$135	$0
6	8" PVC C900	1,376	LF	$105	$144,480
7	6" PVC C900	455	LF	$75	$34,125
8	4" PVC C900	871	LF	$45	$39,195
	TOTAL	**12,145**	LF		**$1,870,308**
	Crossings				
9	Steel Casing for 36" CCP C303	0	LF	$1,050	$0
10	Steel Casing for 30" CCP C303	0	LF	$925	$0
11	Steel Casing for 24" DIP C151	0	LF	$800	$0
12	Steel Casing for 18" DIP C151	458	LF	$650	$297,700
13	Steel Casing for 12" PVC C900	0	LF	$350	$0
14	Steel Casing for 8" PVC C900	120	LF	$350	$42,000
15	Steel Casing for 6" PVC C900	0	LF	$200	$0
16	Steel Casing for 4" PVC C900	0	LF	$200	$0
	TOTAL	**578**	LF		**$339,700**
	Appurtenances				
17	General Connection	23	EA	$2,750	$63,250
18	8" Service Lateral	0	EA	$5,000	$0
19	6" Service Lateral	0	EA	$4,500	$0
20	4" Service Lateral	2	EA	$4,000	$8,000
21	2" Service Lateral	8	EA	$3,500	$28,000
22	1" Service Lateral	13	EA	$2,500	$32,500
23	Water Sampling Stations	1	EA	$2,500	$2,500
24	6" Blowoff Valve	2	EA	$2,500	$5,000
25	4" Blowoff Valve	1	EA	$1,200	$1,200
26	2" Blowoff Valve	0	EA	$900	$0
27	3" Air Release Valve Assembly & Vault	0	EA	$5,000	$0
28	2" Air Release Valve Assembly & Vault	3	EA	$4,500	$13,500
29	1" Air Release Valve Assembly & Vault	1	EA	$4,000	$4,000
30	Fittings for 36" CCP C303	0	EA	$7,500	$0
31	Fittings for 30" CCP C303	0	EA	$6,500	$0
32	Fittings for 24" DIP C151	0	EA	$5,500	$0
33	Fittings for 18" DIP C151	14	EA	$4,000	$56,000
34	Fittings for 12" PVC C900	0	EA	$1,500	$0
35	Fittings for 8" PVC C900	2	EA	$1,200	$2,400
36	Fittings for 6" PVC C900	0	EA	$800	$0
37	Fittings for 4" PVC C900	4	EA	$500	$2,000
38	36" Butterfly Valve C509	0	EA	$13,100	$0
39	30" Butterfly Valve C509	0	EA	$9,500	$0
40	24" Butterfly Valve C509	0	EA	$5,700	$0
41	18" Butterfly Valve C509	7	EA	$3,200	$22,400
42	12" Gate Valve C509	0	EA	$1,500	$0
43	8" Gate Valve C509	1	EA	$1,300	$1,300
44	6" Gate Valve C509	1	EA	$750	$750
45	4" Gate Valve C509	2	EA	$650	$1,300
	TOTAL				**$244,100**
	Surface Restoration				
46	Curb & Gutter Repair for Connections	23	EA	$150	$3,450
47	Asphalt Paving	12,145	LF	$10.00	$121,449
48	Unpaved Restoration	0	LF	$5.00	$0
49	Concrete Road Restoration	0	LF	$16.00	$0
50	Environmental	1.5	Acres	$400,000.00	$600,000
	TOTAL				**$724,899**

Construction Base Cost:		$3,179,007
Miscellaneous:		
7%	Mobilization/Demobilization	$222,530
8%	Traffic Control	$254,321
7%	Sheeting and Shoring	$222,530
Total:		**$3,878,388**
15%	Construction Contingency	$476,851
Construction Subtotal:		**$4,355,239**
15%	Construction Mgmnt.	$476,851
10%	Engineering	$317,901
1%	Permitting	$31,790
Contract Total:		**$5,181,781**
CALL		**$ 6,000,000**

Notes:

*** =** Unit costs for items include materials, trench, labor, backfill, excavation, linear appurtenances, and corrosion protection.