Basis of Design Report

LOS OLIVOS WASTEWATER COLLECTION ANALYSIS

Prepared for:

Los Olivos Community Service District

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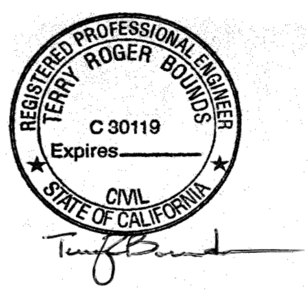

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EXECUTIVE SUMMARY

The purpose of this Basis of Design (BOD) is to compare alternative collection systems configuration and make an initial recommendation on the best approach for the unincorporated community of Los Olivos. This BOD has been conducted by Regen AEC (Regen) for the Los Olivos Community Service District (LOCSD) and the Los Olivos Wastewater Reclamation Program Project (LOWRPP). The City of Los Olivos has been analyzing solutions for the wastewater concerns for close over 15-years, during which time construction costs are estimated to have increased by roughly 85% based on the Construction Cost Index[1]. With the current costs of inflation and the availability of funding the timing for a solution is critical, lest another 15 years of costs drive the price of alternatives even higher.

Within this analysis the community was divided into 6 zones based on guidance from the Board of Directors of the Los Olivos Community Service District. The zones were utilized to evaluate three alternatives, including gravity sewer wastewater collection, effluent sewer wastewater collection, and advanced onsite individual onsite treatment and dispersal systems. Four options (A, B, C, & D) were analyzed utilizing these three alternative systems.

- Option A included a gravity sewer for the collection of wastewater within zones 1 & 2 (commercial area) and effluent sewer throughout zones 3, 4, 5, & 6
- Option B included an effluent sewer throughout all zones
- Option C included a gravity sewer for the collection of wastewater within zones 1 & 2 (commercial area), effluent sewer throughout zones 3, 4, & 5, and advanced onsite systems throughout zone 6
- Option D included an effluent sewer throughout zones 1, 2, 3, 4, & 5, and advanced onsite systems throughout zone 6.

The analysis included an evaluation of capital costs and wastewater constituents associated with all zones and options. A summary of the results is provided below:

Table 1 – Wastewater Flow

Option	Avg Wet Day (gpd)	Max Dry Month (gpd)	Max Dry Day (gpd)	Peak Hour (gpm)
A	129,800*	110,800	134,900	308*
B	96,200	110,800	134,900	134
C	115,000*	93,700	114,100	287*
D	81,400	93,700	114,100	113

* Based on estimated gravity sewer wet weather flow from Metcalf & Eddy 2003
gpd – gallons per day
gpm – gallons per minute

[1] https://www.mortenson.com/cost-index

Table 2 – Wastewater Constituents

Option	Avg BOD (mg/L)	Avg TSS (mg/L)	Avg TKN (mg/L)
A	180	143	53
B	150	40	65
C	186	162	51
D	150	40	65

BOD – Biochemical Oxygen Demand
TSS – Total Suspended Solids
TKN – Total Kjeldahl Nitrogen

Table 3 – Capital Costs

Option	Collection System Subtotal ($US)	Advanced Onsite Subtotal ($US)
A	$25,503,016	$0
B	$21,637,492	$0
C	$23,064,728	$6,734,000
D	$18,669,808	$6,734,000

Based on this analysis the economic benefits of an effluent sewer wastewater collection system option appear to make it the most viable solution at this moment. In addition to the economic benefits of the collection system there are additional benefits to the price, size, and complexity of the centralized treatment and reuse facility with use of an effluent sewer.

INTRODUCTION

This Basis of Design (BOD) report had been developed to provide the Los Olivos Community Service District (CSD or District) with a foundational design basis for the development of a hybrid wastewater collection system design. Regen has been contracted to assist the Los Olivos Community Services District with the design of a hybrid wastewater collection system.

Project Team

Project Principal

Project Engineer – Terry Bounds, P.E.
Engineer, Regen AEC, PLLC

Project Lead

Project Engineer – Tristian Bounds, P.E.
Owner and principal of Regen AEC, PLLC

STUDY AREA CHARACTERISTICS

The Los Olivos area is located within Santa Barbara County off California highway 154. The proposed wastewater collection area consists of 396 parcels and roughly 840 residents. Per adopted Resolution 2019-04, the Los Olivos Wastewater Reclamation Program Project (LOWRPP) was initiated to help identify strategies to provide viable wastewater collection and treatment for the residents and business owners within the CSD.

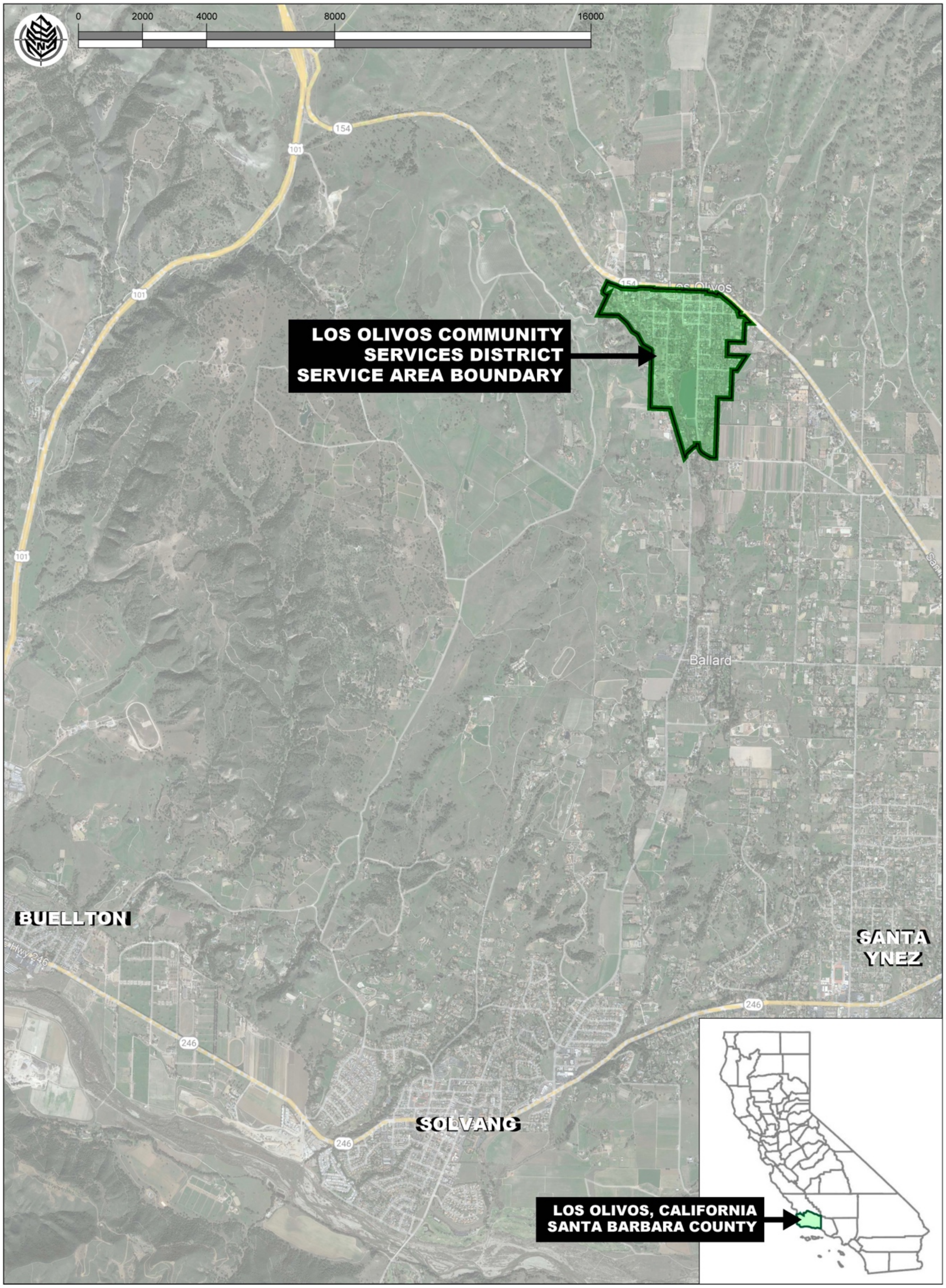


Figure 1 – Vicinity Map

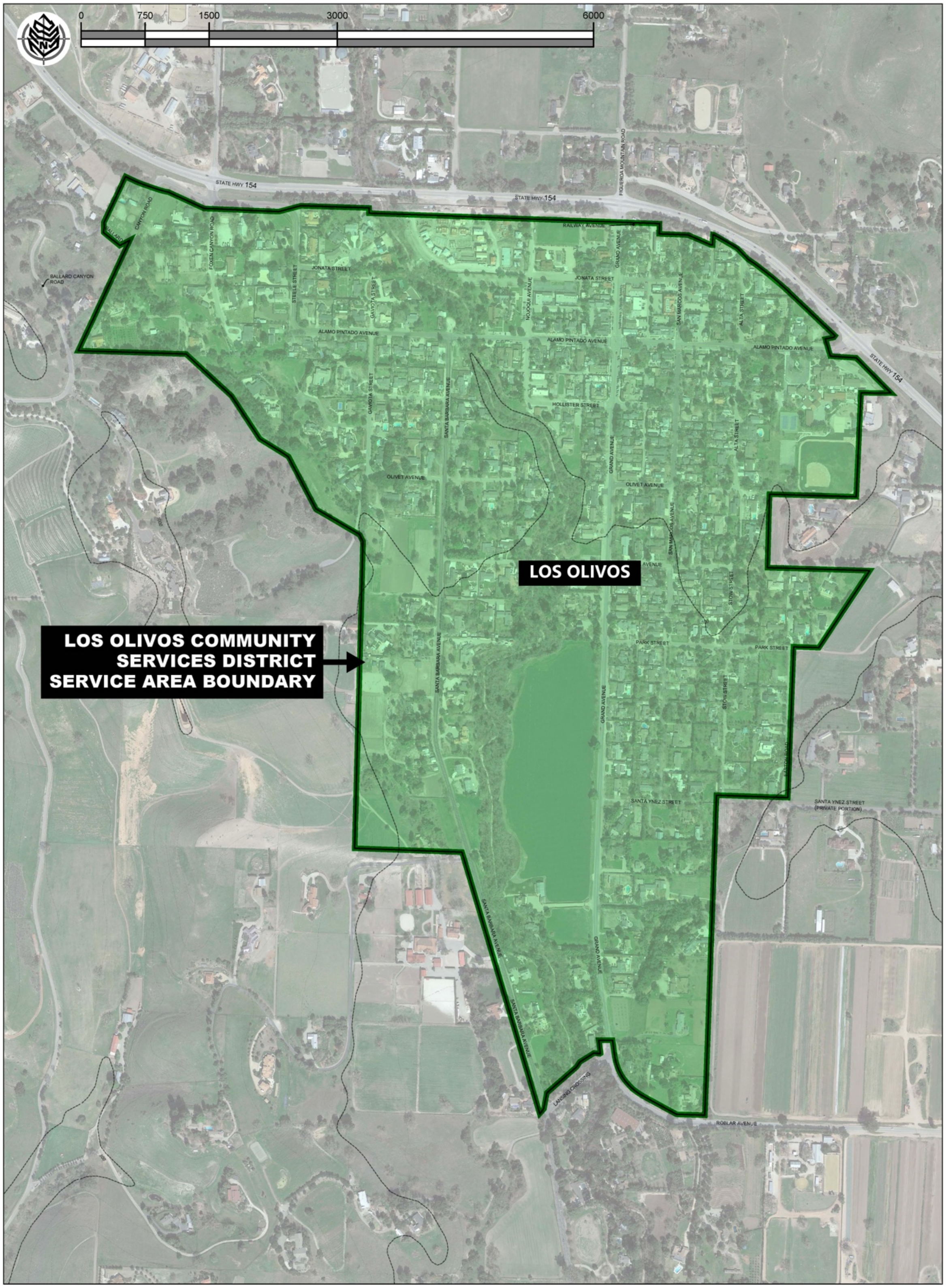


Figure 2 – Community Service District Area Boundary

PREVIOUS STUDIES

The community of Los Olivos has had several studies conducted over the past two decades to evaluate wastewater alternatives to address groundwater quality concerns. Key previous studies include:

1. Santa Ynez Valley Community Plan Environmental Impact Report (EIR 2009)
2. Los Olivos Wastewater Management Plan (LOWWMP 2010)
3. Los Olivos Wastewater System Preliminary Engineering Report (AECOM 2013)
4. Los Olivos Special Problems Area Sewer Calculations (Stantec 2015)
5. Final Draft Plan for Services and Feasibility Study (Berkson 2016)
6. Update to Los Olivos Wastewater System Preliminary Engineering Report (AECOM 2016)
7. Desktop Study- Proposed Wastewater Treatment Plant Siting Study (UPC 2021)
8. Septic to Sewer Task Order No. 1
9. Wastewater Collection and Treatment Basis of Design Report (Stantec 2022)

BASIS OF PLANNING

District Recommended Zone Area Boundaries

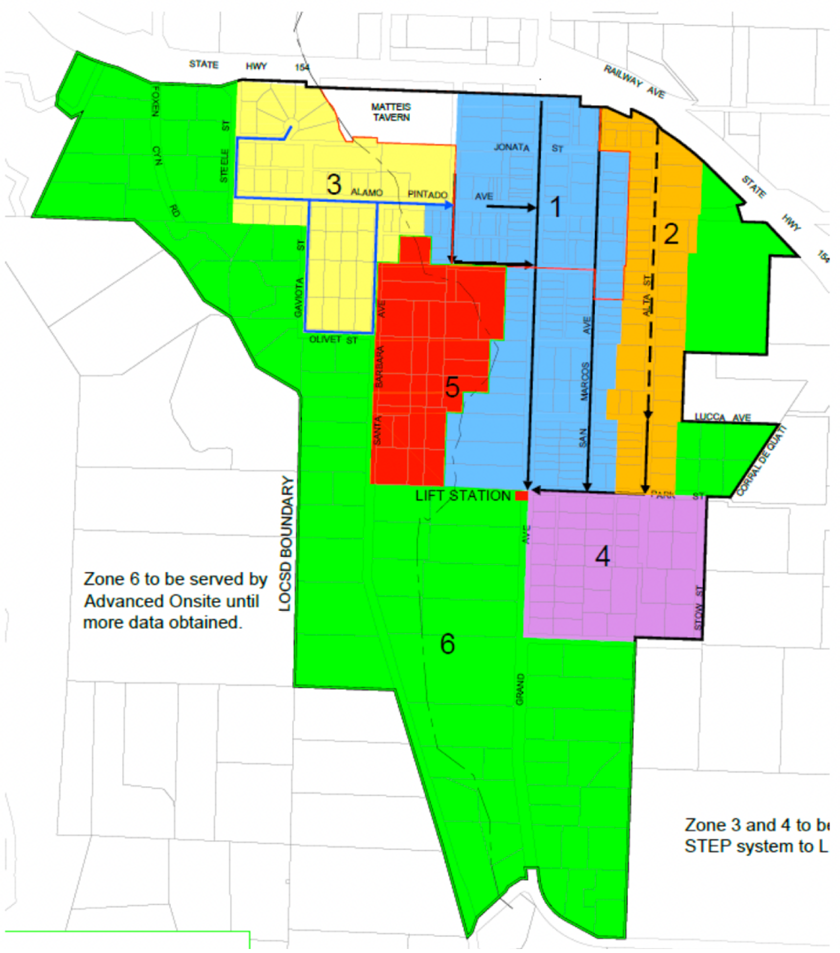


Figure 3 – Service District Zoning Map

Proposed Zone Collections System Alternatives

Collection system alternatives traditionally evaluated for residential development include gravity centralized lift stations, effluent collection systems (also known as step or liquid only sewers), and grinder systems.

Gravity sewers utilize large diameter lines, which gravity flow to a centralized location for further conveyance to a wastewater treatment facility. In Effluent Sewer system, the effluent (primary treated liquid) is typically pumped from the septic tank under low to medium pressure to a small-diameter, pressurized collector sewer. In the individual grinder lift stations, household sewage is collected in a small basin where the solids are macerated and then conveyed into transport lines by the grinder pumps. Residential step and grinder systems consist of an electrical panel, tank or basin, pump vault containing a single pump and level control.

Proposed Treatment Plant Locations

The wastewater treatment works are outside of the scope of Regen's collection system design work.

Treatment plant capacities are based on estimated flows from all residential and commercial properties. Estimated residential flows of 200 gpd (gallons per day) average have been assumed based on national averages, commercial property flows have been estimated based on water records and potential growth.

Hydraulic analysis will be based on the approved configuration when determined.

COLLECTION SYSTEM

Gravity Collection

Conventional gravity sewage collection systems are the oldest forms of sewage collection and sanitation dating back to the Roman Empire. These systems generally require no mechanical or electrical facilities and rely solely on gravity to transport sewage from the points of connection to a central receiving location, either a transfer lift station or a wastewater treatment plant (WWTP). Gravity collection systems are designed with network of pipes placed at slopes sufficient to maintain minimum velocities to transport solids and prevent deposition and accumulation of materials in the system. Typically, the network is subdivided into primary pipes (sewer mainlines along main roads), secondary pipes, and tertiary pipes collecting wastes from individual neighborhoods and properties.

Design Criteria

Gravity sewer wastewater contains human waste solids, grit, and other solids that down the drain. In considering the solid content in gravity sewers they must be designed to "self-clean" which requires specific velocities to be maintained to "flush" the solids to their destination. Velocities must be maintained at a minimum of 2 to 3 fps (feet per second) to ensure minimal build-up of material within collection lines. Velocities are maintained by designing gravity sewer collection lines to have slopes as is related of flow and pipe diameter. Gravity flows per capita are typically estimated in the range of 120 gpcd (gallons per capita per day).

Manholes are required for access at given straight distances along the gravity sewer lines, at pipe intersections, and at any change in pipe direction. Manholes allow for maintenance, inspection, and cleaning of the gravity collection system. Manholes are generally required at the end of each line, at all changes in grade, size, or alignment, at all intersections, and at distances not to exceed 400 ft for sewers 15" or less (Recommended Standards for Wastewater Facilities, 2004).

Minimum pipe diameters are required in gravity sewers to minimize blockages and allow for adequate space for cleaning equipment and cameras. Although the District does not currently have standard design criteria established for gravity sewer collection systems there are standards set forth in the industry and by local agencies that will be the basis for design. Based on agency and industry standards (and previous studies), a 6-inch minimum gravity sewer main line will be utilized. Gravity sewer pipe materials are assumed to be either PVC SDR3-35 or HDPE PE3408.

Manning's equation for open channel flow will be utilized with a minimum allowable pipe slope and coefficient "n" equal to 0.013, where "n" is the roughness coefficient of the pipe material.

Table 4 – Gravity Sewer Main Slopes and Design Depths

Pipe Size (inches)	Minimum Slope[1] (%)	Maximum Liquid Depth to Diameter Ratio (d/D)	Maximum Percent Full (%)
8	0.4	0.5	50
10	0.28	0.5	50
12	0.22	0.5	50
15	0.16	0.75	75

[1] Table 5.1 2013 AECOM Report

Estimated minimum cover over gravity sewer pipes should be maintained at 5 feet with an additional 1-foot vertical separation from existing or future utilities.

Lateral Connection Requirements

Each individual property will be required to connect to the gravity sewer collection system (where appropriate) with private laterals. Laterals are typically owned and maintained by the individual property owners. Each property owner is expected to be responsible for the construction of the lateral connection. Laterals are typically a minimum of 4-inch diameter at a minimum of 2 percent slope per the California Plumbing Code.

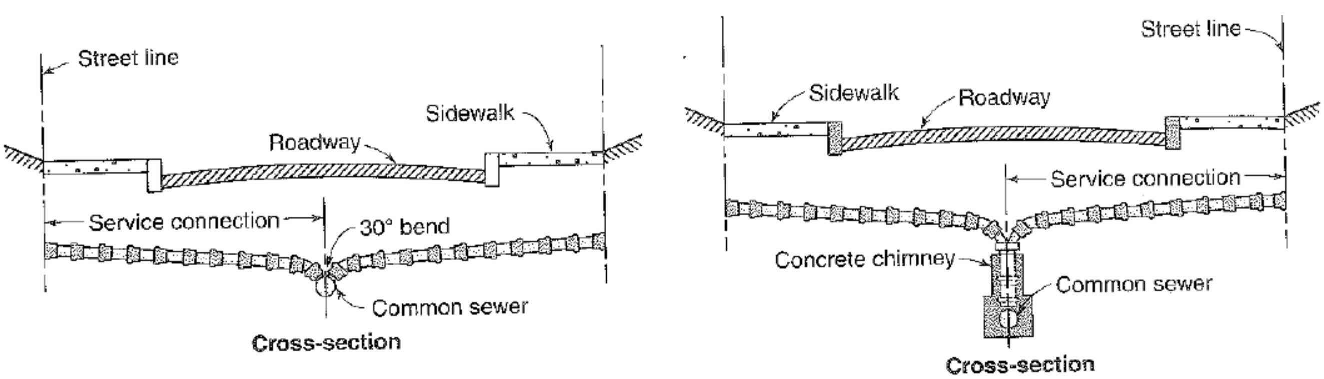


Figure 4 - Typical Gravity Sewer Service Lateral

Constructed costs for gravity sewers service laterals vary based upon main line depth, geological conditions, groundwater elevation, pipe material, and service lateral length.

Lateral size serving commercial multiple family dwellings must maintain pipe slope uniform from the sewer main to the property line. Minimum depths for laterals shall be maintained at 4 feet. Wye branches are used for lateral connections to mainline connections. Cleanouts shall be required with all lateral connections.

Right-of-way Requirements

ROW equipment for gravity sewers consists of large diameter mainline laid at a constant slope, manholes, lift stations (if required), and air release valves (if required). Costs fluctuate based upon bedding material, location (rural versus urban), clearing costs, topography, geological conditions, depth, and surface restoration costs. Table 2 excludes manholes, lift-stations, service wye's, and terminal cleanouts. It also assumes ideal soil conditions, no dewatering, and an 8-ft mean burial depth.

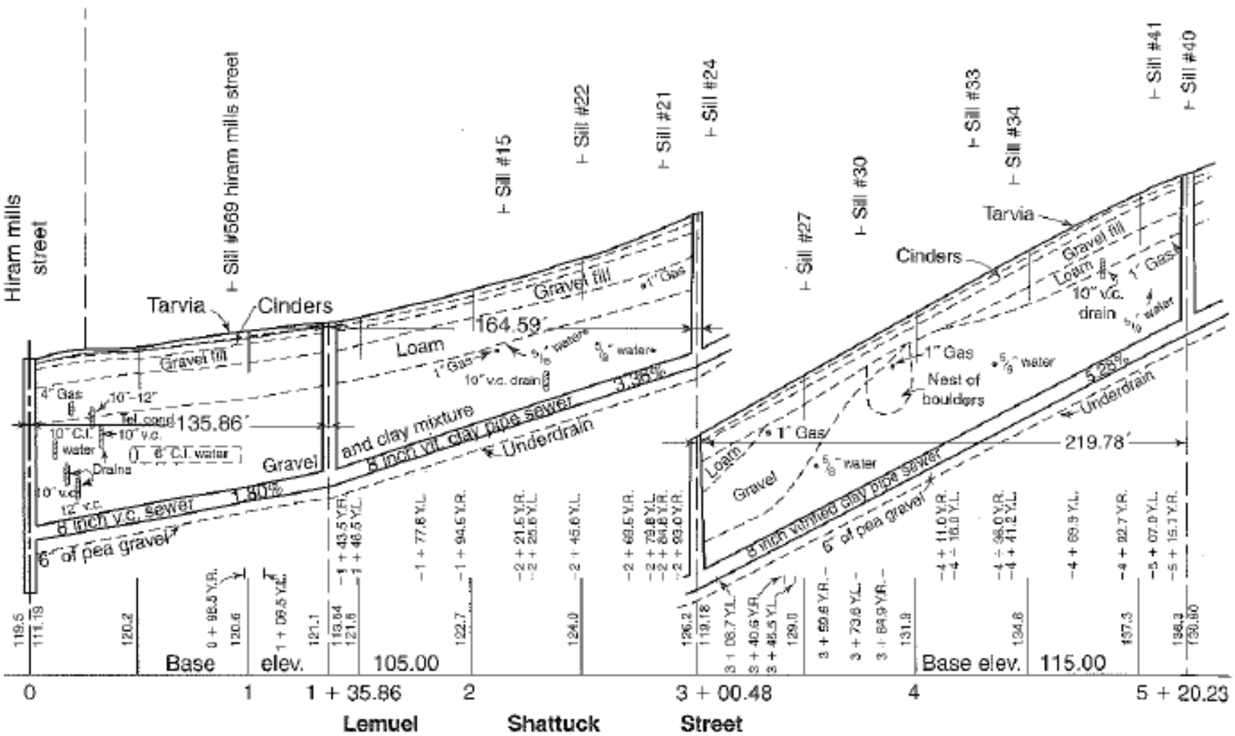


Figure 5 - Profile of Gravity Sewer

Table 5 - Installed Unit Costs: Gravity Sewer Pipe

Item	Cost (2022 USD)[1]
6" dia Mainline (USD/linear ft)	$180
8" dia Mainline (USD/linear ft)	$240
10" dia Mainline (USD/linear ft)	$300

[1] Stantec, Preliminary Construction Cost Estimate, Los Olivos (28-Jun-22), USD/Linear Ft (PVC), WWTP South Side of District

Sewage Lift Station

When gravity sewers are installed in trenches deeper than 10 ft, the cost of sewer line installation increases significantly because of the more complex and costly excavation equipment and trench shoring techniques required. Lift stations are used to reduce mainline installation depth and, in some cases, reduce the capital cost of sewer system construction. Lift station construction has a significant economy of scale and is generally expensive and difficult to apply to small communities. For example, if the capacity of a lift station is increased by 100%, the construction cost would increase only by 50 to 55%.

A sewage lift station will be required to convey wastewater from the District gravity sewer collection system to a wastewater treatment plant regardless of the plant location. For estimating purposes, it is assumed the lift station will include a round manhole wet well, duplex submersible pumps, and telemetry controls. The lift station will need to include an odor control system.

The force main from the pump station to the WWTP shall be a dual force main to provide redundancy and reliability. It shall be two 6-inch diameter force mains, to be confirmed during design (Stantec 2022).

Effluent Sewer Collection

Effluent sewers utilize small settling tanks with pumping filters and effluent filtration units, small diameter transport lines (typically 2”-6”) buried with the contours of the land just below frost depth, and small simple cleaning and air release ports throughout the pressurized line network. Since solids in an effluent sewer system are collected and digested in the on-lot tank, only liquid effluent is conveyed to the collection system. Line cleanings are eliminated as a result, so effluent sewer owners and users should be exempt from the charges typically associated with cleaning activities. In addition, effluent sewer collection systems are watertight, reducing infiltration costs in both conveyance and at the treatment facility. Effluent sewers eliminate the need for main line lift stations and reduce the solids and organic management and treatment sizing needs.

Design Criteria

Transporting wastewater from the primary tanks to the centralized treatment facility will be accomplished with a 2”-4” force main lines. Assumptions include Hazen-Williams C-Factor of 150 and estimated flows per EDU (180 gpd, 3.5 people/dwelling unit). Effluent sewer flows per capita are typically estimated in the range of 50 gpcd (gallons per capita per day).

The force mains in the conveyance system are typically only a few feet deep; therefore, there is potential of breakage due to future excavation events. Location wire and route markers will be used and strict enforcement controlling excavations in proximity of pipe should be exercised. Still, damage can occur and the used of isolation valves can be critical. Odor issues are a potential if primary tanks are not properly installed. All equipment should be installed to ensure proper seal of lids.

Because effluent sewers include a processing tank on-lot that provide primary treatment and convey primary-treated and clarified effluent through a watertight, pressurized collection system that’s largely immune to infiltration and inflow, they allow bioreactor volume reductions compared to other collection systems (gravity or grinder).

Processing Tank

A primary septic, or interceptor, tank will collect and retain raw sewage from each dwelling. In the interceptor tank, heavy solids (known as sludge) settle to the bottom while the lighter material (known as scum) floats to the top of the liquid contents. The organic material at the bottom of the tank (sludge) undergoes facultative and anaerobic digestion converting the organic matter to gases. Facultative microbes solubilize the complex organic material to volatile organic acids while strict anaerobes ferment the volatile organic acids to gases (methane, carbon dioxide, etc.). The rate at which both scum and sludge accumulates decreases as the biological process in the tank matures. It allows sufficient storage capacity for sludge and scum, resulting in long intervals between septage pump-outs. With long solids retention times, the tanks provide natural digestion, greatly reducing the impact of solids on a treatment facility. An effluent filter prevents any solids larger than 1/8-inch from reaching the pump. Typically, 40% to 60% of the Biochemical Oxygen Demand will be removed in the interceptor tank. It provides enough reserve space for 24 to 48 hours of normal operation before an emergency condition must be corrected, which minimizes the need for immediate maintenance. It provides an operating zone sufficient for modulating peak inflows without causing nuisance alarms or excessive hydraulic gradients.

The tanks in effluent sewers provide passive, long-term anaerobic digestion of primary sludge, flow equalization internal to the collection system, resistance to infiltration and inflow (I/I), and fine-screened effluent to the wastewater treatment facility. They facilitate the downsizing or complete elimination of influent fine-screen processes directly upstream of any wastewater secondary treatment process. The lower organic load of effluent sewers and their near elimination of I/I also permit smaller bioreactors (up to ~ 57% smaller), reduce bioreactor aeration requirements (lowering bioprocess aeration by ~ 57%), and reduce biosolids management demands (by up to 75%).

For smaller clustered units such as the cottages and villas, and for commercial buildings such as retail shops and offices, one interceptor tank may serve more than one building. Tanks will be furnished appropriately sized for the expected waste flows, typically at a minimum of 2.2 times design flow. For larger users, such as the restaurant and clubhouse, two tanks in series may be used. Grease traps will be required for all commercial kitchen facilities.

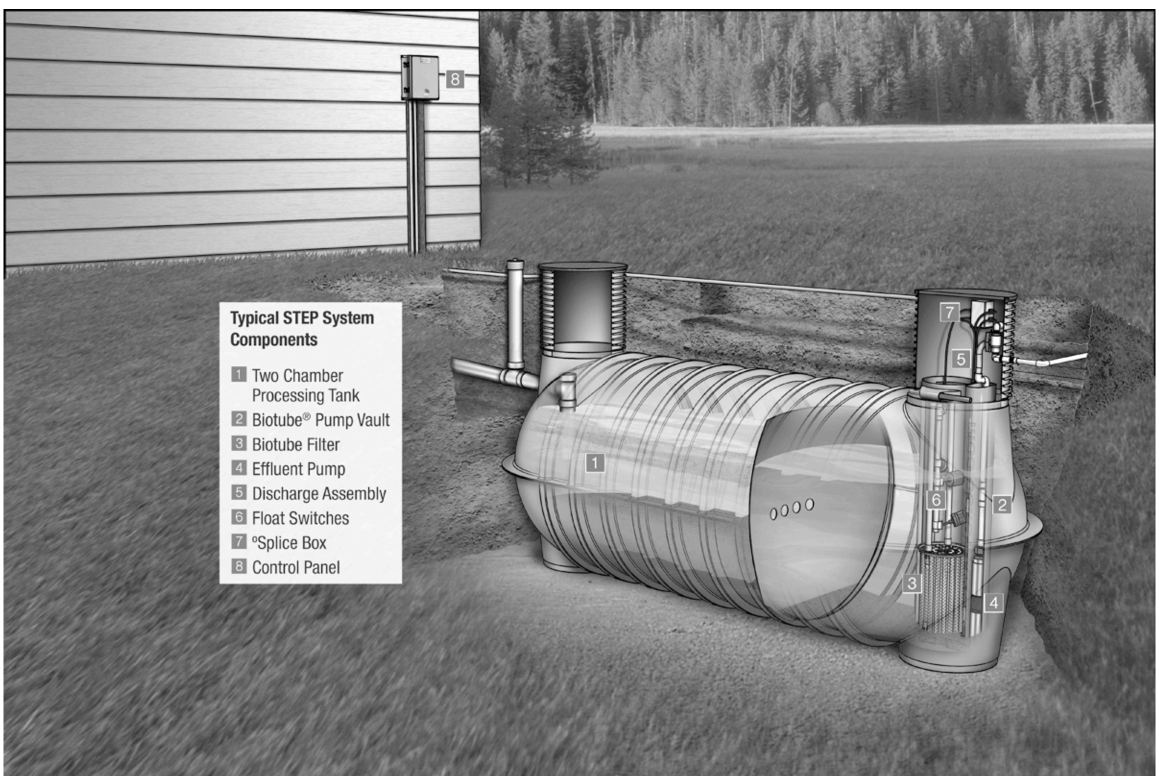


Figure 6 - Typical STEP System Components

Lateral Connection Requirements

Effluent sewers use watertight tanks and low-pressure sewer mains. The mains are also watertight and do not include manholes; therefore, they are largely resistant to I/I. Per capita average flows are typically 50 gpcd.

Right-of-way Requirements

Mainline and appurtenances for pressure sewers typically consist of small diameter mainlines (2” to 6” typical), service saddles, air release valves, clean-outs, pigging ports, and mainline isolation valves. Effluent sewer lines are typically installed at minimum depths of 24” to 30” or below frost depth and follow the contour of the land. Mainline material is generally polyvinyl chloride (PVC), polyethylene (PE or HDPE), with pipe buried at shallow depths and with fewer joints compared to gravity sewer due to their increased individual pipe lengths.

Water Lateral Separation Requirements

Individual property water lateral separation will be required at a minimum of 5 horizontal feet. Primary tank separation from main water lines shall be maintained at a minimum of 25 horizontal feet.

WASTEWATER TREATMENT FACILITY SITING

The siting and size of the treatment facility is outside of the scope of current contract; however, assumptions were made based on previous engineering work. Based on the Stantec Basis of Design Report the preliminary WWTP site will need a minimum of 1.6 acres to accommodate the treatment process, influent/effluent storage, truck access, equipment, buildings/screening, and other onsite needs at buildout of the facility. In addition to the two top recommendations from the Stantec report, an additional option to utilize land at the school was discussed as an alternative treatment and dispersal of effluents. This cooperative with the school district would have to be met before moving forward with additional analysis. For the purpose of this analysis a treatment facility located at the South point of the CSD was utilized for sizing of collection lines. Based on a general hydraulic analysis a location to the North or at the School would not dramatically impact the cost of the effluent sewer collection system.

ADVANCED ONSITE SYSTEMS

Advanced onsite systems may be an alternative for larger lots within the district. Advanced onsite systems are individual lot systems that collect, treat, and disperse treated water to an onsite soil dispersal system. Based on the expected background aquifer nitrogen levels it was assumed that standard septic systems would not be an alternative within the district, additional it has been assumed that nitrogen specific advanced onsite systems would be required if they were identified as a feasible solution. Additional evaluation is required to verify that advanced onsite systems are an approvable solution within the district. Advanced onsite systems include a primary solids settling tank, aeration process for secondary treatment, nitrogen reduction specific processes, and a soil absorption system for final dispersal of treated water. There are a variety of treatment processes and manufacturers available in the area that have systems that can meet the needs of the regulatory requirements if identified as a feasible alternative.

WASTEWATER COLLECTION SYSTEM OPTIONAL LAYOUTS

Various layouts were analyzed based on the recommended district zone map. Options A, B, C, and D provide alternative configurations that can be evaluated as additional information materializes with respect to systems costs and potential for approval of individual on-lot advanced treatment systems.

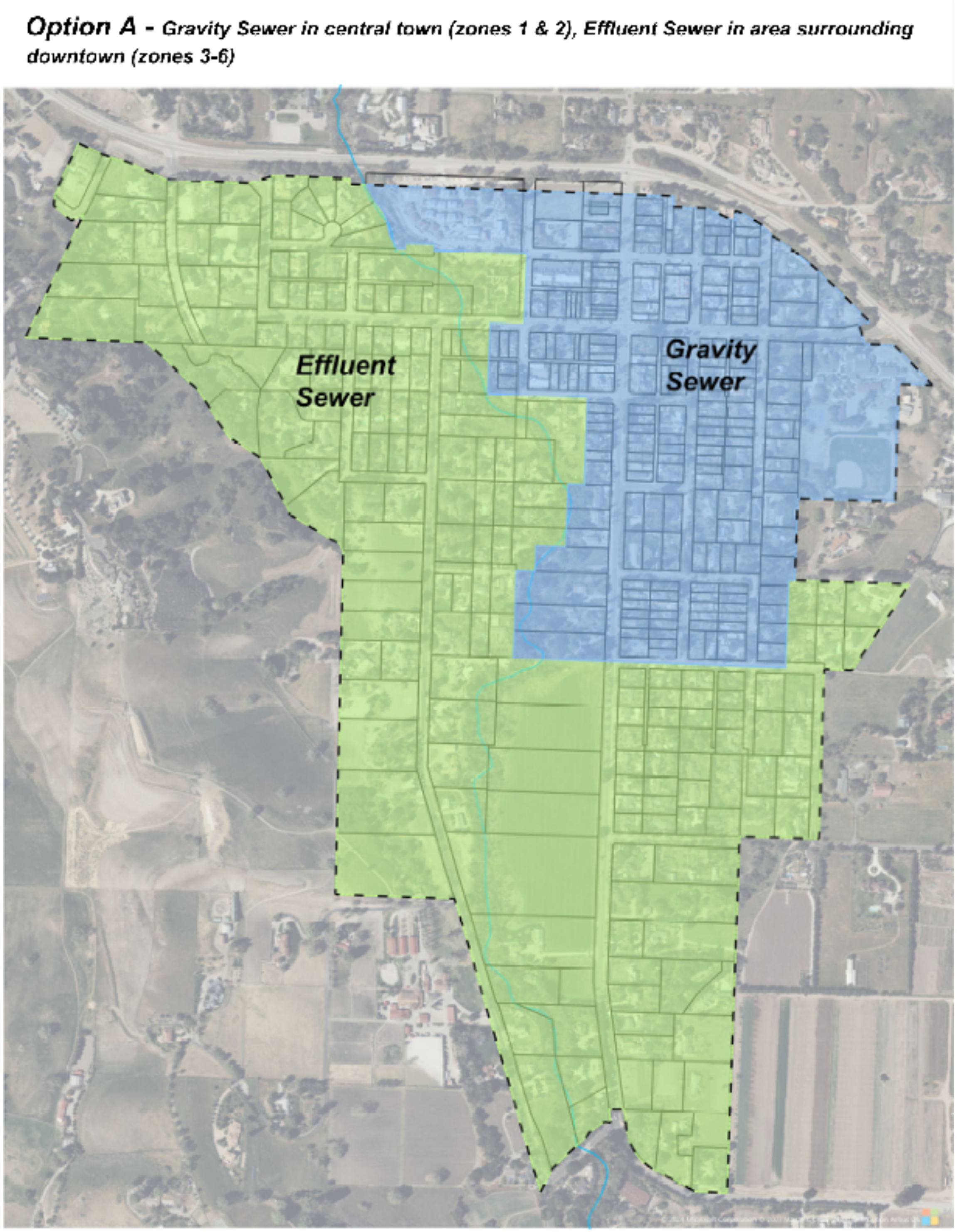


Figure 7 – Proposed Sewer Collection System Option A

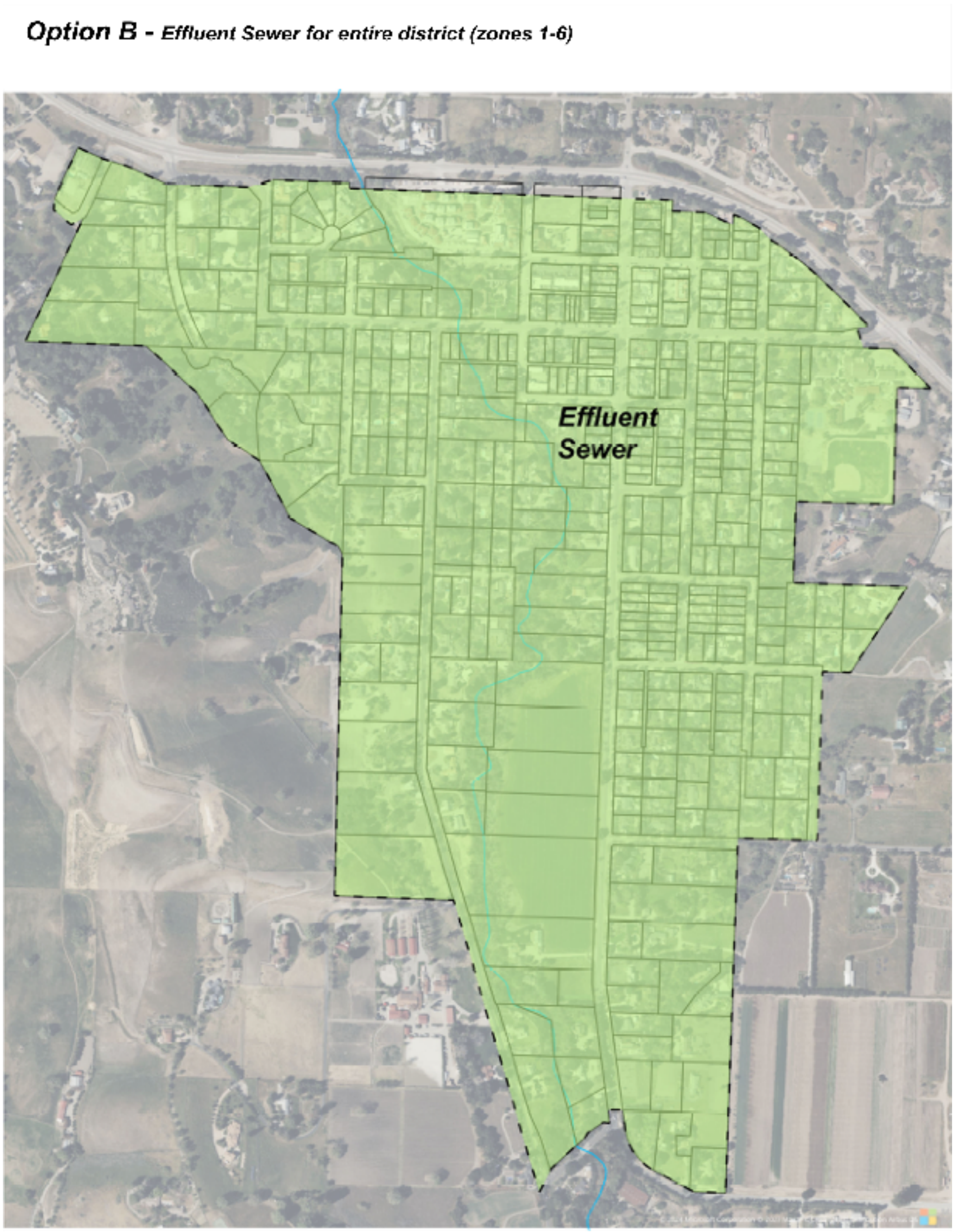


Figure 8 – Proposed Sewer Collection System Option B

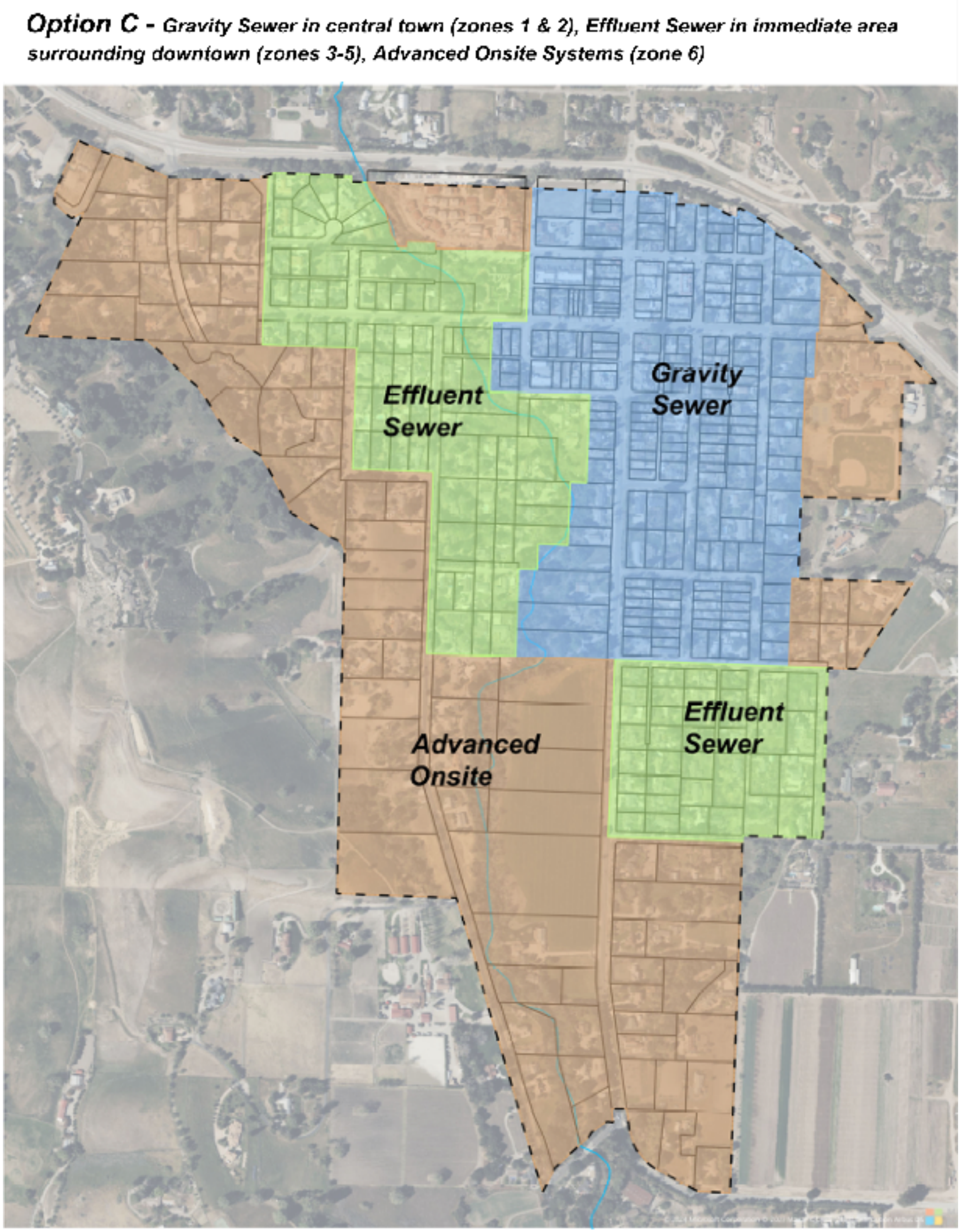


Figure 9 – Proposed Sewer Collection System Option C

Option D - Effluent Sewer in dense areas (zones 1-5), Advanced Onsite Systems (zone 6)

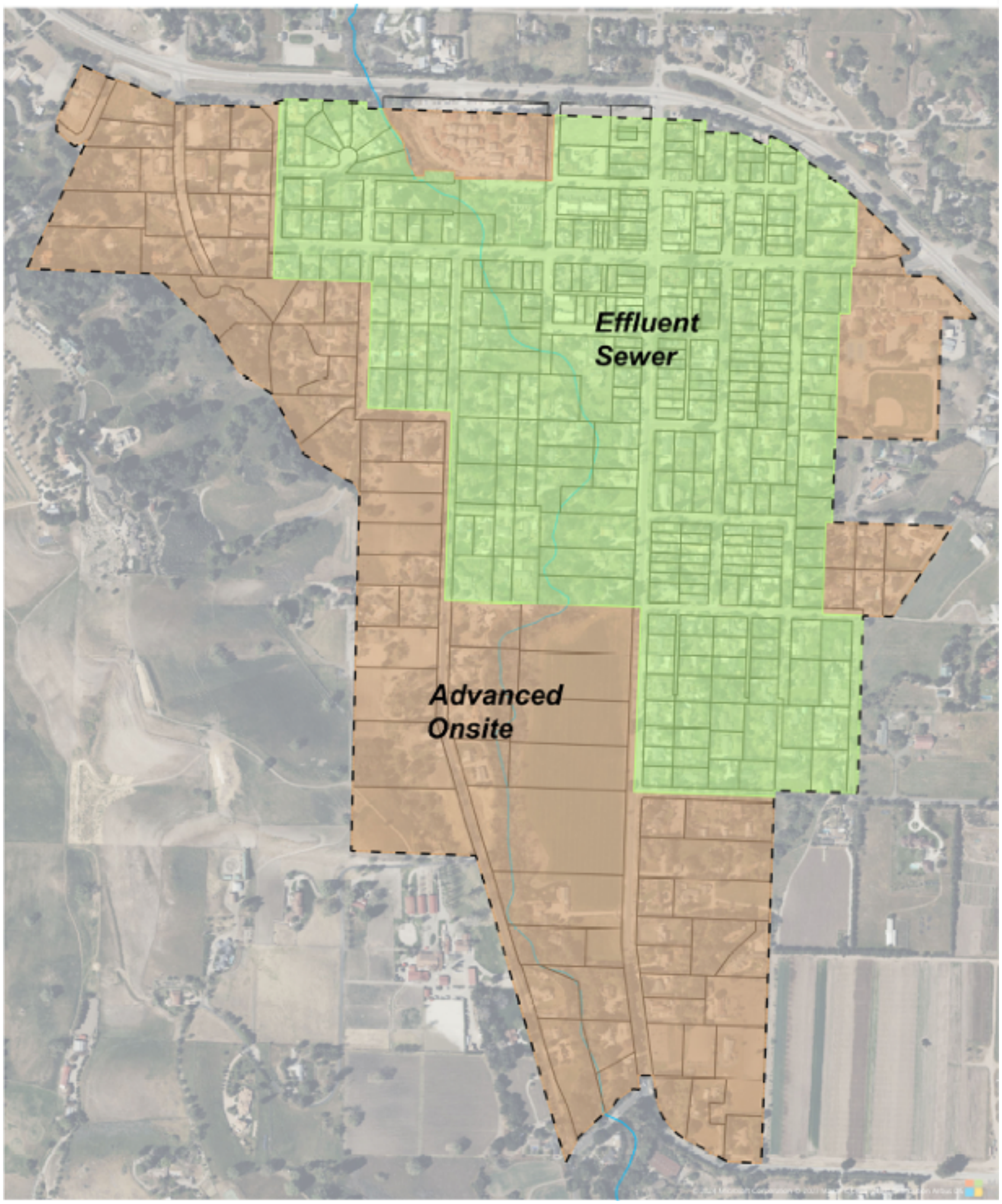


Figure 10 – Proposed Sewer Collection System Option D

WASTEWATER FLOW AND COMPOSITION ANALYSIS

Wastewater collection options such as Gravity, grinder, and effluent sewers each deliver unique hydraulics and wastewater characteristics to downstream wastewater treatment facilities that greatly affect the design, capital costs, performance, and operational costs of treatment facilities.

The type of wastewater collection system also influences primary and biosolid accumulation and management requirements at treatment facilities. Effluent sewers, when paired with MBRs, reduce the overall volume of primary solids and waste-activated sludge generated by up to 75% (refer to Figure 15 and Table 7 for additional details). With the trend for more stringent regulations governing the disposal of solids, design options that reduce the overall quantity of solids warrant close attention.

Zone Populations

Table 6 – Zone Populations

Zone	Parcels	Equivalent Dwelling Units (EDU's)	Population Equivalent (2.5/EDU)
1	149	249	623
2	58	58	145
3	46	46	115
4	43	43	108
5	26	26	65
6	74	74	185
Total	396	496	1240

EDU – Equivalent Dwelling Units

Alternative Collection System Typical Loading Rates

Table 7 – Alternative Collection System Typical Loading Rates

Constituent Loading Assumptions	Effluent Sewer	Grinder Sewer	Gravity Sewer
Design Average Flow	50 gpcd	50 gpcd	120 gpcd
Biochemical Oxygen Demand (BOD_5)	150 mg/L	450 mg/L	200 mg/L
Chemical Oxygen Demand (COD)	381 mg/L	1143 mg/L	508 mg/L
Total Suspended Solids (TSS)	40 mg/L	500 mg/L	210 mg/L
Total Kjeldahl Nitrogen (TKN)	65 mg/L	70 mg/L	35 mg/L
Ammonia (NH_3-N)	40 mg/L	55 mg/L	21 mg/L
Total Phosphorus	16 mg/L	17 mg/L	7 mg/L
Fats, Oils, Greases (FOG)	15 mg/L	164 mg/L	80 mg/L

[1]Adapted from Metcalf & Eddy 2003; Crites and Tchobanoglous 1998; USEPA 2002; Winneberger 1984.

Table 8 – Estimated Typical Flow Rates

Zone	Effluent Sewer Avg Day (gpd)	Gravity Sewer Avg Day (gpd)
1	31,150	74,760
2	7,200	17,400
3	5,750	13,800
4	5,400	12,960
5	3,250	7,800
6	9,250	22,200
Total	62,000	149,000

gpd – gallons per day, rounded to nearest 100 gallons

Gravity Wastewater Hydraulic and Constituents Estimates

Table 9 – Gravity Collection Hydraulic Estimates

Zone	Avg Day* (gpd)	Avg Wet Day (gpd)	Max Dry Month (gpd)	Max Dry Day (gpd)	Peak Dry Hour (gpm)	Peak Hour Factor
1	46,800	74,800	53,800	65,500	130	4
2	11,600	17,400	13,400	16,300	32	4
Total	58,400	92,200	67,200	81,800	162	4

* Average day flow based on current water records, rounded up to nearest 100 gallons
gpd – gallons per day
gpm – gallons per minute

Table 10 – Gravity Collection Wastewater Constituent Estimates

Contaminant	Typical Composition	Design Values
Total Suspended Solids (TSS)	175 to 300 mg/L	200 mg/L
Biochemical Oxygen Demands at 20°C	200 to 350 mg/L	210 mg/L
Nitrogen (total as N)	30 to 70 mg/L	45 mg/L
Phosphorous (total as P)	6 to 12 mg/L	7 mg/L

Effluent Sewer Wastewater Hydraulic and Constituent Estimates

Table 11 – Effluent Sewer Hydraulic Estimates

Zone	Avg Day* (gpd)	Max Month (gpd)	Max Day (gpd)	Peak Hour (gpm)	Peak Hour Factor
1	46,800	53,800	65,500	65	2
2	11,600	13,400	16,300	16	2
3	9,200	10,600	12,900	13	2
4	8,600	9,900	12,100	12	2
5	5,200	6,000	7,300	7	2
6	14,800	17,100	20,800	21	2
Total	96,200	110,800	134,900	134	2

* Average day flow based on current water records, rounded up to nearest 100 gallons
gpd – gallons per day
gpm – gallons per minute

Table 12 – Effluent Sewer Collection Wastewater Constituent Estimates

Contaminant	Typical Composition	Design Values
Total Suspended Solids (TSS)	35 to 50 mg/L	40 mg/L
Biochemical Oxygen Demands at 20°C	110 to 220 mg/L	150 mg/L
Nitrogen (total as N)	40 to 70 mg/L	65 mg/L
Phosphorous (total as P)	8 to 18 mg/L	16 mg/L

Options Wastewater Hydraulic Load Estimates

Table 13 – Option Hydraulic Estimates

Option	Avg Wet Day (gpd)	Max Dry Month (gpd)	Max Dry Day (gpd)	Peak Hour (gpm)
A	129,800*	110,800	134,900	308*
B	96,200	110,800	134,900	134
C	115,000*	93,700	114,100	287*
D	81,400	93,700	114,100	113

* Based on estimated gravity sewer wet weather flow from Metcalf & Eddy 2003

Options Wastewater Constituent Load Estimates

Table 14 - Option Biological and Solids Loading Estimates

Option	Avg Biochemical Oxygen Demand	Avg TSS	Avg TKN
	(mg/L)	(mg/L)	(mg/L)
A*	180	143	53
B	150	40	65
C*	186	162	51
D	150	40	65

* Based on estimated gravity sewer wet weather flow from Metcalf & Eddy 2003

Wastewater Flow and Composition Summary

Options B & D provide both flow and composition benefits to the design of the centralized treatment facility and reuse or treated water discharge systems. The reduced peak hydraulic capacity and reduced wastewater constituents are expected to reduce the capital costs associated with the treatment facility.

If gravity sewers continue to be an attractive alternative moving forward an additional analysis should be completed to further evaluate hydraulic loads for the various alternatives as flows from water records may not accurately reflect flows associated with gravity sewers where groundwater impact may impact the flow a wastewater treatment facility receives from any gravity connection. Additionally, wastewater characteristics from gravity sewers are estimated assuming impacts from groundwater and additional infiltration and inflow sources, therefore wastewater characteristics are based on the 120 gpd per capita typical flow.

COST ESTIMATES

Preliminary Cost Summary

Small communities face enormous challenges when constructing and maintaining wastewater infrastructure. Conventional collection system technologies — when applied to small, rural communities — typically result in costs that exceed affordability thresholds and ultimately require grant subsidies to attain reasonable user rates. Alternative collection systems were developed and designed to avoid the shortcomings associated with applying gravity sewers to small communities. Historically, effluent sewers ($9,702/connection) have resulted in an average cost savings of $6,692 (41%), when compared to gravity sewers ($16,394/connection). In California the price of construction and material greatly exceed costs seen throughout the country, yet the savings historically seen with effluent sewer installations appear to still hold true.

Table 15 – Cost Estimates Breakdown

Option	Overhead and Construction ($US)	Gravity Sewer Construction ($US)	Effluent Sewer Construction ($US)	Collection Contingency Costs ($US)	Advanced Onsite Construction ($US)	Engineering Costs ($US)	Costs Provided by District ($US)
A	$2,830,000	$6,777,000	$3,866,382	$4,042,015	$0	$5,254,619	$2,760,000
B	$2,830,000	$0	$8,279,524	$3,332,857	$0	$4,332,714	$2,360,000
C	$2,830,000	$6,777,000	$2,407,632	$3,604,390	$6,734,000	$4,685,706	$2,760,000
D	$2,830,000	$0	$6,820,774	$2,895,232	$6,734,000	$3,763,802	$2,360,000

Table 16 – Cost Estimate Totals

Option	Collection System Subtotal ($US)	Advanced Onsite Subtotal ($US)
A	$25,503,016	$0
B	$21,637,492	$0
C	$23,064,728	$6,734,000
D	$18,669,808	$6,734,000

SUMMARY

Based on the analysis above and attached estimated construction costs for each option, the lowest capital cost is option B, the effluent sewer technology. Effluent sewer collection technology reduces waste strength and hydraulic loads, compared to gravity sewer options, in a manner that is energy-conscious, environmentally sustainable, and cost-efficient. Effluent sewers may also offer for expedited installation times within the right-or-ways as small diameter pipes and directional boring activities are not as extensive as trenching of deep gravity sewer lines. Effluent sewers also allow for a reduction in biosolids handling costs and eliminate sewer line cleaning.

An effluent sewer alternative would also be an alternative well-suited in connecting to Solvang as an effluent sewer would likely not require additional booster stations to transport the effluent.

Alternatives C&D provide a phased approach which includes the use of Advanced Onsite Systems throughout zone 6, which allows for a slightly reduced capital cost for both collection and treatment. It should be noted that the costs associated with the Advanced Onsite Systems includes treatment and dispersal, compared to the Effluent Sewer and Gravity costs which only include collection (treatment and dispersal or reuse will be additional cost evaluated in another report). If one of these two options is selected for funding and construction, there is a future opportunity for advanced onsite systems to remain in operations while connecting to the centralized facility. This option would greatly reduce the need for the centralized treatment facility to expand based on organic loads, address hydraulic capacity, and would simplify and reduce the cost and extent of future expansion.

Based on the lower economic estimates, potential to control growth, and the reduction of community disturbances during construction it is recommended that Option B & D be considered for funding and further design as the most viable collection alternative for the community of Los Olivos.

APPENDIX A – Preliminary Effluent Sewer Design

30% DESIGN PLANS FOR:

LOS OLIVOS

CALIFORNIA

EFFLUENT SEWER WASTEWATER COLLECTION SYSTEM

DRAWING INDEX

LEGEND

CIVIL

(ELEV.)	EXISTING ELEV.
ELEV.	NEW ELEV.
	EXISTING WATER
	EXISTING WATERMAIN
	NEW WATER
	EXISTING STORM SEWER (STS)
STS	NEW STORM SEWER (STS)
	EXISTING SANITARY SEWER (SS)
SS	NEW SANITARY SEWER (SS)
	EXISTING PRESSURE SEWER (PS)
PS	NEW PRESSURE SEWER (PS)
	EXISTING FORCEMAIN (FM)
FM	NEW FORCEMAIN (FM)
KW	KITCHEN WASTE LINE (KW)
	NEW ELECTRICAL CONDUIT
	CLEANOUT
	EXISTING VALVE
	NEW VALVE
	EXISTING MANHOLE (MH)
	NEW MANHOLE (MH)

MECHANICAL

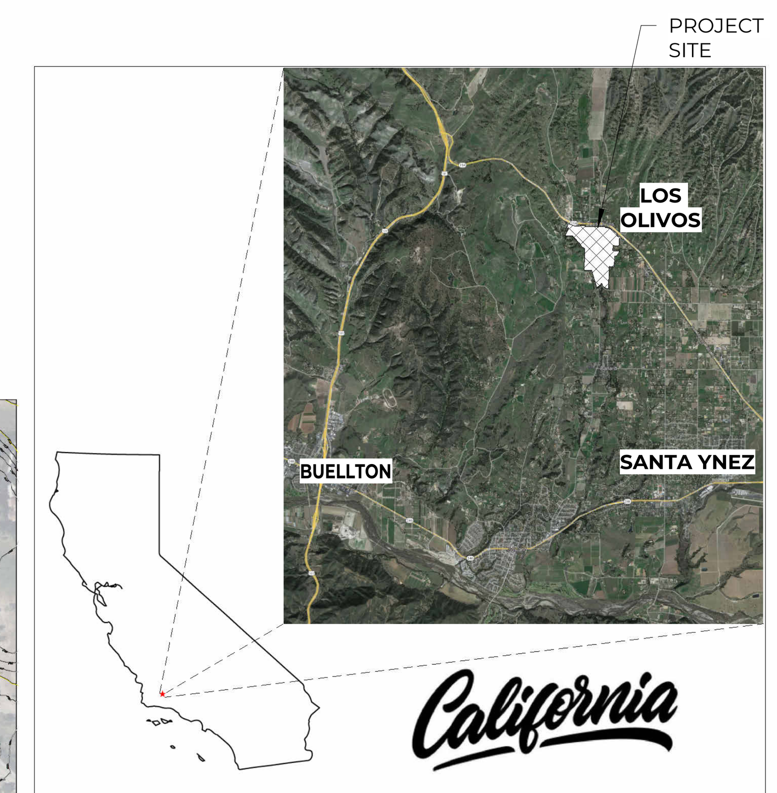
- UNION
- BALL VALVE
- CHECK VALVE
- PIPE BREAK
- PIPE RISE
- PIPE DROP
- PIPE END CAP

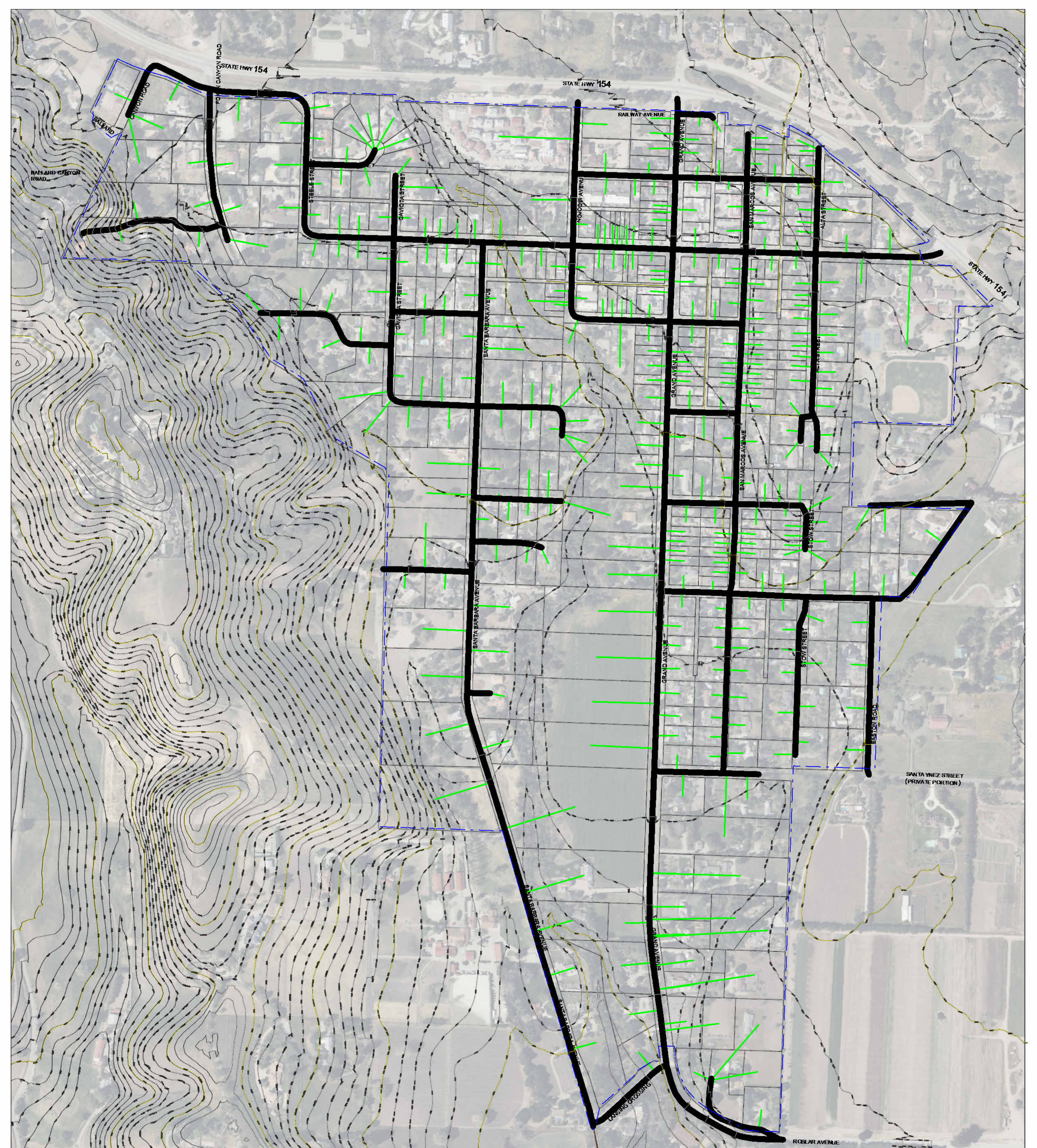
CONTACT INFO

ENGINEERING FIRM: **REGEN, PLLC**
ADDRESS: 213 S 11TH STREET
BOISE, ID 83702
PHONE: (541) 580-2980
CONTACT: TRISTIAN BOUNDS

OWNER: **LOS OLIVOS**
ADDRESS: LOS OLIVIOS
SERVICE DISTRICT
PHONE: (000) 000-0000
CONTACT: GUY SAVAGE

OVERALL SITE PLAN





0 1250' 2500' 5000'
0 8"
Custom

NORTH

PLAN SPECIFICATIONS

SYSTEM DESCRIPTION:
THESE PLANS DEPICT THE PRELIMINARY DESIGN OF THE WASTEWATER COLLECTION AND TREATMENT SYSTEM SERVICING THE SPRING ROCK DEVELOPMENT, LOCATED IN ADA COUNTY, IDAHO STATE. SPRING ROCK DEVELOMENT IS A PRIVATE COMMUNITY LOCATED ALONG TENMILE CREEK RD WITHIN THE CITY OF KUNA, ID.

COMPLIANCE:
THE SYSTEM DESIGN WILL ADHERE TO CALIFORNIA STATE AND SANTA BARBRA COUNTY REQUIREMENTS AS PRESCRIBED IN CALIFORNIA.

TOPOGRAPHIC SURVEY NOTES:
1. LOCATION OF UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND ARE BASED ON RECORD INFORMATION.
2. ALL ELEVATIONS DISTANCES ARE IN FEET.
3. ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL.

DRY UTILITIES NOTE:
DRY UTILITIES (ELECTRICITY, TELEPHONE, GAS, CABLE TV) SHOWN HEREON ARE APPROXIMATE. DESIGN SHALL BE BY THE SURVEYORS, AND INSTALLATION PAID FOR BY OWNER. CONTRACTOR SHALL COORDINATE WITH OWNER AND UTILITY COMPANIES IN THE TIMING AND INSTALLATION OF UTILITIES.

BEFORE YOU DIG, CALL

IT'S THE LAW!

CALL AT LEAST TWO WORKING DAYS PRIOR TO EXCAVATING

UTILITY NOTIFICATION CENTER OF IDAHO

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LOS OLIVOS
30% DESIGN PLANS
LOS OLIVOS, CA

Revision		
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Date	5.824
Drawn by	JS
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PRELIMINARY DESIGN

COVER SHEET

C101

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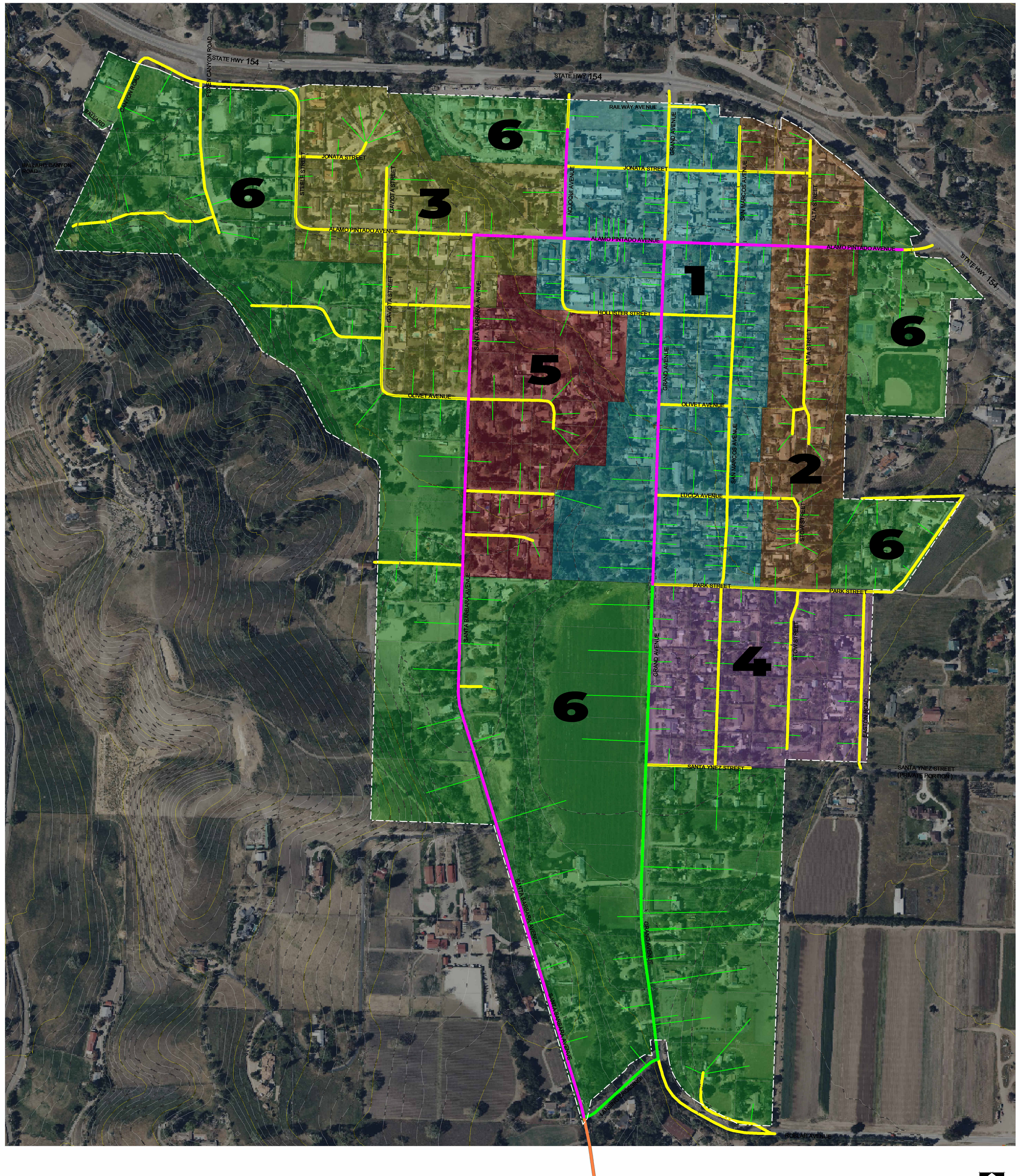

1 OVERALL SITE PLAN

1" = 300'-0"

0 600' 1200' 2400'

0 8"

1" = 300'-0"

NORTH

OVERALL LEGEND

- 2" Ø PIPE
- 3" Ø PIPE
- 4" Ø PIPE
- 6" Ø PIPE
- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- ZONE 5
- ZONE 6

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PRELIMINARY DESIGN

SYSTEM OVERVIEW

C102

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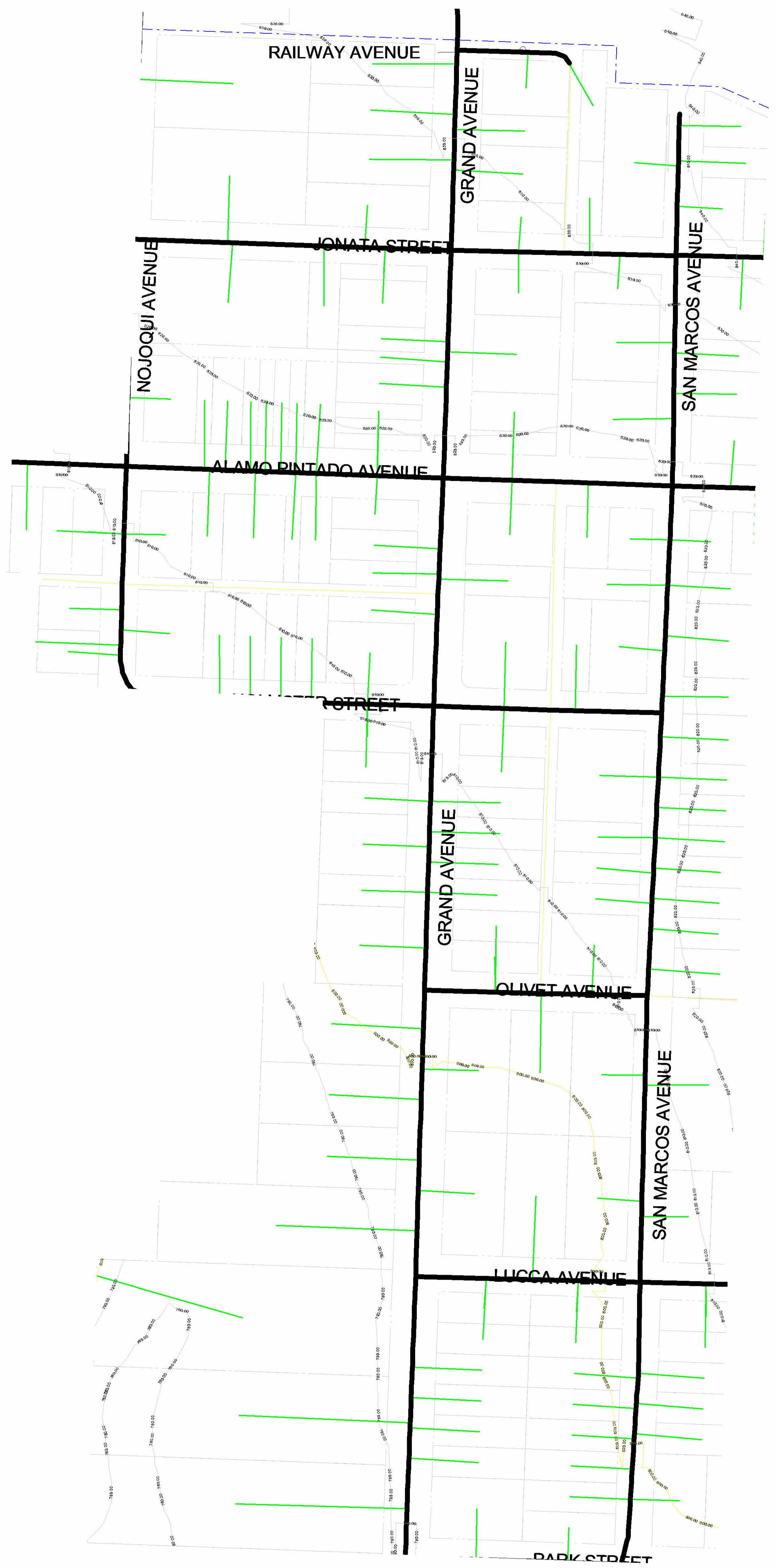
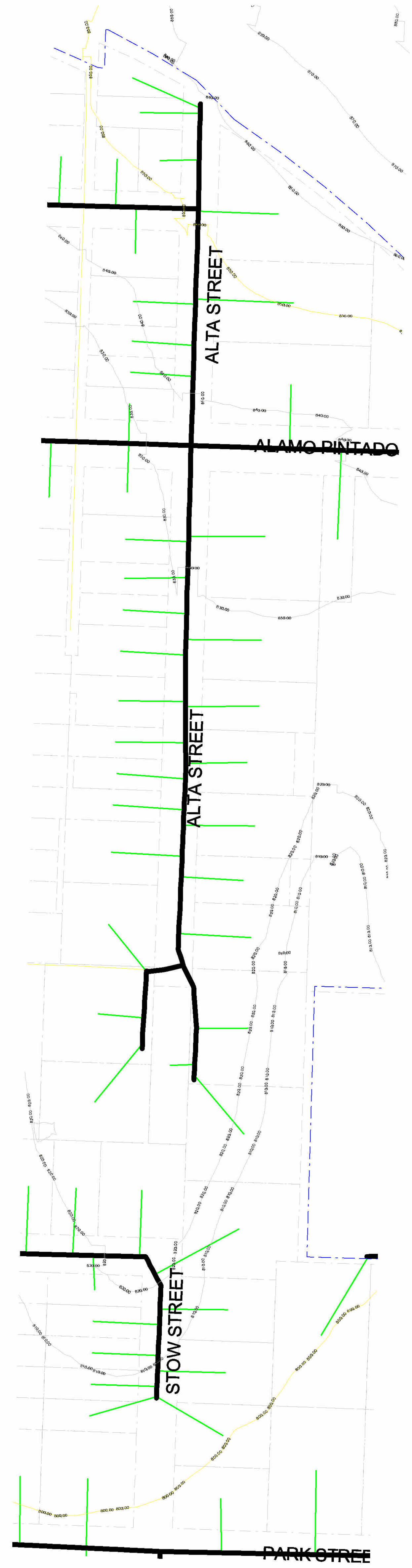
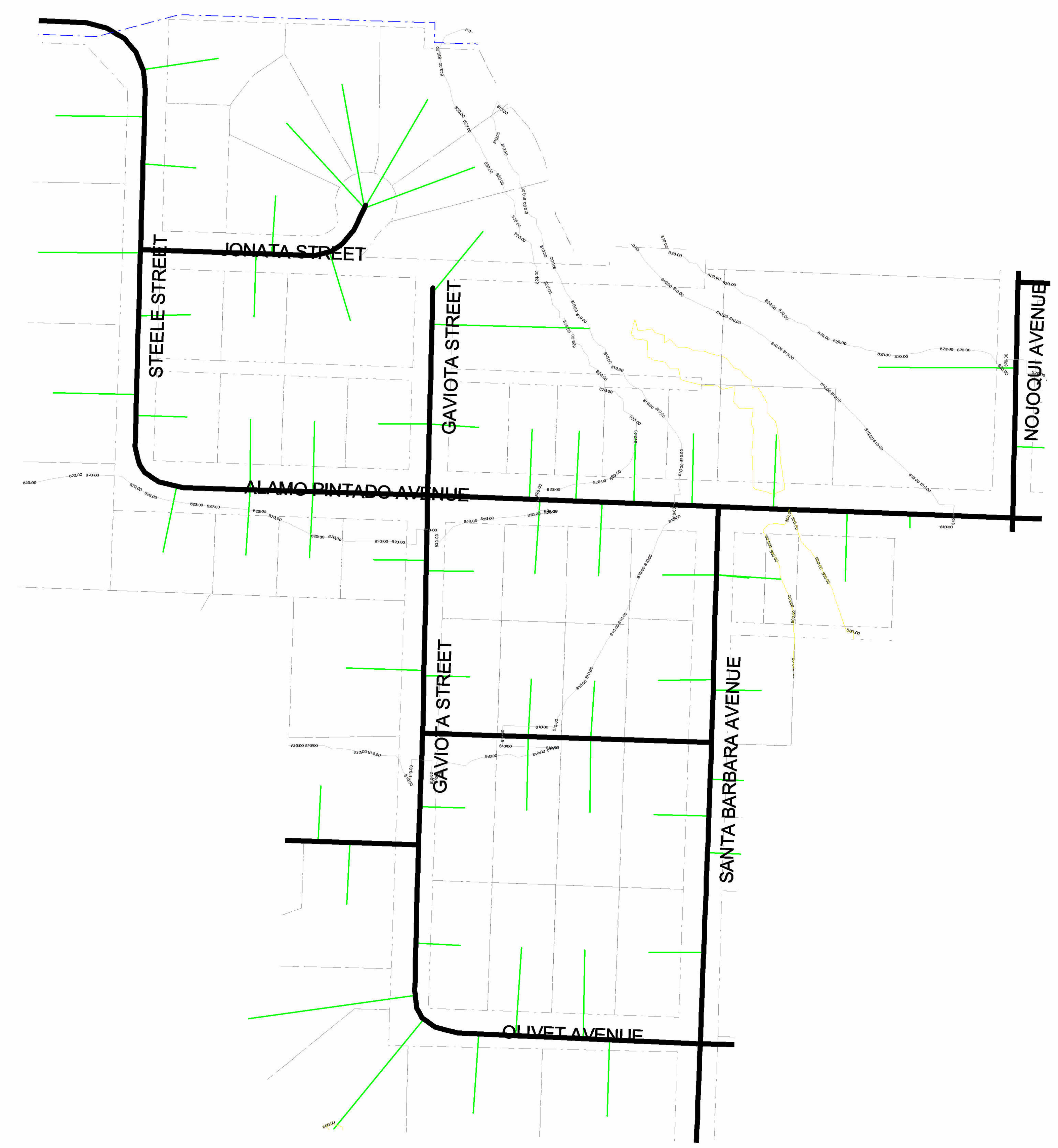


1 ZONE 1
1" = 160'-0"

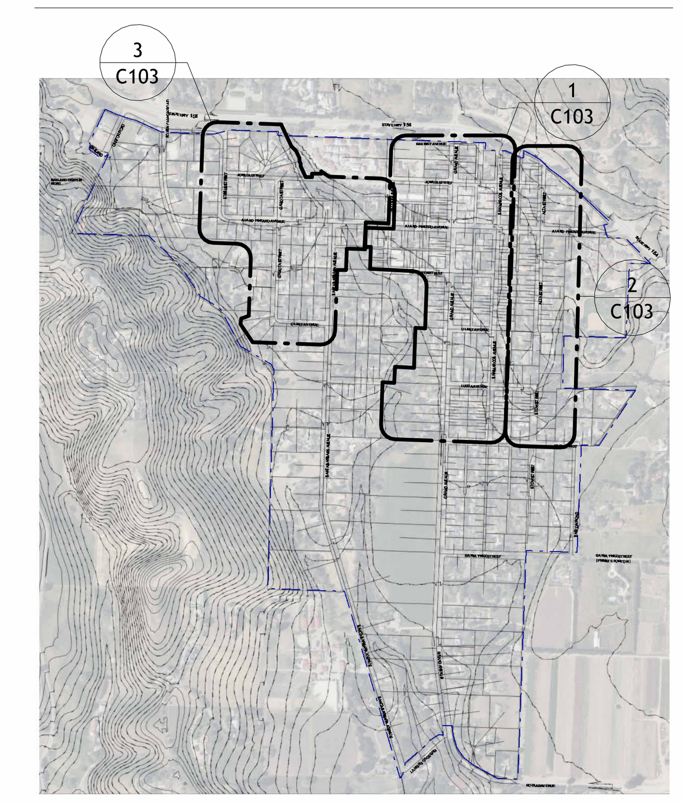


2 ZONE 2
1" = 160'-0"



3 ZONE 3
1" = 160'-0"

KEY PLAN



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LOS OLIVOS, CA

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PRELIMINARY DESIGN

ZONES 1-3

C103

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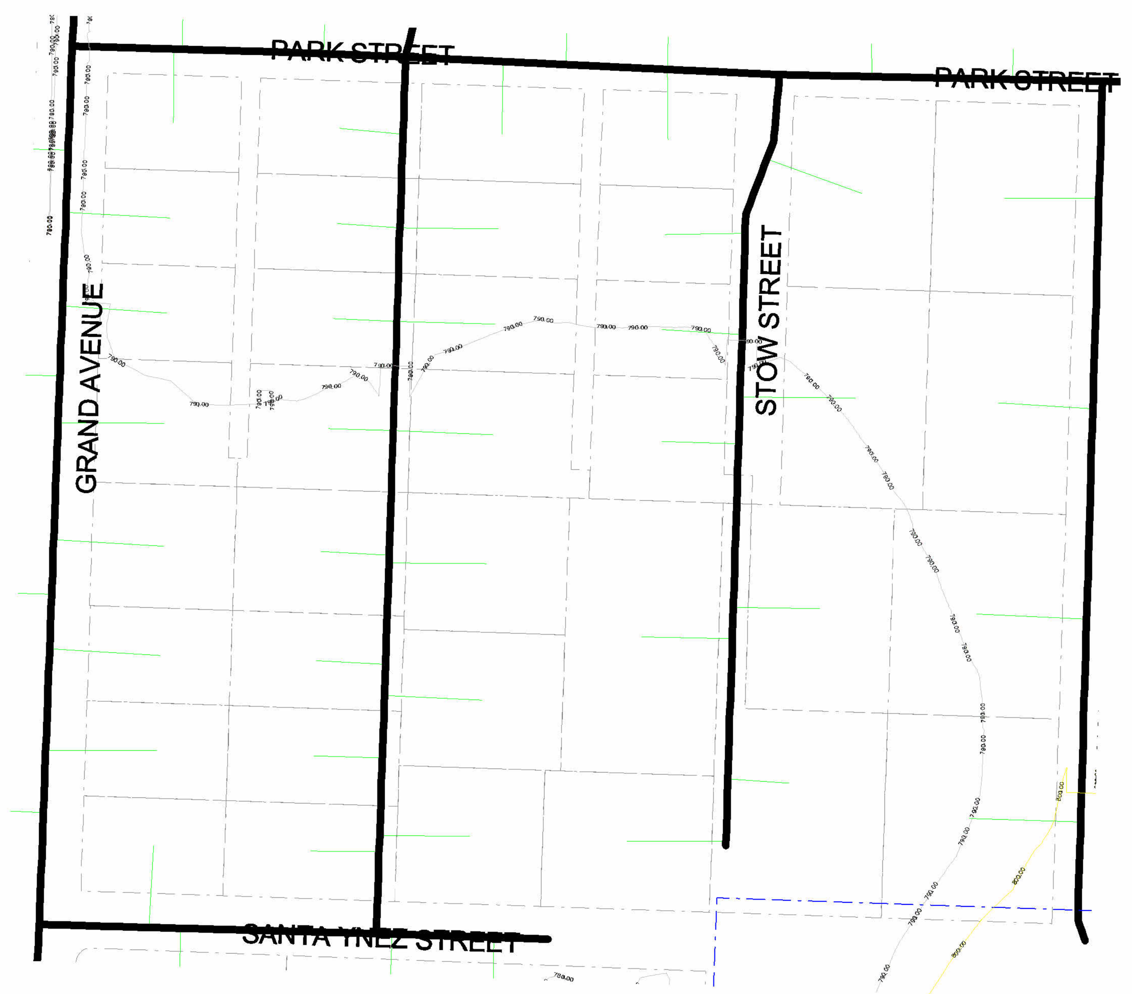
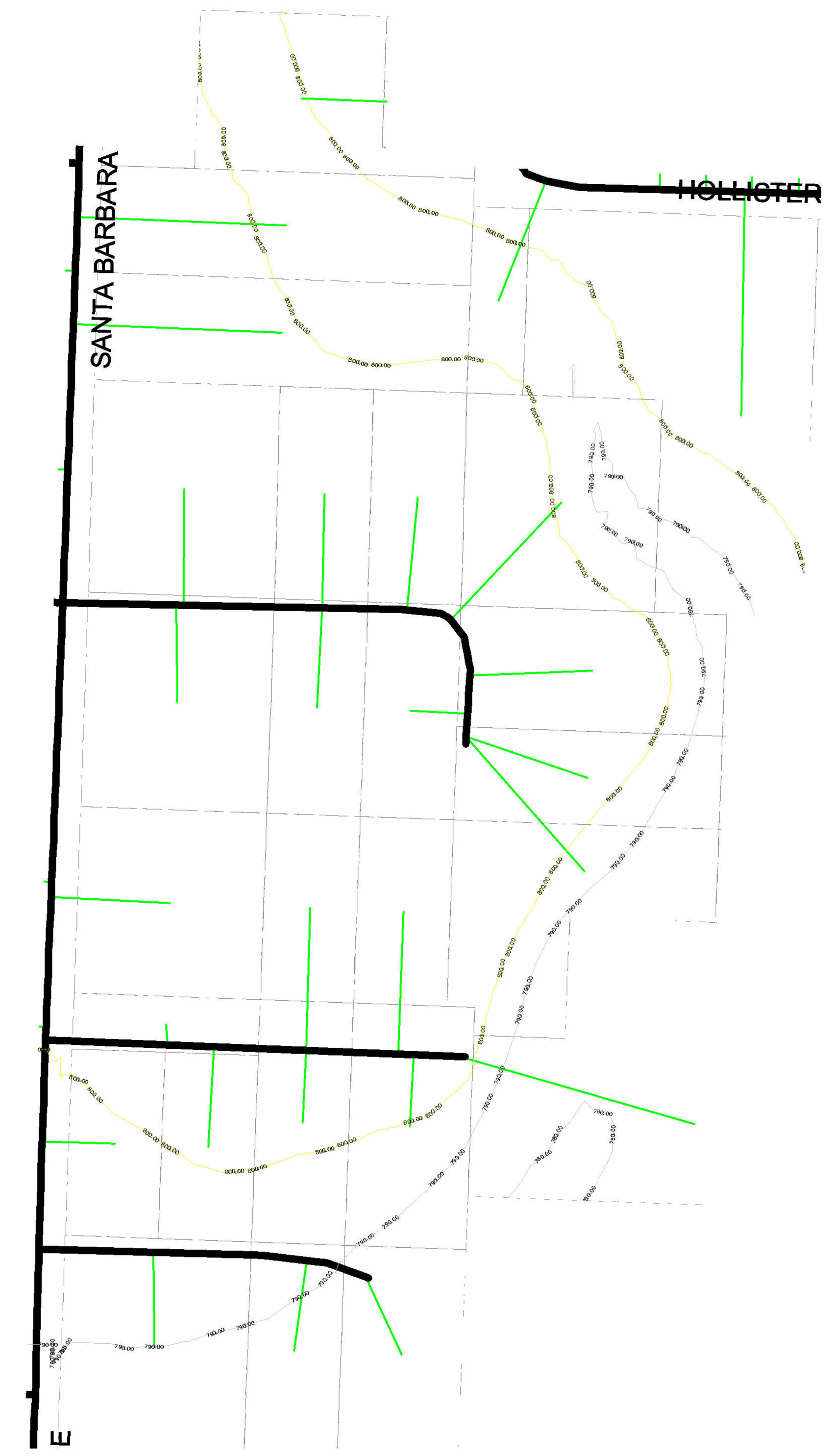
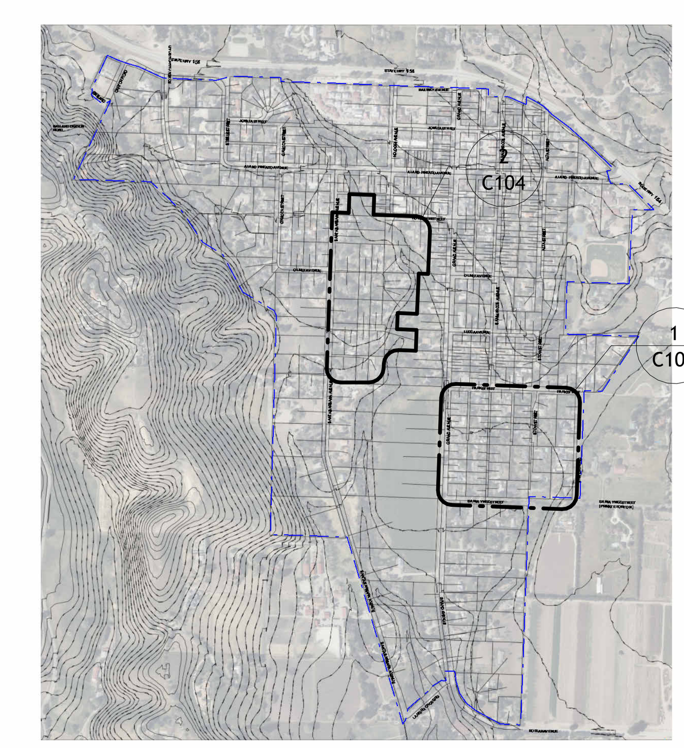


1 **ZONE 4**
1" = 160'-0"



2 **ZONE 5**
1" = 160'-0"

KEY PLAN



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LOS OLIVOS, CA

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PRELIMINARY DESIGN

ZONES 4-5

C104

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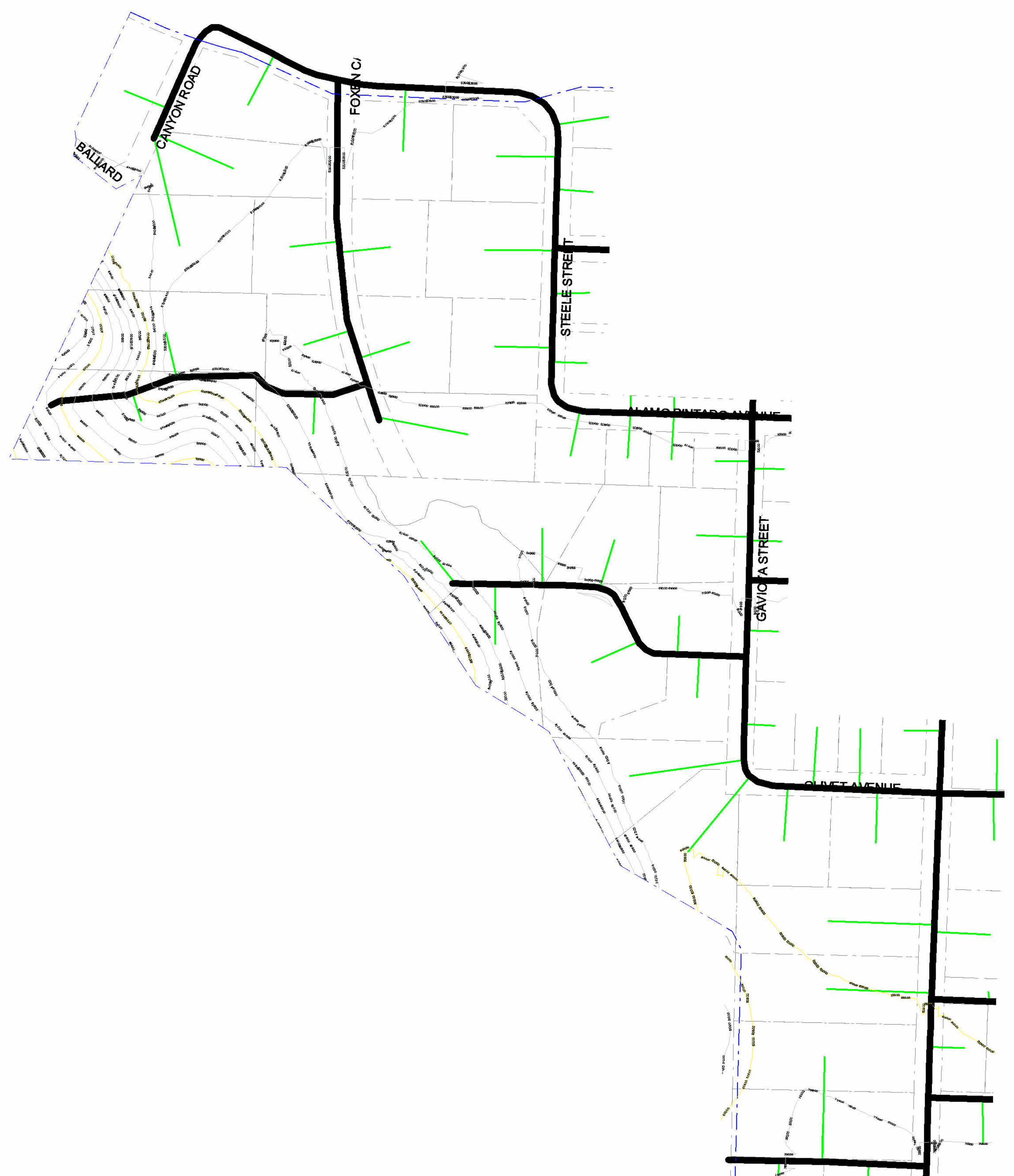
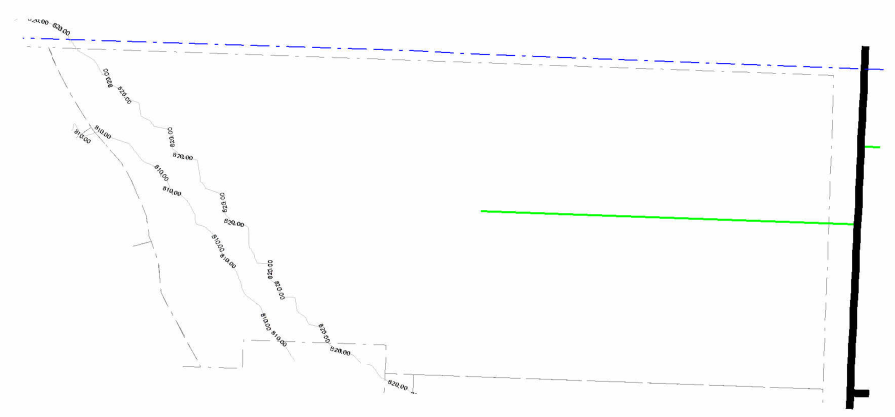
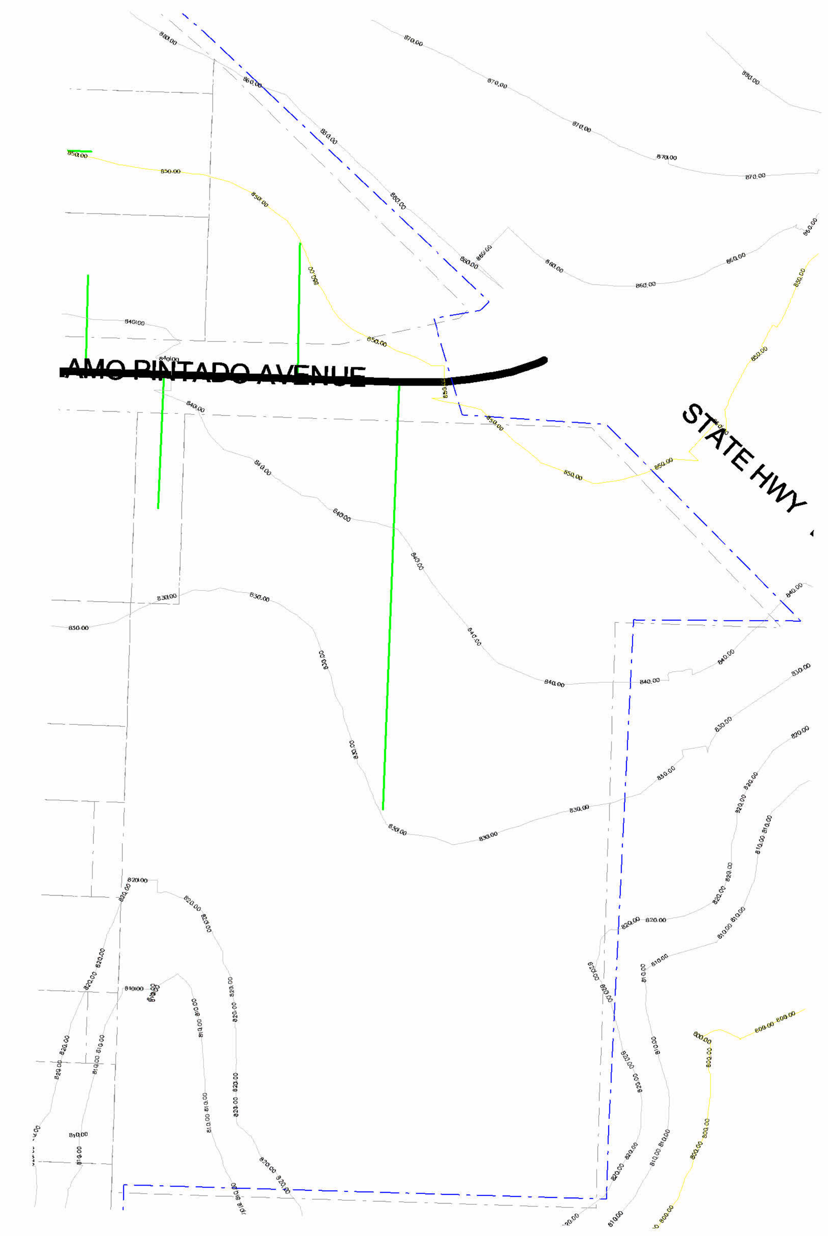


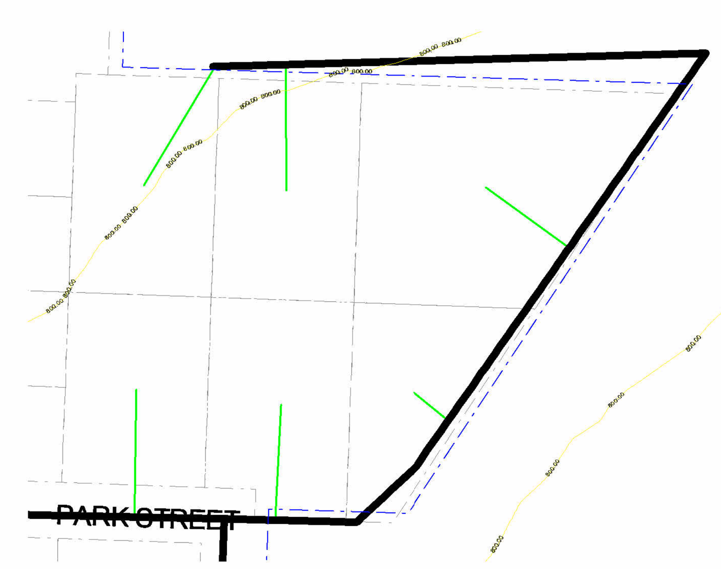

1 **ZONE 6 - 1**
1" = 300'-0"



2 **ZONE 6 - 2**
1" = 160'-0"

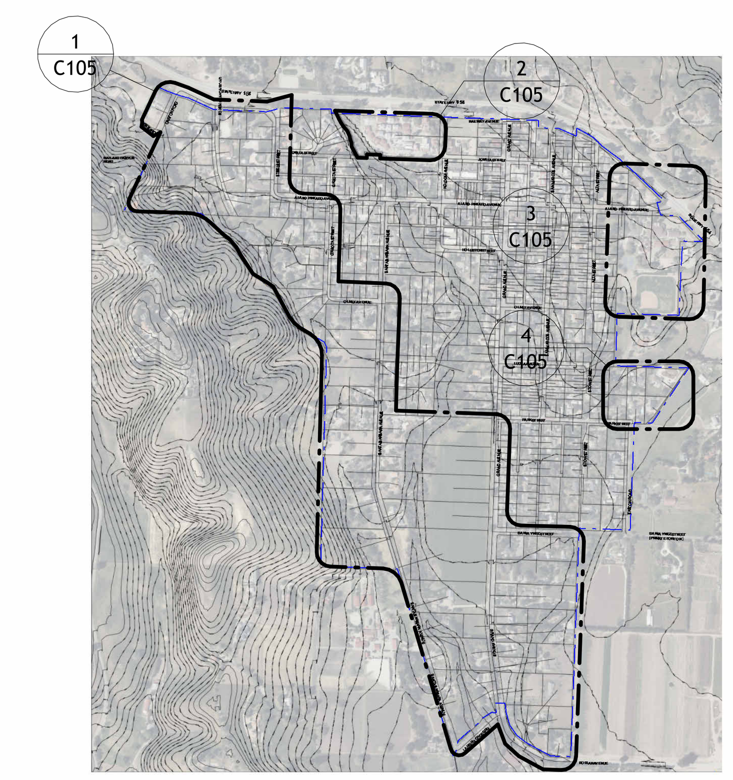


3 **ZONE 6 - 3**
1" = 160'-0"



4 **ZONE 6 - 4**
1" = 160'-0"

KEY PLAN



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LOS OLIVOS, CA

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PRELIMINARY DESIGN

ZONE 6

C105

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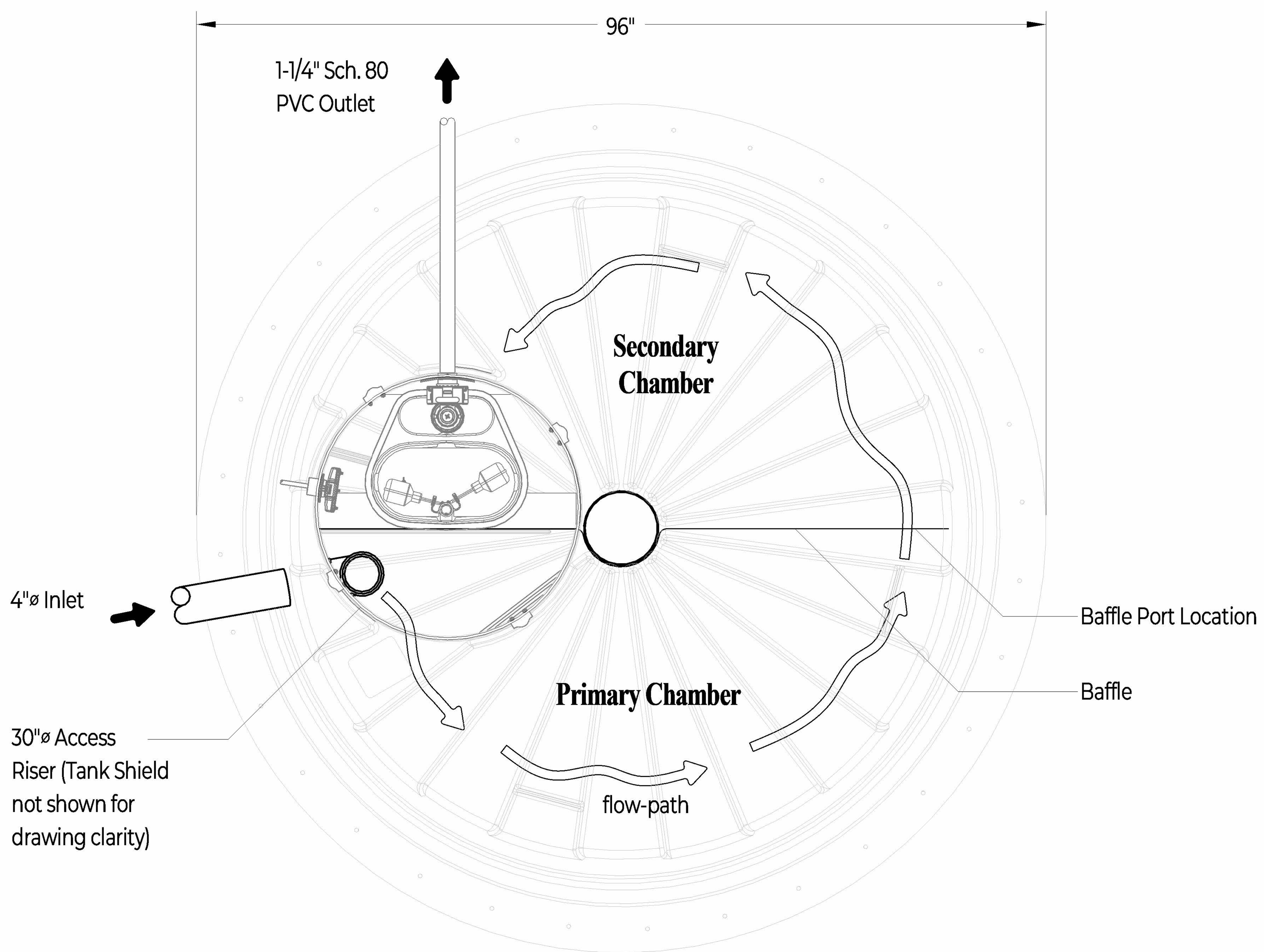


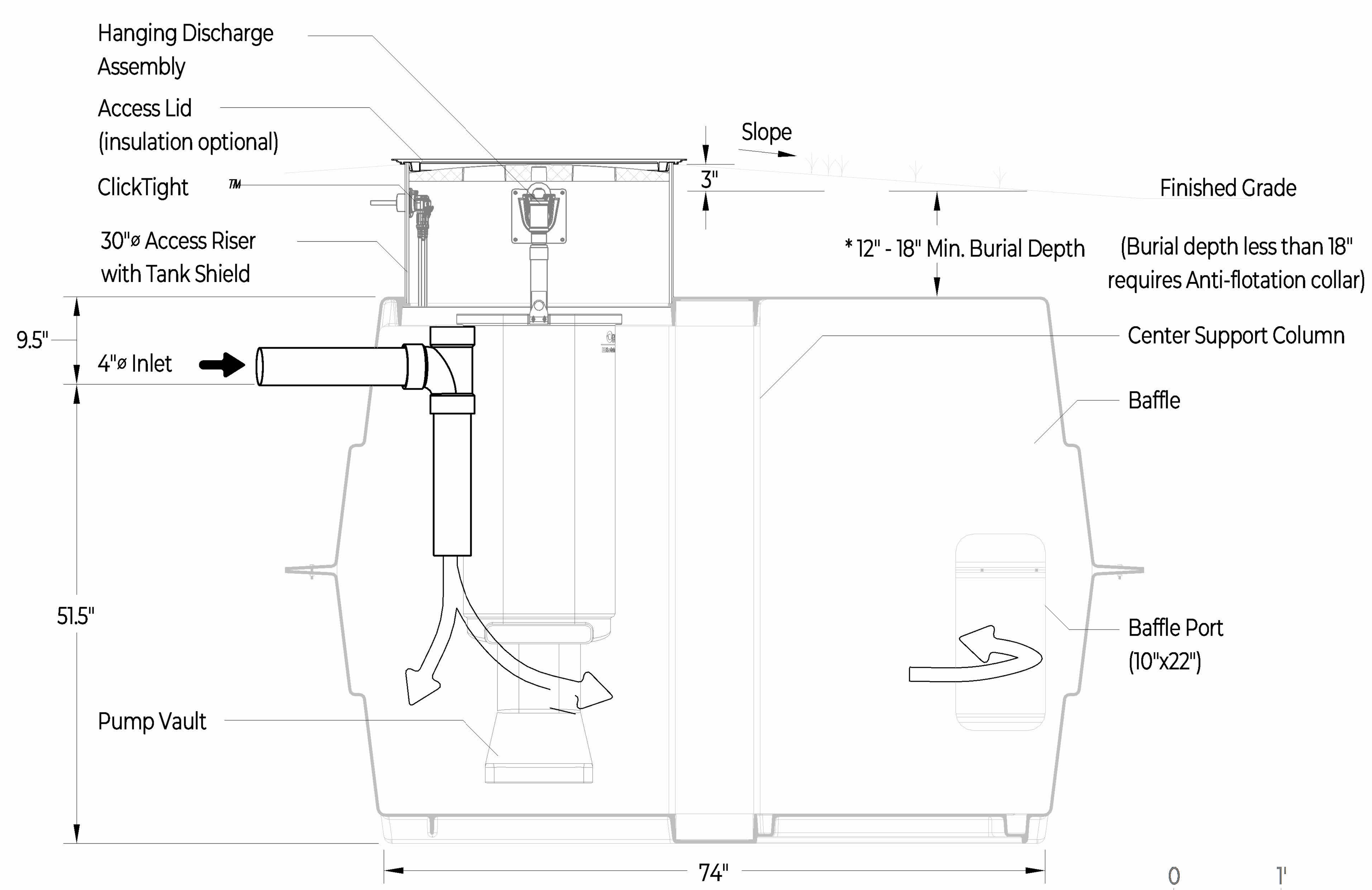
M1000 Tank Top Detail

TANK NOTES:

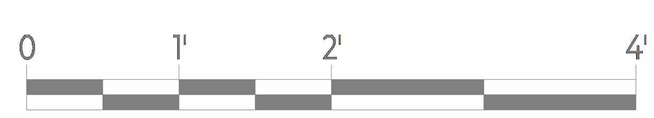
TANK VOLUMES: Total Volume: 1220 gal±
Nominal Volume: 1000 gal± @ 48"
Unit volume at typical Operating Depth : 20 gal./in.±

LOADS: Top = 500 psf minimum
Lateral Load = 62.4 pcf, EFP
Concentrated Wheel Load = 2500 lb.
The septic tank shall be capable of withstanding long-term hydrostatic loading, in addition to the soil loading, due to a water table maintained at ground surface.
Soil Bearing = 1000 psf (re-evaluate support base if soil bearing is less or unequal)

INSTALLATION: Installation, bedding, compaction, etc., shall be in "strict" compliance with the manufacturers standards and state or local rules and or guidelines. All tanks shall be set level on a minimum 4 inch thick compacted sand or approved granular bedding overlying a firm uniform base. The base shall be stable and uniform in order to ensure equal bearing across the tank bottom. Installations with 18 inches or less of ground cover may require additional buoyancy considerations as described in the manufacturers instructions. A minimum cover of 12 inches is required over the tank in areas subject to occasional light wheel loads. Refer to installation instructions
Document NIM-LOS-1.

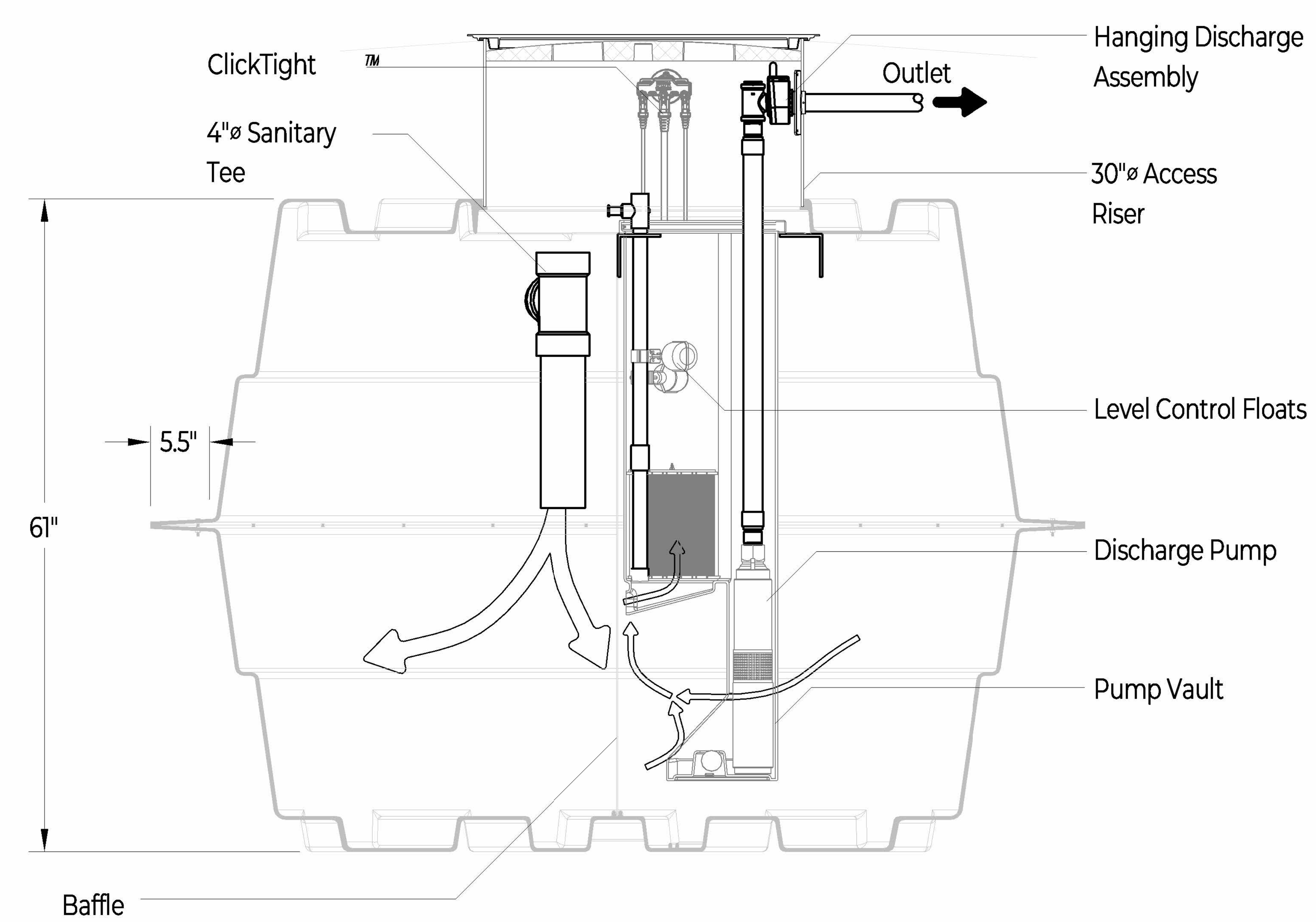


M1000 Tank Side Detail

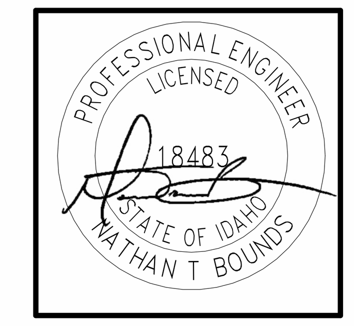


Graphic Scale

Inside Height Inches	Total Gallons
60	1217
54	1124
48	1006
42	881
36	744
30	601
24	460
18	324
12	200
6	83
0	0



M1000 Tank End Detail



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LOS OLIVOS
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PRELIMINARY DESIGN

EXAMPLE OM
LOT TANK
DETAILS

C106

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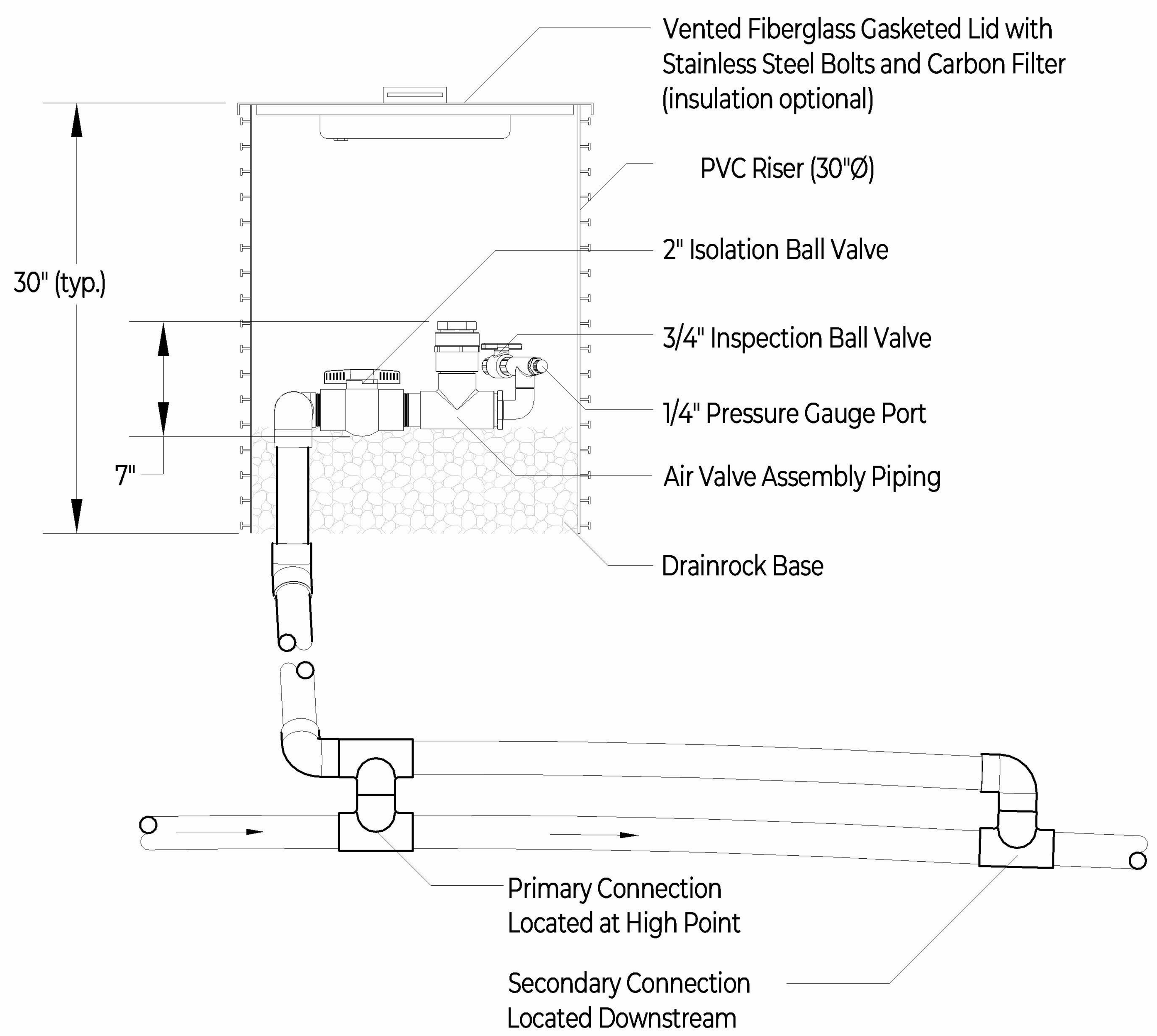
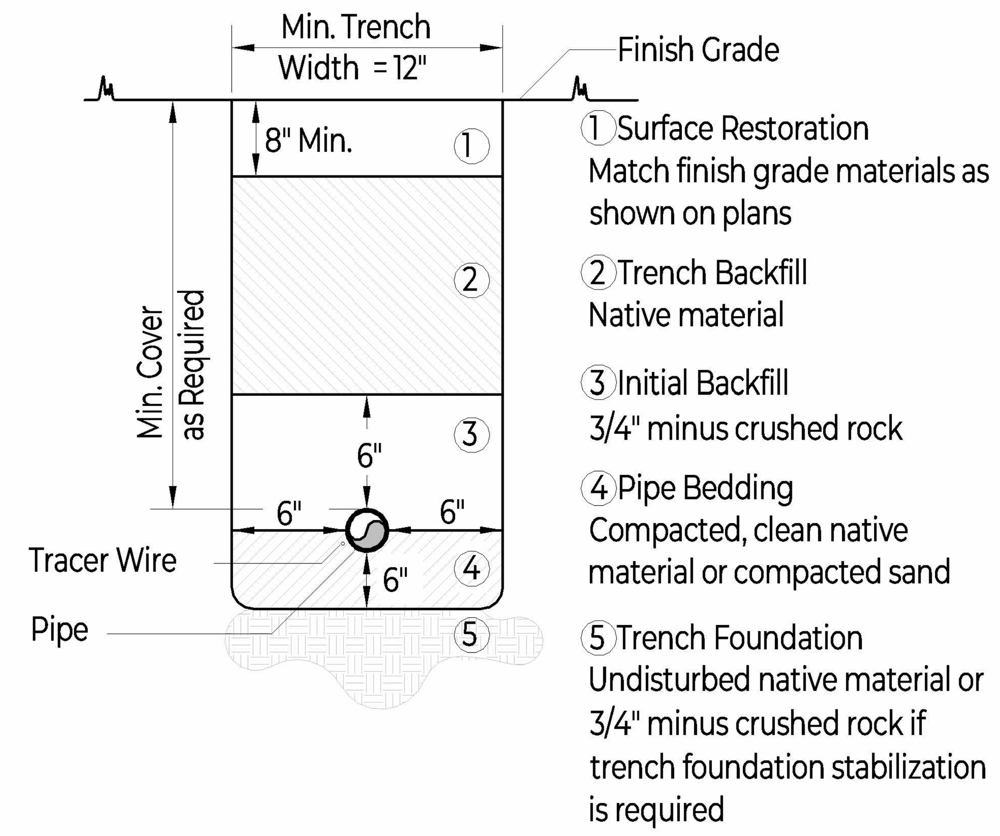


Air Valve Assembly - Manual Configuration

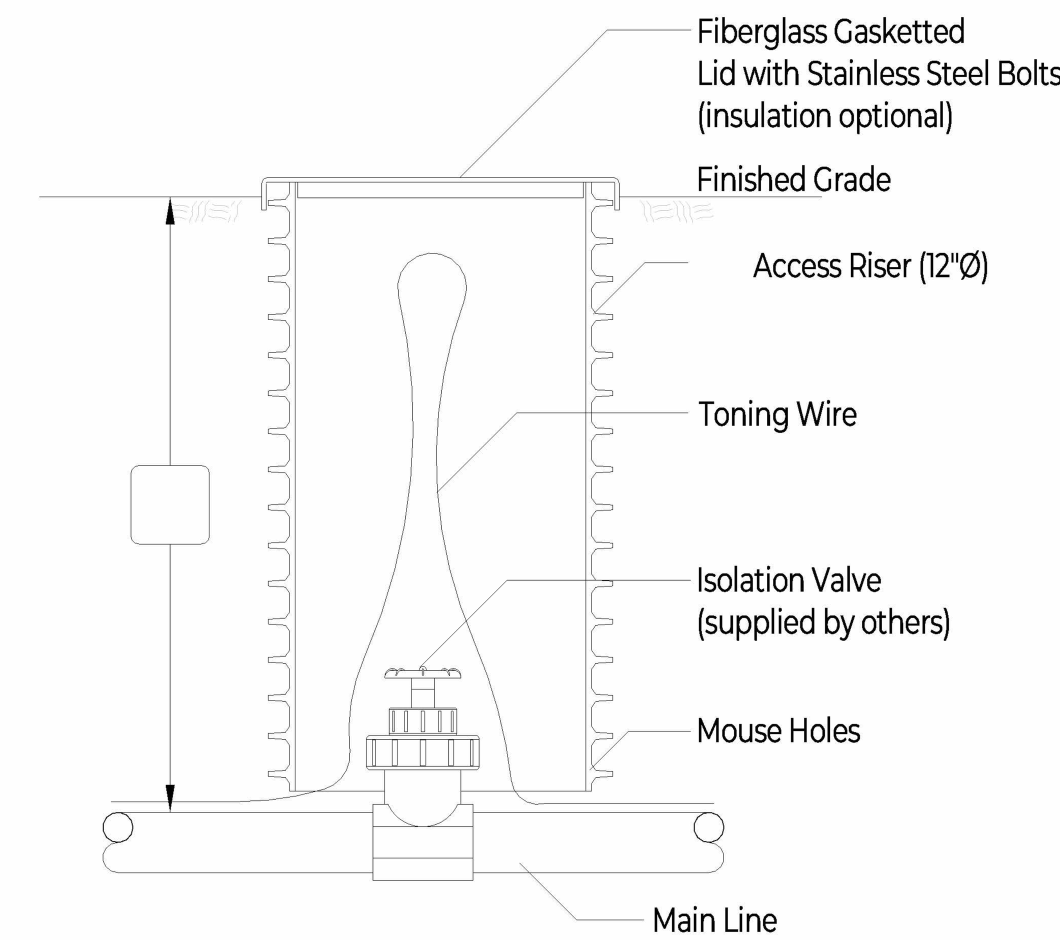


Typical Sewer Trench Details

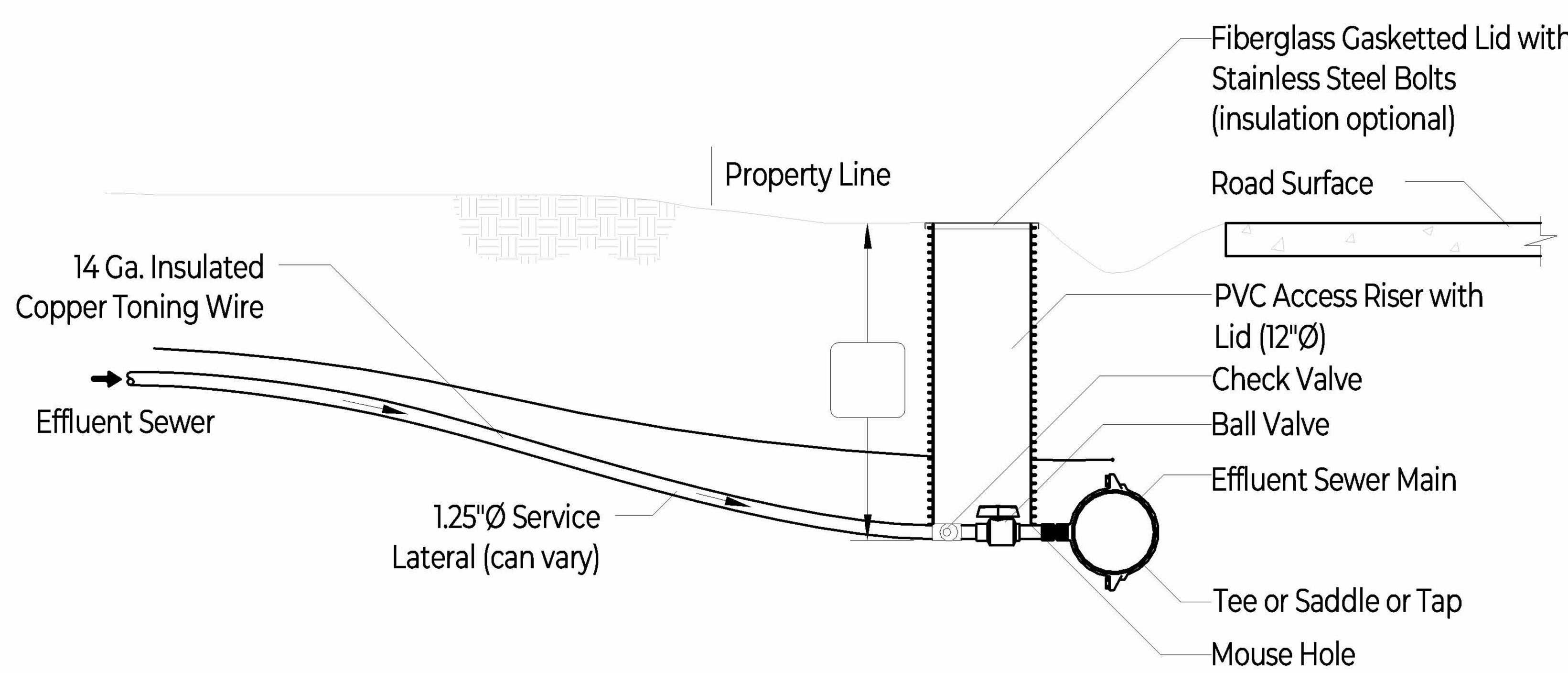
Note:
All dimensions shown are minimum and relative to outside of pipe bell.

Mainline Testing:
Allowable Loss Gal/hr/1000ft

Test Pressure	3 in	4 in	6 in
150 psi	0.23	0.37	0.55
125 psi	0.25	0.34	0.50
100 psi	0.23	0.30	0.45



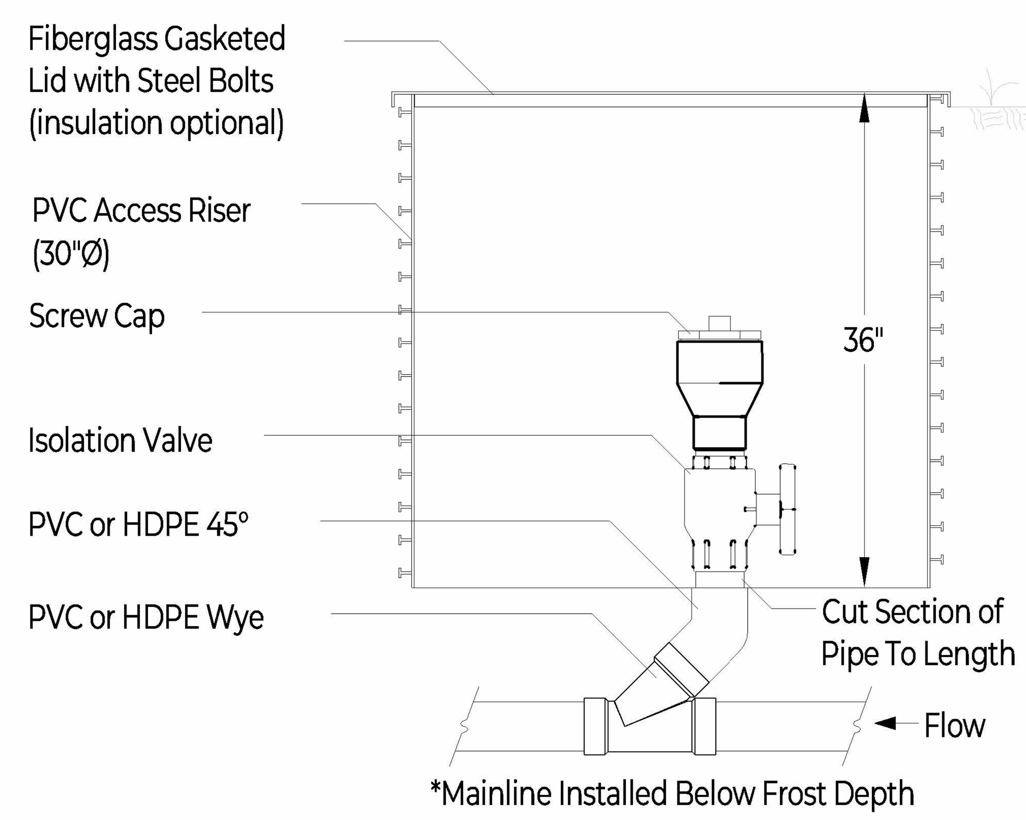
Isolation Valve Detail



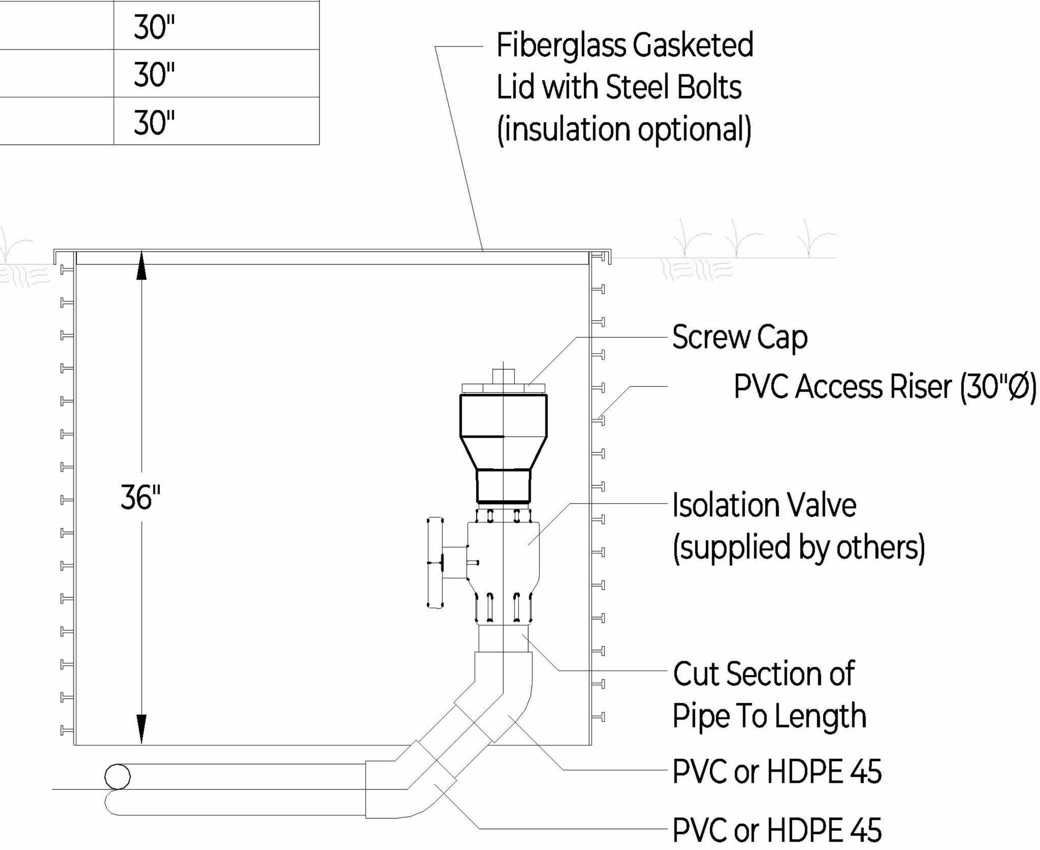
Note: All service laterals from the effluent sewer main to the property line shall be pressure tested prior to any backfilling. Typically tested with air compressor with ≈ zero loss at 60 seconds. Typically installed below frost depth. Access risers shall not be located in vehiculer traffic areas. Alternative HDPE valve box as an option for warmer climates.

Effluent Sewer Service Connection

In-Line Pig Port + Clean-Out Component Sizing			
Force Main Dia.	Screw Cap Dia.	Valve & Fittings Dia.	Access Riser & Lid Dia.
2"	3"	2"	30"
3"	4"	3"	30"
4"	6"	4"	30"
6"	8"	6"	30"



In-Line Pig Port



Clean-Out Detail

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LOS OLIVOS
30% DESIGN PLANS
LOS OLIVOS, CA

Revision		
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PRELIMINARY DESIGN

EFFLUENT SEWER DETAILS

C107

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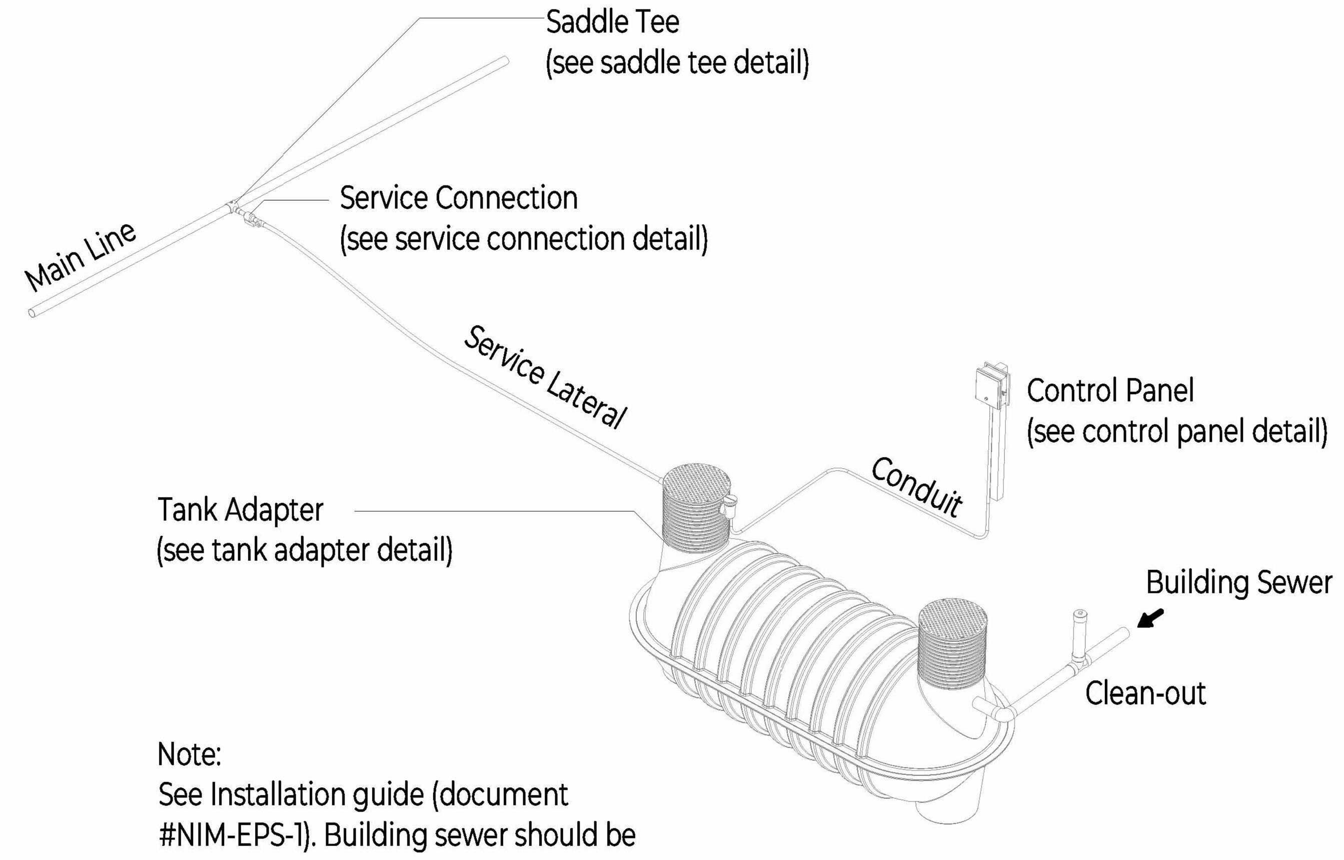
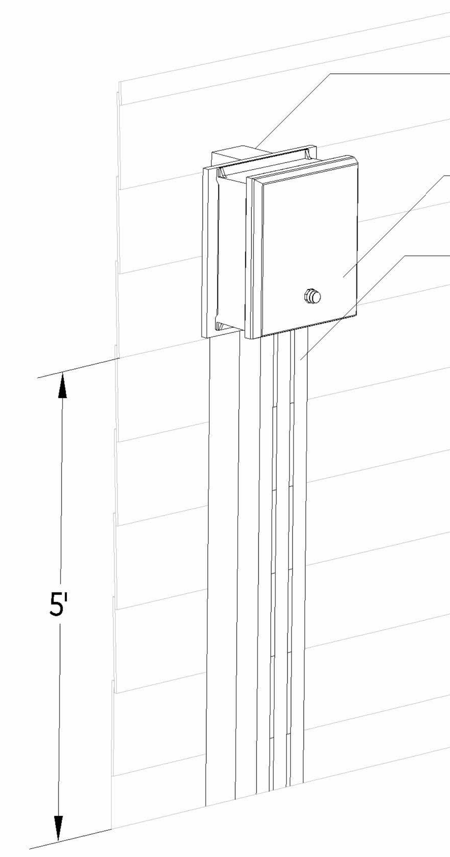


Note:
See Installation guide (document #NIM-EPS-1). Building sewer should be inspected to eliminate illegal connections & confirm pipe & fitting integrity. No storm sewer connections allowed.

Typical Effluent Sewer Detail

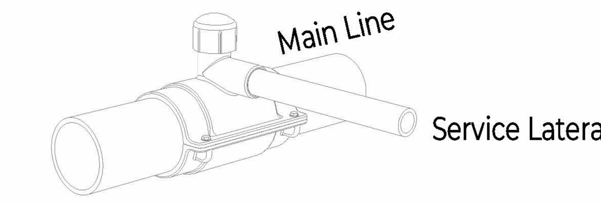


Note:
Install Close to Home and in Sight of Pump Package. For wall mount, only install on garage walls.

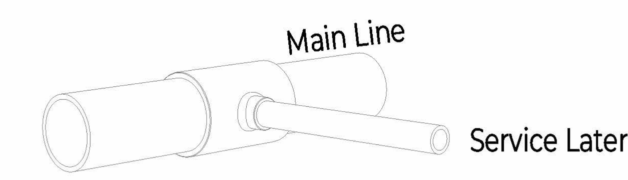
Residential	Commercial
Simplex	Duplex
S1 RO ETM CT	DAX1 ETM CT
11.5" High	15.5" High
9.3" Wide	13.3" Wide
5.4" Deep	6.7" Deep

Control Panel Detail

(Wall or 4x4 Post Mount)



Hot Tap Saddle Detail



Tee Saddle Detail

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LOS OLIVOS
30% DESIGN PLANS
LOS OLIVOS, CA

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PRELIMINARY DESIGN

EFFLUENT SEWER DETAILS

C108

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APPENDIX B – Options Cost Breakdown

Los Olivos Wastewater Collection Option A - Gravity Collection Zone 1 & 2, Effluent Sewer Zones 3-6

Item	Description	Unit	Quantity	Unit Price	Total Cost	Responsible Lead	Notes
Overhead and Construction Support							
1	Mobilization, Demobilization, Road Permits, Bonds, & Insurance	LS	1	$ 2,000,000	$ 2,000,000	Unknown	Stantec Report
2	Construction Survey	LS	1	$ 250,000	$ 250,000	Unknown	Stantec Report
3	Pothole Existing Utilities	LS	1	$ 250,000	$ 250,000	Unknown	Stantec Report
4	Traffic Control	LS	1	$ 330,000	$ 330,000	Unknown	Should be unnecessasary for Effluent zones with boring
	Overhead and Construction Support Services Subtotal:				**$ 2,830,000**		
Gravity Collection System Construction							
Zone 1							
5	6-inch PVC Sewer Main (<15 ft cover)	LF	8000	$ 180	$ 1,440,000	Unknown	Stantec Report
6	8-inch PVC Sewer Main (<15 ft cover)	LF	4000	$ 240	$ 960,000	Unknown	Stantec Report
7	48-inch Standard Manhole	EA	30	$ 17,500	$ 525,000	Unknown	Stantec Report
8	Service Connection	EA	149	$ 12,000	$ 1,788,000	Unknown	4 in service connection (<14 ft) @ 50', landscape repair
	Zone 1 Construction Subtotal:				$ 4,713,000		
Zone 2							
9	6-inch PVC Sewer Main (<15 ft cover)	LF	900	$ 180	$ 162,000	Unknown	Stantec Report
10	8-inch PVC Sewer Main (<15 ft cover)	LF	400	$ 240	$ 96,000	Unknown	Stantec Report
11	48-inch Standard Manhole	EA	8	$ 17,500	$ 140,000	Unknown	Stantec Report
12	48-inch Drop Manhole	EA	2	$ 20,000	$ 40,000	Unknown	Stantec Report
13	Service Connection	EA	58	$ 12,000	$ 696,000	Unknown	4 in service connection (<14 ft) @ 50', landscape repair
14	Lift Station (duplex pumps, 350 gpm each, 25 HP each, 25 ft deep, 8 ft diameter, site gate, fence, electrical, SCE meter, backup power)	LS	1	$ 600,000	$ 600,000	Unknown	Stantec Report
15	4-inch PVC Sewer Forcemain (5 ft cover, separate trench)	LF	3,000	$ 110	$ 330,000	Unknown	Stantec Report
	Zone 2 Construction Subtotal:				$ 2,064,000		
	Gravity Collection Subtotal:				**$ 6,777,000**		
Effluent Sewer Collection System Construction							
Zone 3							
16	2-inch PVC Sewer Main (<4 ft cover)	LF	1705	$ 51	$ 86,955	Unknown	Direct boring estimate (Ventura Drilling)
17	3-inch PVC Sewer Main (<4 ft cover)	LF	1290	$ 54	$ 69,660	Unknown	Direct boring estimate (Ventura Drilling)
18	4-inch VC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate (Ventura Drilling)
19	Primary Treatment Tanks	EA	46	$ 15,000	$ 690,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 3 Construction Subtotal:				$ 846,615		
Zone 4							
20	2-inch PVC Sewer Main (<4 ft cover)	LF	4133	$ 51	$ 210,783	Unknown	Direct boring estimate (Ventura Drilling)
21	3-inch PVC Sewer Main (<4 ft cover)	LF	0	$ 54	$ -	Unknown	Direct boring estimate (Ventura Drilling)
22	4-inch VC Sewer Main (<4 ft cover)	LF	900	$ 63	$ 56,700	Unknown	Direct boring estimate (Ventura Drilling)
23	Primary Treatment Tanks	EA	43	$ 15,000	$ 645,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 4 Construction Subtotal:				$ 912,483		
Zone 5							
24	2-inch PVC Sewer Main (<4 ft cover)	LF	1200	$ 51	$ 61,200	Unknown	Direct boring estimate (Ventura Drilling)
25	3-inch PVC Sewer Main (<4 ft cover)	LF	1321	$ 54	$ 71,334	Unknown	Direct boring estimate (Ventura Drilling)
26	4-inch VC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate (Ventura Drilling)
27	Primary Treatment Tanks	Each	26	$ 15,000	$ 390,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 5 Construction Subtotal:				$ 522,534		
Zone 6							
28	2-inch PVC Sewer Main (<4 ft cover)	LF	4494	$ 51	$ 229,194	Unknown	Direct boring estimate (Ventura Drilling)
29	3-inch PVC Sewer Main (<4 ft cover)	LF	2214	$ 54	$ 119,556	Unknown	Direct boring estimate (Ventura Drilling)
30	4-inch VC Sewer Main (<4 ft cover)	LF	2000	$ 63	$ 126,000	Unknown	Direct boring estimate (Ventura Drilling)
31	Primary Treatment Tanks	Each	74	$ 15,000	$ 1,110,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 6 Construction Subtotal:				$ 1,584,750		
	Effluent Collection Subtotal:				**$ 3,866,382**		
	Collection Construction Subtotal:				**$ 13,473,382**		
32	Construction Contingency (30%)				$ 4,042,015		
	Collection Construction & Contingency Total				**$ 17,515,397**		
Engineering & Construction Management							
33	Final Design Engineering & Support	LS	1	$ 2,627,309	$ 2,627,309	Unknown	Assume 15% of construction
34	Construction Management and Inspections	LS	1	$ 2,627,309	$ 2,627,309	Unknown	Assume 15% of construction
	Engineering & Construction Management Subtotal:				**$ 5,254,619**		
	Option #1 Collection System Total:				**$ 22,770,016**		
Costs to be Provided by District							
35	Legal and Administration	LS	1	$ 250,000	$ 250,000	District	Assumed
36	Property Acquisition for Lift Station	AC	0.4	$ 1,000,000	$ 400,000	District	Assume $1M/Acre, 0.4 acres assumed
37	Property Acquisition for Easements	AC	2.11	$ 1,000,000	$ 2,110,000	District	Assume $1M/Acre, placeholder to match Stantec Estimate
	District Costs Subtotal:				**$ 2,760,000**		
Option A Collection System Total Costs:					**$ 25,530,016**		

Los Olivos Wastewater Collection Option B - Effluent Sewer Zones 1-6

Item	Description	Unit	Quantity	Unit Price	Total Cost	Responsible Lead	Notes
Overhead and Construction Support							
1	Mobilization, Demobilization, Road Permits, Bonds, & Insurance	LS	1	$ 2,000,000	$ 2,000,000	Unknown	Stantec Report
2	Construction Survey	LS	1	$ 250,000	$ 250,000	Unknown	Stantec Report
3	Pothole Existing Utilities	LS	1	$ 250,000	$ 250,000	Unknown	Stantec Report
4	Traffic Control	LS	1	$ 330,000	$ 330,000	Unknown	Should be unnecessasary for Effluent zones with boring
	Overhead and Construction Support Services Subtotal:				**$ 2,830,000**		
Effluent Sewer Collection System Construction							
Zone 1							
5	2-inch PVC Sewer Main (<4 ft cover)	LF	5113	$ 51	$ 260,763	Unknown	Direct boring estimate
6	3-inch PVC Sewer Main (<4 ft cover)	LF	2989	$ 54	$ 161,406	Unknown	Direct boring estimate
7	4-inch PVC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate
8	Primary Treatment Tanks	Each	149	$ 20,000	$ 2,980,000	Unknown	Primary tank, service connection, landscape repair
	Zone 1 Construction Subtotal:				$ 3,402,169		
Zone 2							
9	2-inch PVC Sewer Main (<4 ft cover)	LF	2023	$ 51	$ 103,173	Unknown	Direct boring estimate
10	3-inch PVC Sewer Main (<4 ft cover)	LF	700	$ 54	$ 37,800	Unknown	Direct boring estimate
11	4-inch PVC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate
12	Primary Treatment Tanks	Each	58	$ 15,000	$ 870,000	Unknown	Primary tank, service connection, landscape repair
	Zone 2 Construction Subtotal:				$ 1,010,973		
Zone 3							
13	2-inch PVC Sewer Main (<4 ft cover)	LF	1705	$ 51	$ 86,955	Unknown	Direct boring estimate
14	3-inch PVC Sewer Main (<4 ft cover)	LF	1290	$ 54	$ 69,660	Unknown	Direct boring estimate
15	4-inch PVC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate
16	Primary Treatment Tanks	Each	46	$ 15,000	$ 690,000	Unknown	Primary tank, service connection, landscape repair
	Zone 3 Construction Subtotal:				$ 846,615		
Zone 4							
17	2-inch PVC Sewer Main (<4 ft cover)	LF	4133	$ 51	$ 210,783	Unknown	Direct boring estimate (Ventura Drilling)
18	3-inch PVC Sewer Main (<4 ft cover)	LF	0	$ 54	$ -	Unknown	Direct boring estimate (Ventura Drilling)
19	4-inch PVC Sewer Main (<4 ft cover)	LF	900	$ 63	$ 56,700	Unknown	Direct boring estimate (Ventura Drilling)
20	Primary Treatment Tanks	Each	43	$ 15,000	$ 645,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 4 Construction Subtotal:				$ 912,483		
Zone 5							
21	2-inch PVC Sewer Main (<4 ft cover)	LF	1200	$ 51	$ 61,200	Unknown	Direct boring estimate (Ventura Drilling)
22	3-inch PVC Sewer Main (<4 ft cover)	LF	1321	$ 54	$ 71,334	Unknown	Direct boring estimate (Ventura Drilling)
23	4-inch PVC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate (Ventura Drilling)
24	Primary Treatment Tanks	Each	26	$ 15,000	$ 390,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 5 Construction Subtotal:				$ 522,534		
Zone 6							
25	2-inch PVC Sewer Main (<4 ft cover)	LF	4494	$ 51	$ 229,194	Unknown	Direct boring estimate (Ventura Drilling)
26	3-inch PVC Sewer Main (<4 ft cover)	LF	2214	$ 54	$ 119,556	Unknown	Direct boring estimate (Ventura Drilling)
27	4-inch PVC Sewer Main (<4 ft cover)	LF	2000	$ 63	$ 126,000	Unknown	Direct boring estimate (Ventura Drilling)
28	Primary Treatment Tanks	Each	74	$ 15,000	$ 1,110,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 6 Construction Subtotal:				$ 1,584,750		
	Effluent Collection Subtotal:				**$ 8,279,524**		
	Collection Construction Subtotal:				**$ 11,109,524**		
29	Construction Contingency (30%)				$ 3,332,857		
	Collection Construction & Contingency Total				**$ 14,442,381**		
Engineering & Construction Management							
30	Final Design Engineering & Support	LS	1	$ 2,166,357	$ 2,166,357	Unknown	Assume 15% of construction
31	Construction Management and Inspections	LS	1	$ 2,166,357	$ 2,166,357	Unknown	Assume 15% of construction
	Engineering & Construction Management Subtotal:				**$ 4,332,714**		
	Option #2 Collection System Total:				**$ 18,775,096**		
Costs to be Provided by District							
32	Legal and Administration	LS	1	$ 250,000	$ 250,000	District	Assume
33	Property Acquisition for Lift Station	AC	0	$ -	$ -	District	Assume $1M/Acre, Not needed with option #2
34	Property Acquisition for Easements	AC	2.11	$ 1,000,000	$ 2,110,000	District	Assume $1M/Acre, placeholder to match Stantec Estimate
	District Costs Subtotal:				**$ 2,360,000**		
Option B Collection System Total Costs:					**$ 21,135,096**		

Los Olivos Wastewater Collection Option C - Gravity Collection Zone 1 & 2, Effluent Sewer Zones 3-5, Alt Onsite Zone 6

Item	Description	Unit	Quantity	Unit Price	Total Cost	Responsible Lead	Notes
Overhead and Construction Support							
1	Mobilization, Demobilization, Road Permits, Bonds, & Insurance	LS	1	$ 2,000,000	$ 2,000,000	Unknown	Stantec Report
2	Construction Survey	LS	1	$ 250,000	$ 250,000	Unknown	Stantec Report
3	Pothole Existing Utilities	LS	1	$ 250,000	$ 250,000	Unknown	Stantec Report
4	Traffic Control	LS	1	$ 330,000	$ 330,000	Unknown	Should be unnecessasary for Effluent zones with boring
	Overhead and Construction Support Services Subtotal:				**$ 2,830,000**		
Gravity Collection System Construction							
Zone 1							
5	6-inch PVC Sewer Main (<15 ft cover)	LF	8000	$ 180	$ 1,440,000	Unknown	Stantec Report
6	8-inch PVC Sewer Main (<15 ft cover)	LF	4000	$ 240	$ 960,000	Unknown	Stantec Report
7	48-inch Standard Manhole	EA	30	$ 17,500	$ 525,000	Unknown	Stantec Report
8	Service Connection	EA	149	$ 12,000	$ 1,788,000	Unknown	4 in service connection (<14 ft) @ 50', landscape repair
	Zone 1 Construction Subtotal:				$ 4,713,000		
Zone 2							
9	6-inch PVC Sewer Main (<15 ft cover)	LF	900	$ 180	$ 162,000	Unknown	Stantec Report
10	8-inch PVC Sewer Main (<15 ft cover)	LF	400	$ 240	$ 96,000	Unknown	Stantec Report
11	48-inch Standard Manhole	EA	8	$ 17,500	$ 140,000	Unknown	Stantec Report
12	48-inch Drop Manhole	EA	2	$ 20,000	$ 40,000	Unknown	Stantec Report
13	Service Connection	EA	58	$ 12,000	$ 696,000	Unknown	4 in service connection (<14 ft) @ 50', landscape repair
14	Lift Station (duplex pumps, 350 gpm each, 25 HP each, 25 ft deep, 8 ft diameter, site gate, fence, electrical, SCE meter, backup power)	LS	1	$ 600,000	$ 600,000	Unknown	Stantec Report
15	4-inch PVC Sewer Forcemain (5 ft cover, separate trench)	LF	3,000	$ 110	$ 330,000	Unknown	Stantec Report
	Zone 2 Construction Subtotal:				$ 2,064,000		
	Gravity Collection Subtotal:				**$ 6,777,000**		
Effluent Sewer Collection System Construction							
Zone 3							
16	2-inch PVC Sewer Main (<4 ft cover)	LF	1705	$ 51	$ 86,955	Unknown	Direct boring estimate (Ventura Drilling)
17	3-inch PVC Sewer Main (<4 ft cover)	LF	1290	$ 54	$ 69,660	Unknown	Direct boring estimate (Ventura Drilling)
18	4-inch VC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate (Ventura Drilling)
19	Primary Treatment Tanks	Each	46	$ 15,000	$ 690,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 3 Construction Subtotal:				$ 846,615		
Zone 4							
20	2-inch PVC Sewer Main (<4 ft cover)	LF	4133	$ 51	$ 210,783	Unknown	Direct boring estimate (Ventura Drilling)
21	3-inch PVC Sewer Main (<4 ft cover)	LF	0	$ 54	$ -	Unknown	Direct boring estimate (Ventura Drilling)
22	4-inch VC Sewer Main (<4 ft cover)	LF	900	$ 63	$ 56,700	Unknown	Direct boring estimate (Ventura Drilling)
23	Primary Treatment Tanks	Each	43	$ 15,000	$ 645,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 4 Construction Subtotal:				$ 912,483		
Zone 5							
24	2-inch PVC Sewer Main (<4 ft cover)	LF	1200	$ 51	$ 61,200	Unknown	Direct boring estimate (Ventura Drilling)
25	3-inch PVC Sewer Main (<4 ft cover)	LF	1321	$ 54	$ 71,334	Unknown	Direct boring estimate (Ventura Drilling)
26	4-inch VC Sewer Main (<4 ft cover)	LF	2000	$ 63	$ 126,000	Unknown	Direct boring estimate (Ventura Drilling)
27	Primary Treatment Tanks	Each	26	$ 15,000	$ 390,000	Unknown	Primary tank, service connection, repair (Biosolutions)
	Zone 5 Construction Subtotal:				$ 648,534		
	Effluent Collection Subtotal:				**$ 2,407,632**		
	Collection Construction Subtotal:				**$ 12,014,632**		
28	Construction Contingency (30%)				$ 3,604,390		
	Collection Construction & Contingency Total				**$ 15,619,022**		
Zone 6							
29	Individual Advanced Onsite Systems	LF	74	$ 70,000	$ 5,180,000	Unknown	Assumed TN requirement of 20 mg/L
	Zone 6 Construction Subtotal:				$ 5,180,000		
	Advanced Onsite Systems Subtotal:				**$ 5,180,000**		
30	Construction Contingency (30%)				$ 1,554,000		
	Advanced Onsite Collection Construction Total				**$ 6,734,000**		
Engineering & Construction Management							
30	Final Design Engineering & Support	LS	1	$ 2,342,853	$ 2,342,853	Unknown	Assume 15% of construction (Advanced Onsite Not Included)
31	Construction Management and Inspections	LS	1	$ 2,342,853	$ 2,342,853	Unknown	Assume 15% of construction (Advanced Onsite Not Included)
	Engineering & Construction Management Subtotal:				**$ 4,685,706**		
	Option #3 Collection & Advanced Onsite System Total:				**$ 27,038,728**		
Costs to be Provided by District							
32	Legal and Administration	LS	1	$ 250,000	$ 250,000	District	Assumed
33	Property Acquisition for Lift Station	AC	0.4	$ 1,000,000	$ 400,000	District	Assume $1M/Acre, 0.4 acres assumed
34	Property Acquisition for Easements	AC	2.11	$ 1,000,000	$ 2,110,000	District	Assume $1M/Acre, placeholder to match Stantec Estimate
	District Costs Subtotal:				**$ 2,760,000**		

Option C Gravity & Effluent Collection Systems Total Costs:	**$ 23,064,728**		
Option C Collection & Advanced Onsite Systems Total Costs:	**$ 29,798,728**		

Los Olivos Wastewater Collection Option D - Effluent Sewer Zones 1-5, Alt Onsite Zone 6

Item	Description	Unit	Quantity	Unit Price	Total Cost	Responsible Lead	Notes
Overhead and Construction Support							
1	Mobilization, Demobilization, Road Permits, Bonds, & Insurance	LS	1	$ 2,000,000	$ 2,000,000	Unknown	Stantec Report
2	Construction Survey	LS	1	$ 250,000	$ 250,000	Unknown	Stantec Report
3	Pothole Existing Utilities	LS	1	$ 250,000	$ 250,000	Unknown	Stantec Report
4	Traffic Control	LS	1	$ 330,000	$ 330,000	Unknown	Should be unnecessasary for Effluent zones with boring
				Overhead and Construction Support Services Subtotal:	**$ 2,830,000**		
Effluent Sewer Collection System Construction							
Zone 1							
5	2-inch PVC Sewer Main (<4 ft cover)	LF	5113	$ 51	$ 260,763	Unknown	Direct boring estimate
6	3-inch PVC Sewer Main (<4 ft cover)	LF	2989	$ 54	$ 161,406	Unknown	Direct boring estimate
7	4-inch VC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate
8	Primary Treatment Tanks	Each	149	$ 20,000	$ 2,980,000	Unknown	Primary tank, service connection, landscape repair
				Zone 1 Construction Subtotal:	$ 3,402,169		
Zone 2							
9	2-inch PVC Sewer Main (<4 ft cover)	LF	2023	$ 51	$ 103,173	Unknown	Direct boring estimate
10	3-inch PVC Sewer Main (<4 ft cover)	LF	700	$ 54	$ 37,800	Unknown	Direct boring estimate
11	4-inch VC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate
12	Primary Treatment Tanks	Each	58	$ 15,000	$ 870,000	Unknown	Primary tank, service connection, landscape repair
				Zone 2 Construction Subtotal:	$ 1,010,973		
Zone 3							
13	2-inch PVC Sewer Main (<4 ft cover)	LF	1705	$ 51	$ 86,955	Unknown	Direct boring estimate
14	3-inch PVC Sewer Main (<4 ft cover)	LF	1290	$ 54	$ 69,660	Unknown	Direct boring estimate
15	4-inch VC Sewer Main (<4 ft cover)	LF	0	$ 63	$ -	Unknown	Direct boring estimate
16	Primary Treatment Tanks	Each	46	$ 15,000	$ 690,000	Unknown	Primary tank, service connection, landscape repair
				Zone 3 Construction Subtotal:	$ 846,615		
Zone 4							
17	2-inch PVC Sewer Main (<4 ft cover)	LF	4133	$ 51	$ 210,783	Unknown	Direct boring estimate
18	3-inch PVC Sewer Main (<4 ft cover)	LF	0	$ 54	$ -	Unknown	Direct boring estimate
19	4-inch VC Sewer Main (<4 ft cover)	LF	900	$ 63	$ 56,700	Unknown	Direct boring estimate
20	Primary Treatment Tanks	Each	43	$ 15,000	$ 645,000	Unknown	Primary tank, service connection, landscape repair
				Zone 4 Construction Subtotal:	$ 912,483		
Zone 5							
21	2-inch PVC Sewer Main (<4 ft cover)	LF	1200	$ 51	$ 61,200	Unknown	Direct boring estimate
22	3-inch PVC Sewer Main (<4 ft cover)	LF	1321	$ 54	$ 71,334	Unknown	Direct boring estimate
23	4-inch VC Sewer Main (<4 ft cover)	LF	2000	$ 63	$ 126,000	Unknown	Direct boring estimate
24	Primary Treatment Tanks	Each	26	$ 15,000	$ 390,000	Unknown	Primary tank, service connection, landscape repair
				Zone 5 Construction Subtotal:	$ 648,534		
				Effluent Collection Subtotal:	**$ 6,820,774**		
				Collection Construction Subtotal:	**$ 9,650,774**		
25	Construction Contingency (30%)				$ 2,895,232		
				Collection Construction & Contingency Total	**$ 12,546,006**		
Zone 6							
26	Individual Advanced Onsite Systems	LF	74	$ 70,000	$ 5,180,000	Unknown	Assumed TN requirement of 20 mg/L
				Zone 6 Construction Subtotal:	$ 5,180,000		
				Advanced Onsite Systems Subtotal:	**$ 5,180,000**		
27	Construction Contingency (30%)				$ 1,554,000		
				Advanced Onsite Construction Total	**$ 6,734,000**		
Engineering & Construction Management							
28	Final Design Engineering & Support	LS	1	$ 1,881,901	$ 1,881,901	Unknown	Assume 15% of construction (Advanced Onsite Not Included)
29	Construction Management and Inspections	LS	1	$ 1,881,901	$ 1,881,901	Unknown	Assume 15% of construction (Advanced Onsite Not Included)
				Engineering & Construction Management Subtotal:	**$ 3,763,802**		
				Option #4 Collection & Advanced Onsite System Total:	**$ 23,043,808**		
Costs to be Provided by District							
30	Legal and Administration	LS	1	$ 250,000	$ 250,000	District	Assumed
31	Property Acquisition for Lift Station	AC	0.4	$ -	$ -	District	Assume $1M/Acre, Not needed option #4
32	Property Acquisition for Easements	AC	2.11	$ 1,000,000	$ 2,110,000	District	Assume $1M/Acre, placeholder to match Stantec Estimate
				District Costs Subtotal:	**$ 2,360,000**		
Option D Effluent Sewer Collection Total Costs:					**$ 18,669,808**		
Option D Effluent Sewer Collection & Advanced Onsite Total Costs:					**$ 25,403,808**		